SOCIAL WATER SCARCITY AND WATER USE

Report to the
Water Research Commission

by

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EXECUTIVE SUMMARY

A working definition by this report is that 'social' scarcity of water refers to a social construct of 'resource management', which is determined by political, economic and social power dynamics underpinning the institutions that provide structure to social relations, security of access to bases of social power and productive wealth, and stability to the social organization of human societies. Since secure access to water is an integral part of people's multi-faceted livelihoods, manifestations of social water scarcity become most evident at the micro-levels of social organization namely, communities and households at the local level. People at these micro-levels often perceive social water scarcity to be inadequacy of the quality and quantity of available water to meet their multiple-use requirements, which affects their capabilities to secure and enhance existing livelihood asset 'portfolios' against vulnerability to risks and hazards within their given contexts. As such, narratives over social water scarcity often allude to people's unmet expectations for water services, on the one hand, and 'wasteful' water use, on the other hand. By contrast, narratives over social water security are often closely linked to narratives over livelihood sustainability. Such narratives are imbued with power dynamics underlying discourses over meanings and the structure of institutions governing social relations in organized society.

The report surmises that local people are often aware of these power dynamics and therefore see social water scarcity as largely an end-product of dominance by the more powerful political, economic and social interests. The latter tend to define and dominate discourses over meaning, the structure of resource allocation and relations between themselves and water services institutions and institutional actors. Where such meanings, institutions and relations are perceived to be sub-optimal, local communities and households will exercise their agency to adopt a range of livelihood strategies to safeguard themselves against vulnerability to risks. They mobilize their individual and collective livelihood assets such as financial resources, human labour, social networks and socio-political platforms, to cope with water insecurity and/or to engage with institutions on the need for change. Outcomes of these coping and engagement strategies depend on, on one hand, capabilities entitlements and claim-making power of affected communities and households. On the other hand, such outcomes also depend on the 'legitimacy', 'accountability', 'effectiveness', 'preparedness' and 'robustness' of water services institutions.

Chapter 2 presents a review of literature on water scarcity as well as linkages between multiple-use of water and water services planning. Particular attention is given to social dimensions of water scarcity and 'water security'. Multiple-use of water is seen as resonant with people's multi-faceted livelihoods. 'Institutions' are seen as a critical aspect of social water scarcity and water use at local community and household levels and, in essence, a key determinant of whether or not water security is attained at these levels.

Chapter 3 presents a review of literature on the dynamics between water scarcity and socio-political stability. In light of a "paucity of theory" in the water sector to explain and predict

the critical elements of social stability (Turton & Ohlsson, 1999), the review attempts to strengthen the rigour of analysis by cross-referencing South Africa-specific empirical and anecdotal evidence with theoretical works put forward by social and political scientists, such as Gurr (1970 in Gurr, 1985), Tilly (1977 in Gurr, 1985), Diener (1994), Deicbmann & Lall (2003) and Blanchflower & Oswald (2003). Ground-breaking theory-building efforts by South African scholarly works (Turton & Ohlsson, 1999; Ohlsson & Turton, 1999; Turton & Meissner, 2002; Turton, 2008) are also critiqued.

The review finds that although the post-apartheid South African government has broadened access to water services by historically disadvantaged individuals (HDIs), many people living in informal urban and rural parts of the country still lack adequate and safe drinking water. Inequitable access to water has since 2004 become juxtaposed with an exponential increase in social protests. However, understandings on the extent to which water services issues contribute to protest action remain limited. Evidence also reveals a more complex interplay of causal factors, which at times contradicts the water "service delivery hypothesis". The exponential increase in 2009 in the frequency of violent protests has raised questions over implications of rampant protest action on national socio-political stability. However, the extent to which protests indicate a trend towards socio-political instability remains subject to debate. This report points out that social protests and socio-political stability in the South African context should be seen in light of Section 17 of the national Constitution, which states that 'everyone has the right, peacefully and unarmed, to assemble, to demonstrate, to picket and to present petitions'. Hence, although protests might appear to be an organized and consolidated expression of anger against government, they are also a manifestation of awareness by South African citizenry of the democratic right to freedom of expression.

Chapter 4 presents empirical findings on people's water sources, uses, adaptation and coping strategies, aspirations and expectations for service delivery. Such findings are cross-referenced, where possible, with findings on institutional responses vis-à-vis water services planning and implementation towards meeting people's water access and use requirements. The chapter is based primarily on rapid appraisals of case studies in selected rural and urban 'water scarce' contexts namely, Sannieshof, Khayelitsha, Cala, Mbuzini and Muyexe. Findings from all five study sites suggest that, irrespective of socio-economic status, people in local communities and households expect government to provide 'acceptable' levels of water services. Findings also confirm and strengthen literature review findings that social water scarcity is closely linked to livelihoods.

In urban informal settlements, such as those of Sannieshof in the North West Province, perception was generally that water scarcity and water use problems were largely due to institutional ineptitude, which left communities and households particularly vulnerable to risks associated with water contamination and pollution. Local responses to water insecurity, however, were mostly split along racial, socio-economic and political cleavages. By contrast, within urban informal settlements in Khayelitsha township of Cape Town, formalization and marginalization issues featured strongly in the linkage between water scarcity and societal expectations and/or aspirations for water services. A rift had developed between recently formalized property owners and neighbourhood informal dwellers, whereby the former no longer tolerated hitherto shared informal access (including "illegal" connections) to infrastructure within their property. The excluded were well-aware of

constraints to water access imposed by servitudes that applied to the land they occupied, but nonetheless were aggrieved by perceptions of relative deprivation and marginalization. Such grievances were strongly linked to expectations and aspirations by mostly newly-settled migrants from the Eastern Cape.

Findings from Khayelitsha were also that the linkage between water services and protests is largely mediated through the type of housing residents live in. The type of house – informal settlements and formal housing – is a good proxy for the level of service delivery. Formal houses tend to have internal or yard taps and toilets as well as electricity while informal settlements are generally lacking of toilets and electricity and rely on communal stand pipes for water supplies. It can be said that water scarcity, unsatisfactory delivery of services and dissatisfaction with governance all play important roles in the generation of protests in Khayelitsha. These variables interplay with other factors, such as poverty, inequality, unemployment, poor quality of life, perceptions of relative deprivation, rights-based struggles, power politics and unmet aspirations and expectations.

Beyond the centre-stage of amplified grievances, rural people of Muyexe, Mbuzini and Cala (Chapter 4) continue to devise strategies to cope with long-protracted water scarcity and insecurity. Respondents often alluded to discrepancies between gendered water use requirements and institutional responses (and/or lack thereof). Expectations for water services delivery were linked to livelihood strategies and aspirations, while perceptions of water scarcity were associated with vulnerability to various risks. However, there were variations, according to context, in perceptions of what constitutes acceptable water service levels, with communities and households in relatively arid rural tending to be more willing to accept basic 'RDP' levels of water service delivery than their urban-based counterparts. For example, in drier rural areas, such as Muyexe village in the Giyani area of Limpopo Province, awareness that access to water is below the expected minimum standards of water services delivery and below requirements for livelihood aspirations tends to be tempered by a realism that water use necessarily has to be streamlined to water availability and that government efforts to supply water need to be matched by local people's strategies for water demand management (WDM), water conservation (WC) and augmentation. By contrast, while rural areas with perceived unexploited water resources, such as Mbuzini communal area in Mpumalanga Province and Cala Rural area in the Eastern Cape, show evidence of coping and adaptive strategies, there less acceptance of persisting insufficient institutional responses to water scarcity and water use issues.

While Muyexe's water scarcity was characterized largely in terms of a combination of infrastructure inadequacy, aridity of climate and population growth, it was also clear that dissatisfaction with water governance was at the core of perceptions of deprivation. In both Mbuzini and Muyexe, social water scarcity appeared to be linked to social vulnerability and risk associated with insecure access to water for both basic human needs and livelihoods generation. Such vulnerability and risk were often linked to coping strategies adopted in the absence of effective institutional mechanisms. By contrast, rural residents of Cala Reserve continued to observe that potential natural water sources remained untapped by municipal water services planning, while villagers contend with the hazards of unreliable water supply. It *is* an outstanding social issue that rural communities and households, such as these, remain compelled to rely on raw water sources and to risk their lives to multiple hazards,

such as water-borne diseases, attacks by wild animals and injury by domestic animals, among others.

Empirical research also reveals that a major problem with the linkage of water scarcity and use at micro-level and water resources planning at meso-/macro-level relates to unresolved institutional issues. Although the Integrated Development Planning (IDP) framework is intended to ensure effective integration and coordination between various sectors and spheres of governance, this study found that in some cases water needs expressed and prioritized by communities were not similarly prioritized in terms of implementation funding. There were also discrepancies between population and water use data at meso-/macro- planning levels and ground-truthed data at micro-levels. In some case study sites, such as Sannieshof and Cala, respondents cited lack of institutional financial, technical and skilled human resource capacity as key constraints to addressing water scarcity and use issues. In Sannieshof and Mbuzini, issues of corruption, the ANC's cadre deployment policy and local cultures of political allegiance rather than 'downward accountability' emerged as major constraints. Implications therefore appeared to be that planning strategies and interventions were likely to continue missing service delivery targets unless outstanding institutional issues were resolved.

Chapter 5 presents recommendations towards a future Research Agenda to improve understandings and preparedness. A key recommendation is for further research to deepen understandings on the linkage between social protests and water services.

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ABBREVIATIONS AND ACRONYMS

ABM	Abahlali Base Mjondolo (Social Movement)
ACWR	African Centre for Water Research
ANC	African National Congress (Political Party)
APF	Anti-Privatization Forum
APF-CAWP	Anti-Privatization Forum-Coalition Against Water Privatization
ARV	Anti-retroviral
AWARD	Association for Water And Rural Development
BAU	'Business As Usual' Scenario
CALS	Centre for Applied Legal Studies
CALUSA	Cala University Students Association (Cala Reserve-based NGO)
CBD	Central Business District
CDS	Centre for Development Studies (University of the Free State)
CDW	Community Development Worker
COA	Comprehensive Options Analysis
CRDP	Comprehensive Rural Development Programme
CRI'	'Crisis Management' Scenario
CSOs	Civic Society Organization
CSR	Centre for Sociological Research (University of Johannesburg)
DA	Democratic Alliance (Political Party)
DBSA	Development Bank of Southern Africa
DCGTA	Department of Cooperative Governance and Traditional Affairs
DRDLR	Department of Rural Development and Land Reform
DSS	Decision Support System
DWA	Department for Water Affairs
DWAF	Department for Water Affairs and Forestry
EIA	Environmental Impact Assessment
ESKOM	Electricity Supply Commission
GDP	Gross Domestic Product
HDIs	Historically Disadvantaged Individuals
HIV and AIDS	Human Immuno-Virus and Acquired Immunity Deficiency Syndrome
HSRC	Human Sciences Research Council
IDASA	Institute for Democracy in South Africa
IDP	Integrated Development Plan
IDT	Independent Development Trust
IRD	Integrated Rural Development
IWRM	Integrated Water Resource Management
LVWMA	Lower Vaal Lower Management Area
MDGs	Millennium Development Goals
MIG	Municipal Infrastructure Grant
MUS	Multiple-Use Water Services
NGOs	Non-Governmental Organization
NMMDM	Ngaka Modiri Molema District Municipality (North West Province)
NTU	National Taxpayers Union
QLGHS	Quality of Life General Household Survey
RDP	Reconstruction and Development Program

RIAM	Rapid Impact Assessment Matrix
RSA	Republic of South Africa
RW	Rand Water
RWH	Rainwater Harvesting
SADC	Southern African Development Community
SANCO	South African National Civic Organization
SIBU	Sannieshof Inwoners Betalers Unie
SLF	Sustainable Livelihoods Framework
SMME	Small Medium and Micro Enterprises
StatsSA	Statistics South Africa
SUS	'Sustainable Water Use' Scenario
SWELL	Securing Water to Enhance Local Livelihoods
TLM	Tswaing Local Municipality (North West Province)
TRC	Truth and Reconciliation Commission
UN	United Nations
UNDP	United Nations Development Programme
VPUU	Violence Prevention through Urban Upgrading Programme (City of Cape Town)
WC	Water Conservation
WDM	Water Demand Management
WEAP	Water Evaluation And Planning
WMAs	Water Management Areas
WRIAM	Water Resource Issues Assessment Matrix
WSA	Water Services Authority
WSDP	Water Services Development Plan
WSNIS	Water Services National Information System (DWA)
WSP	Water Services Provider
WSSD	World Summit on Sustainable Development

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Despite remarkable achievements by the post-apartheid South African government in broadening access to water services by historically disadvantaged individuals (HDIs), many people living in urban and rural parts of the South Africa still lack access to adequate and safe drinking water. Recent updates by the United Nations on progress towards attaining Millennium Development Goals (MDGs) reveal that the target of halving the proportion of population without access to safe drinking water and sanitation (MDG 7, Target 10) is unlikely to be met unless there is rapid improvement before 2015 (Phillips et al., 2006). Since 2004, inequitable access to water in South Africa has become juxtaposed with an exponential increase in social protests mostly in urban localities. This has elicited debates around dynamics between water scarcity and socio-political instability. However, understandings on the extent to which poor access to water services contribute to protest action remain limited and evidence reveals a more complex interplay of causal factors that at times seems to contradict the water service delivery hypothesis. Although social protests currently occupy a centre stage in South African development discourses, this should not detract from the critical need to find effective mechanisms to enhance water security for all people within the country.

The WRC considered 'future scenario-based planning' as a possible approach to robustly link water services planning at meso- and macro-levels, on the one hand, to water scarcity and water use at micro-community and household levels, on the other hand. Pre-requisite to developing scenario-building approaches was a need to develop clearer understandings of meanings of the concept of 'social water scarcity' from a South African perspective, as well as the relationship between social protests and water services delivery. These prerequisites formed the basis for exploring and developing a methodological framework for future scenario-based planning by this study.

Given that the modification of existing water services planning practices inevitably has wide-ranging implications for key stakeholders, WRC conceived this project as a scoping study to identify key issues for further research and to improve preparedness and understanding. The primary objective for this project was therefore to develop a methodological framework for linking future scenario-based water services planning at meso- and macro-levels, on the one hand, to water scarcity and water use at micro-community and household levels, on the other hand. A key output of this study is a working definition of the concept of **'social' water scarcity'.**

In addressing the project aims and objectives, this report foregrounds the concept of 'social' water security rather than social protests. The rationale is that the latter are one component of a diverse basket of strategies that people adopt to secure their livelihoods against perceived risks and hazards. By themselves, therefore, social protests do not provide a sufficient basis for deepening understandings of social aspects of water scarcity and water use. The report also considers, *inter alia*, that 'socio-political stability' should be understood

in context of the South African constitution. Such clear understandings are prerequisite to the forging of long-lived co-governance relationships between micro-level water users and meso-/macro-level water services planning institutions. To begin with, the study sought therefore to develop a working definition of the concept of 'social water scarcity', which is outlined herein.

The Water Research Commission (WRC) recognized the urgent need for strategic interventions and synergies to optimize the effectiveness of existing water services planning approaches, particularly in view of uncertainties posed by drivers such as climatic change. The WRC found it necessary for research to explore ways to enhance understandings and preparedness in water services planning. Clearer understandings, from a South African perspective, of the 'social' aspects of water scarcity and water use, as well as the relationship between social protests and water services, were seen as providing a firm basis for exploring mechanisms to enhance the effectiveness planning. Towards enhancing preparedness, the WRC required research to develop mechanisms by which 'future scenario-based planning' can be used to link water services planning at meso- and macro-levels, on the one hand, to water scarcity and water use issues at micro-community and household levels, on the other hand. WRC conceived this research project as a scoping study to identify key issues for further research.

In acknowledging views of the WRC on the above research requirements, this report considers that 'water security' is at the core of the research problem. The report further sees the Sustainable Livelihoods Framework (SLF) as providing a useful construct to enhance understandings of 'social' aspects of water scarcity and water use at local community and household levels as well as develop requisite institutional approaches to planning at municipal, regional and national levels. The sustainable livelihoods perspective is extended to the examination of social protest issues. A key output of the report is a Methodological Framework to optimize understandings, preparedness and linkages between micro-community and household levels of water scarcity and use, on the one hand, and meso-/macro-levels of water services planning.

1.2 PROBLEM STATEMENT

The Social Charter for Water (Agence de l'Eau), which emerged from the Second World Water Forum held at The Hague in 2000, underscores the need to foreground social issues within efforts to achieve water security. Scholars (Ohlsson & Turton, 1999; Turton & Ohlsson, 1999) allude to the importance of a social dimension to conceptualizations of water scarcity. From an institutional interventionist perspective, Ohlsson & Turton (1999) assert that "the story of meeting the challenges of water scarcity is a social story. It is a story of societies employing different means of adapting over time, at different stages of scarcity, and in response to different perceptions of what constitutes challenges to be met…" Although such work provides a useful starting point for conceptualizing social aspects of water scarcity, the concept of 'social water scarcity' has yet to be fully understood and developed within the South African context.

Towards enhancing water security, there is a need to broaden the traditional focus on top-down planning approaches to include a focus on people, for whom access to water is critical to well-being, quality of life and livelihoods. People's water needs are integrated and are

part and parcel of their multi-faceted livelihoods (Van Koppen et al., 2006:2). People simultaneously use multiple natural and human-made sources, such as surface water bodies, wetlands, soil moisture or rooftop water, individual or communal storage facilities, irrigation canals, groundwater wells and boreholes, irrespective of whether or not they have household connections or public taps (Van Koppen, 2010). However, such multiple-use occupies a 'blind-spot' in water services planning and is therefore often at variance with the single-use design of formal public water schemes (Ibid.). The mismatch between infrastructure design and end-use practices by the rural and peri-urban poor, in particular, appears to be part of the reasons for failure by planning to meet water services delivery targets, as actual demand outstrips water supply. There is a need, however, to develop clear understandings of the social aspects of water scarcity and water use at local community household level. These is also a need develop mechanisms to optimize linkages between micro-level aspects of social water scarcity and use, on the one hand, and planning at meso- and macro-levels, on the other hand.

The research problem for this study is captured in the following questions:

- What are the linkages between water scarcity and societal expectations for water services?
- What are the dynamics between water scarcity and socio-political stability?
- With reference to the politics, economics and sociology of service delivery and development, what are the possible future scenarios around water scarcity?
- How can these scenarios be optimally linked to water services planning at municipal, provincial, national and regional level?
- What specific issues would a future research agenda address in order to improve understanding and preparedness?

1.3 AIMS AND OBJECTIVES OF THE STUDY

The study addressed five (5) aims set out by WRC. These were:

1. To develop a thorough understanding of the dynamics between water scarcity and socio-political stability;
2. To develop a thorough understanding of the linkages between water scarcity and societal expectations for water services;
3. To develop future scenarios around water scarcity in relation to the politics, economics and sociology of service delivery and development (highlighting micro community and household level aspects);
4. To link the scenarios to water services planning at municipal, provincial, national and regional level; and
5. To formulate a research agenda on specific issues that would improve understanding and preparedness.

In addressing the above aims and developing the requisite methodological framework, this report foregrounds 'social' water scarcity and water security issues rather than social protests. The rationale is that the latter, by themselves, do not provide a sufficient basis for deepening understandings of social aspects of water scarcity and water use.

From the above aims, a key objective for the study was to develop a Methodological Framework for linking future scenario-based water services planning at meso- and macro-levels, on the one hand, to water scarcity and water use at micro-community and household levels, on the other hand.

1.4 RESEARCH HYPOTHESIS

A hypothetical view by the study was that institutional responses that are designed to proactively plan for changing resource demand-and-supply scenarios and predicated upon good governance principles, sound data and clear understandings of people's multiple water uses and requirements for water services are more effective at ensuring water and livelihood security than those that are not.

1.5 RESEARCH METHODOLOGY

The study began with a review of literature on the dynamics between water scarcity and socio-political stability as well as relationships between water and livelihoods. This was followed by empirical research in selected micro-level case study sites to deepen understandings of the linkages between water scarcity and societal expectations and/or aspirations for water services. Although selection of case studies was largely aligned to prioritization criteria used by the Department of Water Affairs's (DWA) Reconciliation Studies, this project purposively focused on water-scarce localities within the broader water universes. The rationale was that such sites provided a clearer lens for examining linkages between water scarcity and societal expectations and/or aspirations for water services. Both the empirical research findings and literature review were then used to develop future scenarios around water scarcity in relation to the politics, economics and sociology of service delivery and development. Scenario development highlighted micro-community and household level aspects, and proceeded to link these scenarios to water services planning at municipal, provincial, national and regional levels (macro-/meso-levels). This was done using a methodological framework that was developed by this study and tested to gauge its effectiveness in linking micro-community and household level scenarios and macro-/meso-level planning scenarios.

The methodological framework was tested on hypothetical scenarios for one of the case study sites, using a combination of empirical findings by this study and a relevant draft DWA Reconciliation Strategy report. The test drew principally from the Sustainable Livelihoods Framework for understandings of livelihood systems, the Water Resource Issues Assessment Method (WRIAM) to evaluate water resource issues at micro-community and household levels, and Vulnerability Analysis for predictive assessments of micro-level responses to vulnerability and risk. WRIAM, in particular, enabled the assessment of specific micro-level 'water resource issues', which are easily lost in the multiplicity of issues and the volume of data accruing at higher scales of water resources planning. Since livelihoods and water resources issues at micro-level tend to be fraught with subjective perceptions, a key strength of WRIAM was that the method allowed the attribution of reasonably qualified quantitative values to more or less subjective judgments, thus enabling the prioritization of issues within micro-level water universes as part of a structured situational analysis. One of the prioritized issues was examined using Vulnerability and Risk Analysis, and attempt was

made to indicatively predict possible micro-level responses to risk under different scenarios.

1.6 CASE STUDY AREAS

Rapid appraisals of case studies were conducted in selected rural and urban 'water scarce' contexts. Urban cases included the small town of Sannieshof in the North West Province and two sites in Khayelitsha township of Cape Town. Rural case studies included Cala in the Eastern Cape, Mbuzini in Mpumalanga Province and Muyexe village of Giyani in Limpopo Province. Site selection was guided by the principle of representativity, such that sites with evidence of violent and non-violent protests and social movements were examined alongside sites that lacked such phenomena but instead demonstrated a range of individual and/or collective coping and adaptive strategies.

1.7 CHAPTER OUTLINE

Chapter Two presents a review of literature on water scarcity as well as linkages between multiple-use of water and water services planning. Particular attention is given to social dimensions of water scarcity and 'water security'. Multiple-use of water is seen as resonant with people's multi-faceted livelihoods. 'Institutions' are seen as a critical aspect of social water scarcity and water use at local community and household levels. In essence, the review seeks to develop clear understandings of the role of institutions in determining whether or not water security is attained at these levels.

Chapter Three presents a review of literature on the dynamics between water scarcity and socio-political stability. In light of observations by water scholars that there is a 'paucity' of literature on water scarcity and socio-political stability, review attempts to strengthen the rigour of analysis by cross-referencing South Africa-specific empirical and anecdotal evidence with theoretical works put forward by social and political scientists, such as Gurr (1970 in Gurr, 1985), Tilly (1977 in Gurr, 1985), Diener (1994), Deicbmann & Lall (2003) and Blanchflower & Oswald (2003). Attention is also given to ground-breaking theory-building efforts by South African scholarly works (Turton & Ohlsson, 1999; Ohlsson & Turton, 1999; Turton & Meissner, 2002; Turton, 2008). While reference to such theories accedes to Gurr's (1985) view is that the theories have some useful applications for poorer countries, this study keeps South African context-specific characteristics in perspective.

Chapter Four presents empirical findings on people's water sources, uses, adaptation and coping strategies, expectations and aspirations. Such findings are cross-referenced, where possible, with findings on institutional responses vis-à-vis water services and resource management planning and implementation towards meeting both human and de facto informal claims to rights of access to water. The chapter is based primarily on rapid appraisals of case studies in selected rural and urban 'water scarce' contexts namely, Sannieshof, Khayelitsha, Cala, Mbuzini and Muyexe. The chapter begins with an outline of the research problem, objectives, methodology and conceptual framework. This is followed by a presentation of findings on individual case studies. A synthesis and analysis of findings is then presented, followed by a discussion that compares and contrasts findings by this study with those of studies elsewhere by other institutions.

Chapter Five presents a Methodological Framework for Integrated Scenario-Based Water Services Planning. The framework provides a conceptual overview on how to the effectiveness of future scenario-based water services planning can be optimized to ensure water and livelihoods security at micro-community and household levels. A key objective of framework development is to find a possible scientific approach to linking nuanced insights on social water scarcity and water use issues at micro-community and household levels, on the one hand, to future scenario-based water services planning at municipal, regional and national levels. Such objective complements ongoing strategy development by DWA All Towns and Metropolitan Area Reconciliation Studies.

Chapter Six presents recommendations towards a future Research Agenda to improve understandings and preparedness. An overview of selected key issues emerging from study findings is given. Focus is on requisites for robust and effective water services planning on the one hand, and water security for households and communities at local levels, on the other hand. Drawing from this study's findings, planning requirements are quickly appraised and key issues for further research outlined.

CHAPTER 2: LITERATURE REVIEW: SOCIAL WATER SCARCITY AND WATER USE

2.1 INTRODUCTION

This chapter presents a review of literature on water scarcity as well as linkages between multiple-use of water and water services planning. Particular attention is given to social dimensions of water scarcity and 'water security'. Multiple-use of water is seen as resonant with people's multi-faceted livelihoods. 'Institutions' are seen as a critical aspect of social water scarcity and water use at local community and household levels. In essence, the review seeks to develop clear understandings of the role of institutions in determining whether or not water security is attained at these levels.

From a livelihoods perspective, the review attempts to unpack the pathways through which institutions, as mechanisms for social organization of human societies, intersect with issues of water scarcity and water use as local community and household levels. The Sustainable Livelihoods Framework (SLF), in particular, is found useful in structuring, firstly, this study's examination of linkages between water scarcity and societal expectations for water services (Aim 2; this chapter) and, secondly, dynamics between water scarcity and socio-political stability (Aim 1; see Chapter 3 of this report). Understandings of the relationship between institutions and local-level water security provide a basis for this study's development of a 'Methodological Framework towards an Integrated Approach to Scenario-based Water Services Planning' (Chapter 5). Such understandings also underpin the recommendations made for a future Research Agenda to improve understandings and preparedness (Chapter 6).

Towards developing this study's working definition of 'social water scarcity', however, this chapter begins by reviewing various definitions of 'water scarcity'. The review proceeds to review and use the SLF to disassemble the social dimensions of water scarcity and water use. A working definition of 'social water scarcity' is then developed, as a work-in-progress, and subsequently used in references to social dimensions of water scarcity in this report. The chapter concludes by reviewing literature on salient features of water scarcity in South Africa, as a prelude to examining the dynamics between water scarcity and socio-political stability (Chapter 3 of this report).

2.2 DEFINITION OF 'WATER SCARCITY'

Scholars have put forward varying definitions and interpretations of the concept of 'water scarcity'. Generally, water scarcity is viewed as lack of water in relation to water requirements (Falkenmark et al., 2007; Appelgren, 1998). Two forms of scarcity are often identified namely, physical (or environmental) and structural water scarcity. Physical scarcity refers to deficits in the natural availability of water and is a function of a combination of natural attributes, such as climate, hydrology, geomorphology, soils and vegetation, as well as human-induced physical modifications of these. On the other hand, structurally-induced water scarcity relates to the political-economy of resource allocation and the attendant institutional frameworks, structures and procedures for water

governance, management, use and development. Distinction is made between 'water shortage', 'water scarcity', 'water stress' and 'water security'.

According to Appelgren (1998), the term 'water shortage' is used to describe an absolute shortage where levels of available water do not meet certain defined minimum requirements. The actual quantity that determines a per capita minimum may differ from place to place. 'Water scarcity' is a more relative concept, which describes the relationship between demand or water and its availability. Such demand may vary considerably between different countries and different regions within a country. 'Water stress' is the symptomatic consequence of scarcity, which may manifest itself in a number of ways, such as increasing conflict over sectoral usage, a decline in service levels, crop failure and food insecurity. Finally, 'water security' refers to a situation of reliable and secure access to water over time. It does not equate to constant quantity of supply as much as predictability, which enables measures to be taken in times of scarcity to avoid stress.

Definitions of water scarcity are further refined by distinctions between 'blue' and 'green' water scarcity. According to Falkenmark et al. (2007), the term 'green water' is shorthand for water in the root zone of the soil that controls plant growth. Green water scarcity is induced by both environmental factors, such as aridity of climates, and human actions that limit water infiltration, such as soil compaction and impervious surfaces in urban settlements. It is the classic cause of famines. The term 'blue water' refers to freshwater associated with surface sources, such as rivers and lakes, and groundwater sources, such as aquifers. Consumptive and depletive uses of blue water contribute to scarcity. Indicators of blue water scarcity include growing competition and disputes among users, water supply collapses, crop failure in irrigated fields, the closure of river basins, higher levels of water pollution as dilution capacity decreases, and increased hydraulic infrastructure costs. In identifying 'structurally-induced social scarcity', Turton & Ohlsson (1999) add further qualification to the notion of blue water scarcity. They define this form of scarcity as a condition that exists when a social entity has both a first order resource abundance (i.e. natural availability) and a second order resource scarcity (i.e. structurally determined scarcity).

In the case of Southern Africa, water scarcity has been interpreted to be a function of three factors namely, resource depletion, population growth and structural factors (Turton, 1999; Pallett, 1997; Rudengren et al., 1997; Falkenmark & Lundqvist, 1995; Ohlsson, 1995). Within such perspectives, water scarcity has been defined in terms of the relationship between demand for water and its physical and structural availability (Appelgren, 1998). Despite the complexity of factors that influence this relationship (Appelgren, 1998), 1990s scholars (Turton & Ohlsson, 1999; Postel, 1998; Falkenmark, & Lundqvist, 1995; Gleick, 1993) have tended emphasize demographic factors namely, population and population growth relative to water availability. For example, Turton & Ohlsson (1999) define water scarcity as "a decrease in the volume of water available per capita over time" and, according to Turton & Meissner (2002), "a condition that exists when the demographically-induced demand for water exceeds the level of sustainable supply". By contrast, Elhance (1999:4) defines water scarcity as "a lack of secure, uninterrupted, and long term availability of adequate amounts of fresh water, of required quality, on a regular basis, and for multiple needs".

Emphasis on demographic factors underpinned much of the 1990s debate about possible water 'crises' and implications for regional security and conflict. With the shift of focus away from inter-state to sub-national levels, attempts at theory-building appear to have taken

cognizance of observations by scholars, such as Rudengren et al. (1997), that problems of sharing water in Southern Africa are largely unknown and unexplored and there might be a gap between "actual water scarcity and the conceived water situation". Nonetheless, messages of an impending water 'crisis' persist and have been transposed to discourses on sub-national water scarcity and socio-political stability.

Latter scholarly works distinguish between demand-driven 'apparent' scarcity, which can be measured by examining how water is withdrawn from rivers and aquifers, and population-driven 'real' scarcity, which is related to the number of people that have to share each unit of "blue" surface and ground water (Falkenmark et al., 2007). While such distinction is useful for implementing redistributive reforms in water allocation, observations that "people's water needs are integrated and are part and parcel of their multi-faceted livelihoods" (Van Koppen et al., 2006: 2) raise questions about the validity of such a clear-cut distinction, which neatly compartmentalizes water use and scarcity into two separate categories. Notwithstanding, latter works (Falkenmark et al., 2007) adopt a broader view of causes of water scarcity, which include both physical lack of water and difficulties in mobilizing more of the freshwater resources available. Such difficulties range from financial costs, infrastructure-related challenges and the size and growth of the population competing for the resource. In addition to demographic factors, climatic change and economic growth and decline are increasingly recognized as key drivers of socio-political dynamics pertaining to water scarcity.

2.3 WATER SCARCITY AND THE DISJUNCTURE BETWEEN MULTIPLE WATER USE AND WATER SERVICES PLANNING

Without detracting from the usefulness of foregoing definitions of water scarcity, this study finds Elhance's (1999:4) definition of water scarcity to be a particularly useful starting point for developing clear meanings of the concept of social water scarcity. Elhance defines water scarcity as "a lack of secure, uninterrupted, and long term availability of adequate amounts of fresh water, of required quality, on a regular basis, and for multiple needs". This view resonates with empirical evidence (Van Koppen, 2010, 2006; Maluleke et al., 2005; AWARD, 2005; Mendiguren & Mabelane, 2001) that people simultaneously use multiple natural and man-made sources, such as surface water bodies, wetlands, soil moisture or rooftop water, individual or communal storage facilities, irrigation canals, groundwater wells and boreholes, irrespective of whether or not they have household connections or public taps. However, observations have also been made that such multiple-use occupies a 'blind-spot' in water services planning (Van Koppen, 2006). The mismatch between people's multiple water use needs and planning by water services has often been cited as a key determining factor for water scarcity at local community and household levels in South Africa.

Arguments have been put forward that since water plays an integral part of people's multi-faceted livelihoods, planning interventions need to adopt a Multiple Use Systems (MUS) approach to water services (Van Koppen et al., 2006, 2010; Maluleke et al., 2005; AWARD, 2005; Mendiguren & Mabelane, 2001). The MUS approach takes people's multiple uses of water as the starting point for planning and providing integrated services to enhance livelihoods of especially the poor (Maluleke et al., 2005). The MUS approach can also ensure

that water services planning responds appropriately to people's socio-economic demands for water (Mendiguren & Mabelane, 2001).

Towards articulating the MUS approach, the Association for Water and Rural Development (AWARD) developed the Securing Water to Enhance Local Livelihoods (SWELL) methodology. SWELL provides a set of tools for participatory assessment of the role of water in people's livelihoods and the planning of water resources and water services to enhance people's livelihoods (AWARD, 2005). SWELL methodology focuses at the ward level of planning and attempts to link up with Municipal planning frameworks, such as Integrated Development Plans (IDPs) and Water Services Development Plans (WSDPs).

The development in 2006 of a *Municipal Guideline for Provision of Water for Small Scale Multiple Use Systems* by the national Department of Water Affairs and Forestry (DWAF) seems to indicate awareness by water services planning institutions of the need to shift away from a narrow focus on basic needs towards embracing people's multiple livelihood needs for water. However, views persist that the single-use design of formal public water schemes by water services planning continues to be at variance with multiple-use practices of local communities and households, particular the poor in rural and peri-urban localities (Van Koppen, 2010).

Similarly, surveys of post-2004 social protests in South Africa (see Chapter 3 of this report) reveal that mismatches between planning and people's multiple-use needs and expectations for water services are often cited alongside a complexity of service delivery issues. Specifically, studies indicate that water issues often include dissatisfaction over unmet expectations for water, perceptions of relative deprivation to water services, deprivation-induced anger among the poor in informal urban settlements and dysfunctional relationships between local communities and planning institutions (see Chapter 3 of this report). Other issues include fears that privatization of water services might lead to higher costs of water services and thereby place the affordability of water services beyond the reach of many poor households and communities.

Privatization represents an articulation of shifts by planning institutions away from state-driven water services towards decentralization of operational functions and concomitant reductions of government roles in service provision. Such institutional rationalization is underpinned by assumptions that decentralization will contribute to greater efficiency in water supply services. However, given that concerns have been voiced that privatization might lead to or entrench water insecurity for the majority of poor people, the role of planning institutions in determining the balance between equity of access to water and efficiency of operations needs to be examined.

At a conceptual level therefore, the disjuncture between people's multiple-use of water and water services planning suggests that social water scarcity can be seen as a product of 'resource management'. Resource management, according to O'Riordan (1971:19 in Mitchell, 1979), is "a process of decision making whereby resources are allocated over space and time according to the needs and desires of man, within the framework of his technological inventiveness, his political and social institutions, and his legal and administrative arrangements".

O'Riordan's emphasis on the role of institutions resonates with views by Appelgren (1998) that:

> *Water scarcity is a relative concept – it is partly a social construct in that it is determined both by the availability of water and by consumption patterns. Because of the large number of factors which influence both availability and consumption, any definition of water scarcity will vary widely from country to country and from region to region within a country…Because the concept of water scarcity is a social construct or…a matter of political and economic perception, it may be more useful to describe water scarcity as a particular mix of availability and demand at which water stress occurs, rather than an absolute per capita figure.*"

If social water scarcity can therefore be viewed as a social construct of resource management, then the prevailing disjuncture between people's multiple-use of water and water services planning needs to examined from a broader perspective than afforded by a narrow focus on societal expectations of service delivery and social protests. Such broader view goes beyond casting the disjuncture in terms of historical and prevailing socio-political economies of inequitable water resource allocation, which includes allocation of secure access to water services. A broader view also casts the disjuncture in terms of institutional frameworks, structures and networks that serve to "reduce uncertainty by establishing a stable (but not necessarily efficient) structure to human interaction" (North, 1990:6). Such institutions "operate at multiple levels of jurisdictions and are transported by various carriers, such as cultures, structures and routines" (Scott, 1995).

From the broader perspective, the Integrated Water Resources Management (IWRM) approach provides an overarching framework for examining linkages between water scarcity and water use at local community and household levels and water services planning at municipal, regional and national levels. IWRM is defined as a process that "aims to ensure the coordinated development and management of water, land and related resources by maximizing economic and social welfare without compromising the sustainability of vital ecosystems" (Global Water Partnership-GWP, 2000).

While definitions of IWRM fall short of providing clear guidelines on how to operationalize such integration, the framework places obligations upon governments to ensure that people have secure access to water for basic human needs as well 'economic and social welfare'. The latter seems to allude also to people's multiple livelihood needs for water. This implies that disconnects between multiple-use of water and water services planning need to be viewed outside of the confines of technical legal jargon within the Water Services Act of 1997. Ultimately, a key underlying principle of the Water Services Act is to ensure water security. If a disjuncture exists between peoples' multiple-use requirements for water and water services planning, and such disjuncture contributes to water insecurity within communities and households, then a re-examination of institutional frameworks and practices becomes requisite, among other interventions.

2.4 SOCIAL WATER SCARCITY AND WATER USE: LIVELIHOODS PERSPECTIVE

Studies suggest that multiple-uses of water at local communities and households reflect its integral role in people's multi-faceted 'livelihoods' (Van Koppen et al., 2006). Livelihoods have been defined in terms of the capabilities, assets and activities required for a means of living (Chambers & Conway, 1992: 7). 'Sustainable livelihoods' are those that can cope with, recover from and adapt to stresses and shocks, maintain or enhance their capabilities and assets and provide net benefits to other livelihoods locally and more widely, both at present and in the future, without undermining the natural resource base (Ibid.). The UNDP (1999: 3) defines a 'livelihood system' as a dynamic realm that integrates both the opportunities and assets available to a group of people for achieving their goals and aspirations as well as interactions with and exposure to a large range of beneficial or harmful ecological, social, economic and political influences that may help or hinder the group's capacity to make a living. Towards clear meanings and definition of social water scarcity, this study adopts the Sustainable Livelihoods Framework (SLF) (Figure 1) developed by various scholars (Scoones, 1998; Farrington et al., 1999; Carswell, 1997; McDowell & De Haan, 1997; Carney, 1998; Hussein & Nelson, 1998; Chambers & Conway, 1992).

2.4.1 BACKGROUND TO SUSTAINABLE LIVELIHOODS APPROACHES

According to Clark (2005), sustainable livelihoods approaches build upon 'basic needs' approaches, which were pioneered in 1981 by Paul Streeten et al. and 1985 by Frances Stewart. 'Basic needs' approaches came to the fore following failure by many African countries to achieve industrial development and economic growth during the Industrial Development era (Friedmann, 1992). At that time, development approaches were premised upon the notion of regional convergence and tended to assume similar paths of development for both developed and Third World countries (Daly, 1996 in Hoff, 1998). At independence many Less Developed Countries (LDCs) therefore entered the world economy with the goal of achieving industrial development and economic growth, but their export-based economies and the heavy financial debts soon militated against this aim (Chatterjee & Finger, 1994). Centrally planned, capital-intensive aid projects and integrated rural development (IRD) projects failed to alleviate poverty and resulted in environmental degradation and further erosions of rural livelihoods, food security and incomes (Darkoh, 1996). Such failure constituted a crisis that forced a re-examination of the mainstream development models in the 1970s and adoption of basic needs approaches (Friedmann, 1992).

The resurgence of interest in sustainable livelihoods in the late 1990s is attributed to rising concerns over the persistence of poverty despite interventions by governments, donors and non-governmental organizations (Farrington et al., 1999; Ellis, 2002 in Hussein, 2002). Farrington et al. (1999) further ascribe this renewed interest to increasing donor commitment to tackling poverty, which has made the search for answers on how to best address poverty more urgent. Carswell et al. (1997 in Scoones, 1998) observe that despite the widespread adoption of sustainable livelihoods approaches, "definitions of sustainable livelihoods are often unclear, inconsistent and relatively narrow" and without clarification there is a risk of simply adding to the conceptual muddle. Scoones (1998) observes that the

term ‘sustainable livelihoods’ often embraces “uneasy compromises” that are embedded within the same definition, and existing literature often gives little clarity about how contradictions are addressed and trade-offs assessed. He compares this ambiguity of definition and methodological vagueness to similar difficulties with the concept of ‘sustainable development’. Despite these difficulties, the sustainable livelihoods framework provides a useful analytical tool for examining dynamics of ‘social water scarcity’ and socio-political stability.

There are limitations associated with the framework, however, particularly with regard to issues of power and rights. Hence, the study also draws from frameworks such as Entitlement Analysis and the Capability Approach (Sen, 1981, 1984, 1999; Gasper, 1984) and Stakeholder Analysis (Overseas Development Administration – ODA, 1995; Bryson, 2003; World Bank, 1996). Within such hybrid framework of analysis, ‘institutions’ (North, 1990) and ‘social capital’ (Bourdieu, 1980; Coleman, 1988; Putnam, 2001) a central to addressing the research problem.

2.4.2 INSTITUTIONS, WATER SECURITY AND SUSTAINABLE LIVELIHOODS

From a sustainable livelihoods perspective, water security is critical to livelihood security. Secure access to water is central to livelihood generation strategies. It enables the mobilization of existing ‘natural’, ‘physical’, ‘financial’, ‘human’ and ‘social’ assets of a household or community to create wealth, ensure food security, enhance quality of life and well-being, build resilience against vulnerability and risk (Figure 1) and ensure social integration.

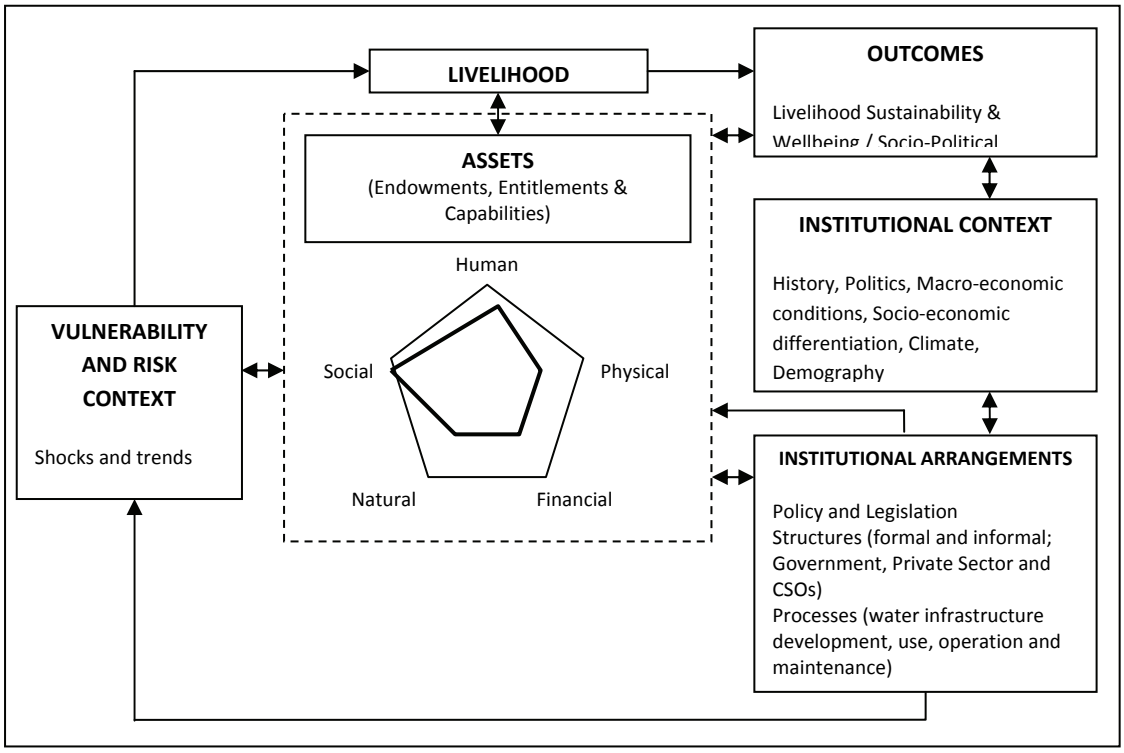


FIGURE 1 SUSTAINABLE LIVELIHOODS FRAMEWORK

Natural assets refer to resources such as land, floodplains, lakes and rivers. Physical assets include water pipelines and reticulation, housing, electricity and other types of infrastructure. Financial assets include, for example, incomes, savings and access to credit for private investments in water storage tanks or in-house taps. Human assets refer to knowledge, information, skills, labour, culture and sound health. Social assets include kinship relations, access to platforms for socio-political engagement and collective action networks for mobilizing access to water.

The social value of access to water becomes enhanced when such access is used to strengthen asset profiles of households and communities and build resilience against risks and shocks. Benefits of access to water can cascade towards further generation of tangible assets, such as income and health, and intangible assets, such as personal dignity and well-being. However, institutional contexts and institutional arrangements play a critical role in determining the asset profiles of households and communities (Figure 1).

Institutional theory defines institutions as the rules, regulations and conventions that impose constraints to human behavior to facilitate collective action (North, 1990). Institutions "provide stability and meaning to social behavior", operate at multiple levels of jurisdictions and are transported by various carriers, such as cultures, structures and routines (Scott, 1995). By providing structure and stability to social relations and access to bases of social power and productive wealth, institutions determine the endowments, entitlements and capabilities of local communities and households. Conversely, social organization of communities and households influences institutional contexts and arrangements (Figure 1), irrespective of downward accountability (or lack thereof) of institutional actors.

Effectively, therefore, 'institution' refers both to formal and informal frameworks, structures and networks. Formal institutional frameworks include policies, legislation, guidelines and regulations. From a water services planning perspective, formal institutional structures include relevant government departments at national and regional levels, WSAs such as municipalities, WSPs like Schedule One municipalities and private water utilities, and others. Institutional arrangements refer to all the above features, as well systems and procedures. At the local community and household level, formal institutional arrangements intersect with context-specific formal and informal institutions. While some of latter are rooted in long-standing traditional governance systems and cultural rules and norms, others are routinely crafted by people as they grapple with day-to-day social challenges and uncertainty. The emergence of the latter type of institutions takes place in long-lived and cohesive rural communities, which are grounded on traditional and customary rules and norms, as well as in more recently settled localities, where conglomerations of people with diverse backgrounds are compelled by circumstances to invent requisite mechanisms for structuring social behavior.

While institutions are intended to provide stability and structure, they are transported by diverse social, political and economic interests, as well as the power relations among such interests. Consequently, institutions contribute to the 'socio-economic differentiation' of individuals, households and communities. Socio-economic differentiation relates to differences in individual, household and community endowments, entitlements and capabilities regarding water and other assets within 'baskets' of livelihood strategies.

Requirements for water often vary between individuals, households and communities, due to differences in socio-economic profile, livelihood strategies and vulnerability context. However, secure access to livelihood assets, such as water for multiple livelihood requirements, is often governed by political, economic and social interests as well as power relations that underpin institutional arrangements. The more dominant of such interests tend to define the discourses over meaning and the structure of resource allocation. Since institutions operate at multiple levels of jurisdictions and are transported by various carriers, such as cultures, structures and routines (Scott, 1995), such power dynamics are found at levels ranging from household to international community.

At local community and household levels, the structure of social relations and access to livelihood resources – at both household and community level – is often gendered (Chambers & Conway, 1992). Consequently, direct and indirect costs and benefits of access to water are often inequitably distributed among women and men. Consequently, while women and girls play critical roles in water conveyance, use and protection at household and community levels, they are likely to have lower access than men and boys to bases of social power and productive wealth. Such bases contribute to enhancing benefits from secure access to water. Socio-economic differentiation means that women's experiences of constraints vary. In many rural communities and informal urban settlements, for example, benefits of women's access to water services might tend to be directed more towards reproductive and subsistence activities than towards strategic wealth-creation and decision-making. By contrast, women in more affluent and formal urban localities are less vulnerable and might therefore be better able to strategically mobilize benefits of secure access to water towards wealth-creation and a broader range of other social activities.

Since institutions operate at multiple levels of jurisdictions and are transported by various carriers, such as cultures, structures and routines (Scott, 1995), the coexistence of plural formal and formal institutions at local community and household levels has been cited as a possible reason for the observed disjuncture between people's multiple-uses of water and water services planning. Similarly, such pluralism also seems to account for the variance between policy provisions for equity and the persistence of inequalities in the distribution of access to water and associated costs and benefits.

Although water policy reforms and the Water Services Act, in particular, recognize that secure access to water for basic needs is a human right, South African space economies remain replete with historical legacies of inequitable access to water services, among other livelihood assets. Post-apartheid reforms have not only partially resolved these inequalities, but have also spawned unprecedented social challenges associated with societies in transition. For example, formal institutional responses to the mushrooming of urban informal settlements have often failed to keep pace with urban social change and many such informal settlements remain with insecure access to water. Similarly, formal institutional responses in rural areas have often fallen short of meeting newer social consumption patterns, livelihood aspirations and expectations for service delivery. The challenge of broadening access to water services for marginalized rural and urban localities is compounded by the need to maintain existing levels of service provision in better resourced areas, within a context of uncertainties due to drivers such as climatic change and economic recession.

The above discussion demonstrates that SLF enables better understandings of relationships between people and institutions, and the effects of such linkages on livelihood asset endowment, entitlement and capability in local communities and households. Where such relationships are sub-optimal, water services planning might predispose people towards vulnerability to risks and shocks, possibly leading to resilience failure, deeper poverty and/or dissolution of households and communities. For example, water insecure HIV and AIDS infected and affected households, which are a particularly vulnerable group, have been observed to progress more rapidly towards such decline and dissolution than those with secure access to water for multiple uses (Makonese, 2007). Where relationships between people and institutions are optimal and robust, water security can contribute to enhancing both the tangible assets (e.g. health, productivity, incomes and property) and intangible assets (e.g. well-being and dignity). Such gains can be used to increase existing assets, thereby strengthening coping strategies, resilience and thereby sustainability.

Where institutions do not relate optimally to household and community needs and expectations, studies show that people will often exercise their agency and devise strategies to safeguard themselves against vulnerability and risk and to ensure water and livelihood security. Such strategies might include individual and/or collective coping strategies, such as own investments in water infrastructure. Alternatively, people might adopt more confrontational strategies to deal with dissatisfaction, deprivation and perceived lack of downward accountability by institutional actors. Depending on each given set of circumstances, coping strategies might succeed or fail to generate desired livelihood outcomes. A water security approach, however, seeks to develop and strengthen optimal relationships between people and water services institutions. The SLF helps to enhance understandings on how these linkages can be improved.

2.5 'SOCIAL' WATER SCARCITY: WORKING DEFINITION

A working definition by this report is that social scarcity of water refers to a social construct of 'resource management', which is determined by political, economic and social power dynamics underpinning the institutions that provide structure to social relations, security of access to bases of social power and productive wealth, and stability to the social organization of human societies. Since secure access to water is an integral part of people's multi-faceted livelihoods, manifestations of social water scarcity become strongly manifest at the micro-levels of social organization namely, communities and households at the local level.

People at these micro-levels often perceive social water scarcity to be inadequacy of the quality and quantity of available water to meet their multiple-use requirements, which affects their capabilities to secure and enhance existing livelihood asset 'portfolios' against vulnerability to risks and hazards within their given contexts. As such, narratives over social water scarcity often allude to people's unmet expectations for water services, on the one hand, and 'wasteful' water use, on the other hand. By contrast, narratives over social water security are closely linked to narratives over livelihood sustainability.

Such narratives are imbued with power dynamics underlying discourses over meanings and the structure of institutions governing social relations in organized society. Local people are often aware of these power dynamics and therefore see social water scarcity as largely an

end-product of dominance by the more powerful political, economic and social interests, which define and dominate discourses over meaning, the structure of resource allocation and relations between themselves and water services institutions and institutional actors.

Where such meanings, institutions and relations are perceived to be sub-optimal, local communities and households will exercise their agency to adopt a range of livelihood strategies to safeguard themselves against vulnerability to risks. They mobilize their individual and collective livelihood assets, such as financial resources, human labour, social networks and socio-political platforms, to cope with water insecurity and/or to engage with institutions on the need for change. Outcomes of these coping and engagement strategies depend on, on one hand, capabilities entitlements and claim-making power of affected communities and households. On the other hand, such outcomes also depend on the 'legitimacy', 'accountability', 'effectiveness', 'preparedness' and 'robustness' of water services institutions.

Legitimacy, in resource management, derives more strongly from the extent to which water services institutions pursue the interests of local constituencies than from mere accession into governance structures by democratically-elected representatives. Accountability, from the perspective of 'good governance', refers both to upward and downward accountability. Effectiveness of institutions is closely linked to robustness, but focuses more on the outcomes of institutional responses than on the pre-emptive and ongoing adaptations. Preparedness refers to the pre-emptive possession and use of predictive and mitigatory measures to deal with risks, shocks and uncertainty. Robustness refers to institutional capacity to adapt to changing contexts by timeously adopting innovative mechanisms to strengthen the 'alignment' between water services demand and supply.

'Alignment' between water demand-and-supply is not necessarily a supply-sided relationship whereby Water Services Planning perpetually strives to meet demand while water users continually expect their demands to be met, even as water availability decreases. Alignment implies a dual-sided relationship whereby BOTH supply-side and demand-side options are reconciled, through constructive 'engagement' between, on the one hand, local communities and households and, on the other hand, planning institutions. Through dialogue, shared responsibility and collective action, both parties can work together (or "walk together", according to Dinokeng Scenarios) towards sustainable water and livelihood security. Preconditions, however, are that 'outstanding' social issues will need to be addressed alongside efforts towards co-governance of water services. For example, perceptions that municipalities, as WSAs and/or WSPs, have not lived up to expectations will need to be addressed and trust built. Also needing to be addressed are perceptions of relative deprivation, particularly by people living in urban informal settlements, for whom responsibility to adopt demand-side options might not be easy to accept. Similarly, genuine support to rural people's strategies for coping with water insecurity will need to be demonstrated. Without good governance in Water Services Planning institutions, however, trust-building efforts might not yield desired outcomes.

Optimal water services institutions are therefore those that possess a combination of all the above governance attributes, which enhance prospects of achieving the objectives of IWRM, Water Services Planning, livelihoods and social integration. Ultimately, integrated and optimal Water Services Planning contributes to the resilience and stability of social

organization. Overarching institutional frameworks, such as the National Constitution, serve as common points of reference over meanings of what stability entails and therefore define the 'social contract' between government and citizenry. In many local community and household contexts, however, the co-existence of plural institutional frameworks means that struggles over meaning often play out within the socio-political space. It is possible therefore that within such terrain, relations between local people and water services planning institutions at municipal, regional and national levels of government are determined by unresolved differences over meanings as well as the degree to which planning optimally address people's requirements for water security and livelihood sustainability.

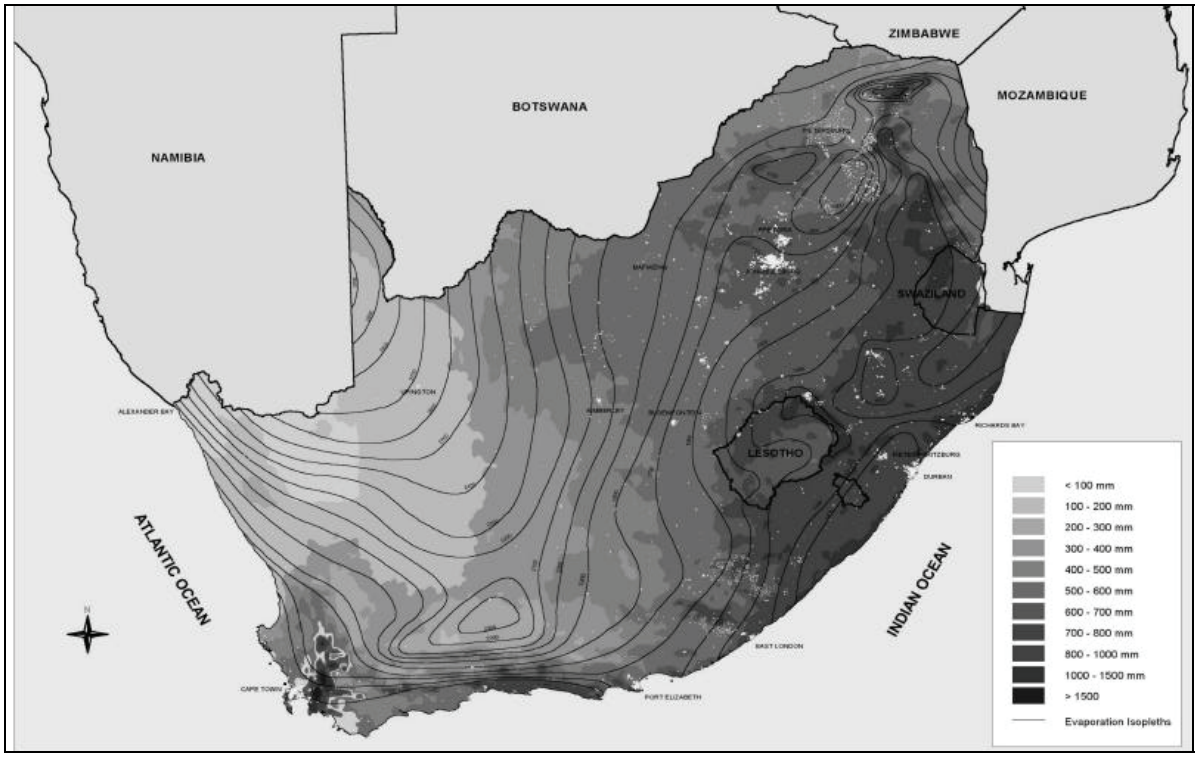
In postulating the working definition above, this study agrees, in principle, with scholars such as Ohlsson & Turton (1999) and Turton & Ohlsson (1999) about the importance of a social dimension to conceptualizations of water scarcity. The study also concedes that relationships between the state and water users are critical to determining distributions of structurally-induced social scarcity of water. However, this study's point of departure from conceptualizations by Turtonian models of social scarcity of water, which focus on the role of the state, is that the working definition outlined herein views social water scarcity from a more decentralized perspective that begins with people, who use water for multiple 'livelihood' and other needs. From that perspective, social water scarcity is examined in terms of the linkage between people and water services planning by government agencies.

2.6 SOUTH AFRICA: SALIENT CHARACTERISTICS OF PHYSICAL AND STRUCTURAL WATER SCARCITY

The water allocation system in South Africa, both in terms of water services and water resources management, largely owes its present configuration to the history of the country and, in particular, the colonial and apartheid political economies of resource allocation that prevailed mainly from 1913 to 1993. The Native Land Act of 1913, for example, designated seven per cent (7%) of land to indigenous African people, who at the time constituted approximately two-thirds (66.6%) of the population. Concomitantly, a host of other laws restricted virtually every aspect of lives of African people. Various scholars (Turton & Ohlsson, 1999; Ohlsson & Turton, 1999; Turton & Meissner, 2002; Turton, 2008) have attempted historical and social analyses of dynamics of water scarcity and socio-political stability. While such attempts represent a welcome shift towards broadening emphasis on physical and structural scarcity to include social aspects, they have not sufficiently illuminated the social realities of people who live with water scarcity. This is not unique to these scholars but emblematic of the prevalence within South African scholarship of "silent backdrops", wherein historical narratives tend to be more concerned with political organization at the more institutional level than with daily struggles of local people (Marks & Rathborne, 1982 in Reid & Lane, 2004). Towards greater clarity about social water scarcity, this review begins by presenting conventional characterizations of physical and structural water scarcity and then proceeds to draws insights from selected case studies of local people's experiences.

With a mean annual rainfall of 450 mm, which is well below the world average of 860 mm, South Africa is considered a water stressed country in global terms (DWAF, 2004; Otieno &

Ochieng, 2005). Internally, the country experiences high spatial variability of climate, ranging from desert in the west to sub humid in the east as illustrated in Figure 2. It can be seen that rainfall is South Africa is highly spatially variable. Since population density and economic activity is also spatially variable and does not follow patterns of rainfall, there exist a number of water management areas (WMAs) that have physical water scarcity while others enjoy a relative abundance of water. Although observations that over ninety per cent (90%) of South Africa's incident precipitation remains untapped seem to indicate that the country has a surplus of available water (Backeberg, 2010), eleven (11) of the nineteen (19) WMAs experience problems associated with physical water scarcity.



Source: DWAF, 2004

FIGURE 2 RAINFALL MAP OF SOUTH AFRICA

Table 1 indicates the total rainfall in each of the country's nineteen (19) WMAs, the total yield in each of them, the user requirements and the deficit (surplus) of each of the WMAs. The bulk of the country's economic activity is concentrated in Johannesburg-Pretoria conurbation, Durban and Cape Town which lie in the Crocodile (West) and Marico, Mvoti to Umzimkulu and the Berg Water Management Areas respectively. All these three WMAs cannot meet their requirements from within their boundaries and rely on inter-basin transfers, of which Johannesburg also relies on an international inter-basin transfer from the Lesotho Highlands Project, in which a series of dams on the Orange River. Although, the country currently has a surplus, it has been calculated that this will be exhausted by year 2025 leading perhaps to conflict.

TABLE 1 RAINFALL, YIELDS AND USER REQUIREMENTS IN THE 19 WATER MANAGEMENT AREAS

Water Management Area	Natural Mean Annual Rainfall (A)	Available Yield (B)	Total User Requirements (C)	Deficit (C-B)
Limpopo	986	281	322	41
Luvuvhu/Letaba	1185	310	333	23
Crocodile West and Marico	855	716	1184	468
Olifants	2040	609	967	358
Inkomati	3539	897	844	(53)
Usuthu to Umhlatuze	4780	1110	717	(393)
Thukela	3799	737	334	(403)
Upper Vaal	2423	1130	1045	(85)
Middle Vaal	888	50	369	234
Lower Vaal	181	126	643	517
Mvoti to Umzimkulu	4798	523	798	275
Mzimvubu to Keiskamma	7241	854	374	480
Upper Orange	6981	4447	968	3479
Lower Orange	502	962	1028	(66)
Fish to Tsitsikamma	2154	418	898	(480)
Gouritz	1679	275	337	(62)
Olifants/Doring	1108	335	373	(38)
Breede	2472	866	633	233
Berg	1429	505	704	199
South Africa (total)	**49040**	**13227**	**12871**	**(356)**

Information gleaned from the water requirements and availability in Table 1 indicates reliance by some WMAs on inter-basin water transfers to meet their system requirements. Although this might be seen as potentially leading to inter-basin conflicts, the National Water Act (RSA 1998) provides for the redistribution of water to mitigate unfavorable of water in space and time to achieve an equitable allocation. This is made possible by the

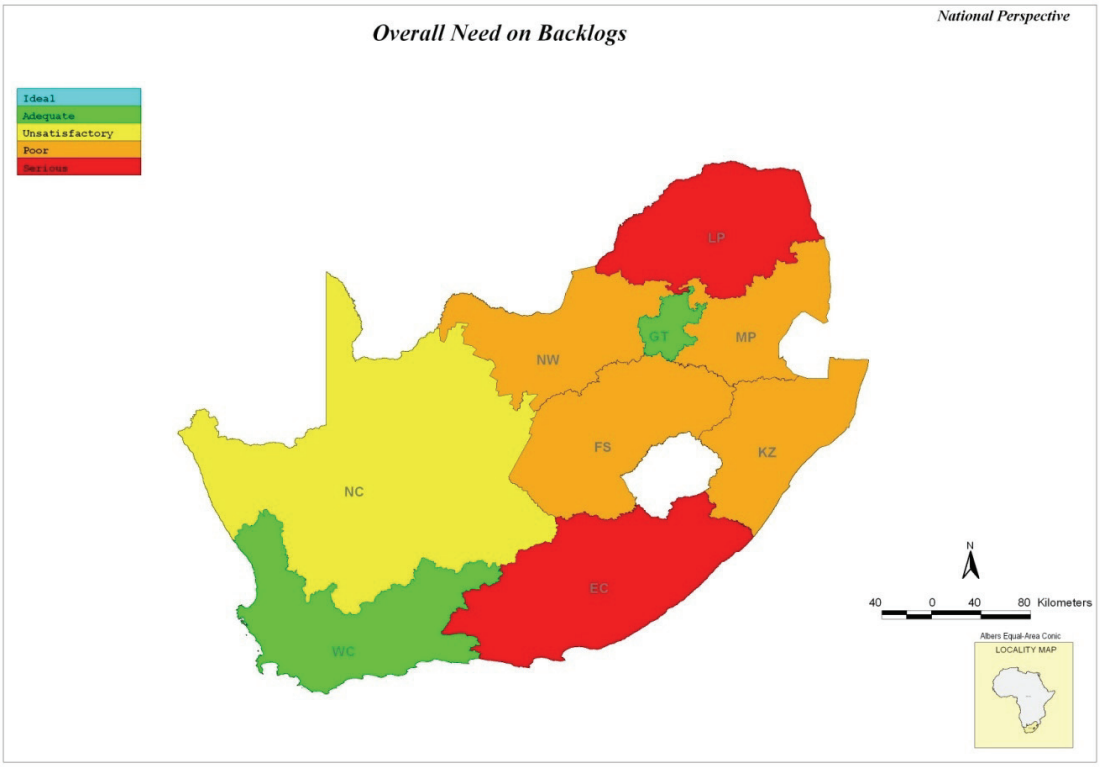
principle of water as a 'public good', which considers water to be a national resource, whose responsibility is vested in the Minister of Water Affairs (DWAF, 2004).

The water service situation, by contrast, shows dissimilarities to the physical availability of water. The two most affluent provinces namely, Gauteng and the Western Cape, face water deficits as outlined in Table 2 but are economically the most endowed, have the best developed water services that are classified as 'adequate' (Figure 3 and Table 2) and have the highest performing municipalities (Allen & Heese, 2009). While the water scarce Johannesburg-Pretoria conurbation in Gauteng Province relies heavily on inter-basin transfers to meet its requirements, the relatively better endowed Eastern Cape and Limpopo Provinces perform most poorly in terms of water services provision. This is in line with their relatively lower wealth ranking and reflects, perhaps, a relative lack of capacity to meet the water services needs, including infrastructure development. The Northern Cape, meanwhile, performs relatively better than Limpopo and Eastern Cape despite a more arid climate.

TABLE 2 WATER SUPPLY DELIVERY: QUALITY AND ACCESS

Province	Microbiological and Chemical Compliance#	Access to basic water supply*
Eastern Cape	96%	54.1%
Free State	99%	89.6%
Gauteng	99%	88.4%
Kwazulu-Natal	85%	63.9%
Limpopo	97%	56.3%
Mpumalanga	77%	72.5%
North West	0%	72.5%
Northern Cape	81%	85.6%
Western Cape	95%	92.0%
Total	94%	74.4%

 # Source: DWAF, 2009; *Source: StatsSA, 2008:54



Source: DWAF, 2009

(Internet [http://www.dwaf.gov.za/dir_ws/WSNIS/maps/overallneed_backlogs.jpg])

FIGURE 3 PROVINCIALLY DISAGGREGATED OVERALL NEED, BASED ON WATER SERVICES BACKLOGS

Table 2 and Figure 3 also show that the worst performing provinces are Limpopo, Eastern Cape, KwaZulu-Natal, Mpumalanga and the North West. These provinces contain within their boundaries former Bantustans and 'homelands'. Such areas have historically served as labour reserves, and their levels of service delivery and hydraulic infrastructure development have suffered years of underinvestment and neglect. By contrast, the Western Cape, Gauteng and the Northern Cape did not have homelands and Bantustans and their water infrastructure is relatively better. Despite this, however, it is worth noting that the overall impression of adequate service provision, particularly in the Western Cape and Gauteng, masks the more localized inequalities in access to adequate services and sufficient water. Apart from the relatively lower levels of service delivery in former black townships, such as Khayelitsha in Cape Town (Nleya, 2009) and Phiri in Soweto (Bond & Dugard, 2008), the Western Cape and Gauteng are characterized by the existence of informal settlements that served as refuges for many African people who evaded restrictive colonial and apartheid laws to settle within or on the peripheries of major urban centres. Since failure by the late 1970s of influx control legislation to stem rural-urban migration, the growth of informal settlements has not been matched by provisions of adequate water services. Levels of service delivery in informal settlements therefore often fall far below the levels reflected by average rankings.

CHAPTER 3: LITERATURE REVIEW: DYNAMICS BETWEEN WATER SCARCITY AND SOCIO-POLITICAL STABILITY

3.1 INTRODUCTION

This chapter presents a review of literature on the dynamics between water scarcity and socio-political stability. The first problem for the review is that much of the evidence on social protests is based on media reports, with a limited range of scientific analyses (Bryant, 2005). Despite this constraint, however, useful quantitative and qualitative analyses are provided by organizations such Municipal IQ, which have compiled useful data on monitoring and assessment of South African municipalities, many of who are water services authorities (WSAs) and/or water service providers (WSPs). The Dialogue Unit of the Institute for Democracy in South Africa (IDASA) also provides useful qualitative analyses of dynamics of social protests. Such sources are reviewed alongside scientific and popular literature.

A second problem for the review is that there is a "paucity of theory" in the water sector to explain and predict the critical elements of social stability (Turton & Ohlsson, 1999). There is also "a relative neglect of political analysis" in most of the literature on global resource scarcity and ecological crisis (Gurr, 1985) and no agreed typology for categorizing chronic conflict and political instability (Schafer, 2002). Despite the aforementioned constraints, the review attempts to strengthen the rigour of analysis. This is done through cross-referencing South Africa-specific empirical and anecdotal evidence with theoretical works put forward by social and political scientists, such as Gurr (1970 in Gurr, 1985), Tilly (1977 in Gurr, 1985), Diener (1994), Deicbmann & Lall (2003) and Blanchflower & Oswald (2003). Attention is also given to ground-breaking theory-building efforts by South African scholarly works (Turton & Ohlsson, 1999; Ohlsson & Turton, 1999; Turton & Meissner, 2002; Turton, 2008). However, while the latter works provide some useful insights, their applications to this study's research problem are limited. Consequently, the review draws, to a larger extent, from works by scholars outside the water sector, such as Gurr and Tilly. In drawing from theory, the review seeks to highlight both the individual perceptions of water scarcity and motivations for protest action (Gurr) as well as the processes by which challenging groups mobilize for collective action (Tilly). The review recognizes that although theories are generic constructs, in essence, some of these have been predicated upon conditions obtaining in highly industrialized countries. While reference to such theories accedes to Gurr's (1985) view is that the theories have some useful applications for poorer countries, this study keeps South African context-specific characteristics in perspective.

3.2 BACKGROUND

Notions around 'water scarcity and social stability' are rooted in the discourse about 'water and security' and 'water and conflict', which pervaded much of the 1990s debate among peace and conflict researchers, governments and the public in general. This discourse was imbued with two diametrical strands of thinking. The first postulated that water scarcity would potentially be the greatest future cause of inter-state conflict within Southern Africa (Turton & Ohlsson, 1999; Turton, 1999; Turton, 2000; Wolf, 1999; OECD, 2005; Ashton, 2000; Swain, 2000; Elhance, 1999; Pallett, 1997; Swatuk & Omari, 1997; Ohlsson, 1995). The

converse argument was that problems of sharing water provided opportunities for cooperation within the region (Elhance, 1999; Rudengren et al., 1997). Although postulations about regional 'water wars' have largely been dismissed as having often been exaggerations (Swatuk & Wirkus, 2009; Boege, 2009), an enduring legacy of the debate has been a heightened awareness of the problem of water and 'security', in the broader sense of the term (Buzan, 1997). The perceived locus of security, however, has shifted from the inter-state level to sub-state or local levels. In other words, threats to security are perceived as emanating largely from within state boundaries (Swatuk & Vale, 2000; Shaw, 1997).

A growing perception among scholars (Boege, 2009; Benjaminsen, 2008; Turton, 2004, 1999; Turton & Ohlsson, 2000; Ohlsson, 1995, 1999) is that water is and will become increasingly a source of violent conflict in sub-national or local contexts. Turton & Ohlsson (1999) concede that although the global increase in water scarcity can be expected to impact on social stability particularly within developing states, it is not known where or how water scarcity will impact of social stability. Boege (2009:31), however, asserts that:

> "*It is likely that in the future, more localized violent conflicts between different types of water users and new types of violence in the form of 'water riots' will occur…due to the impact of privatization of water infrastructure, as well as indirect structural violence that denies the masses of rural and urban poor in the South access to quality water in sufficient quantity and of sufficient quality as is necessary for a decent human life*".

3.3 SOCIAL PROTESTS IN POST-2004 SOUTH AFRICA

According to Bond & Dugard (2008), South Africa's "water apartheid" (Ibid.) came to the fore in August 2002 as a result of a defiant protest march during the World Summit on Sustainable Development (WSSD). Since then, insufficient and inequitable water and sanitation services have featured among key factors in a majority of social protests that have burgeoned in post-apartheid South Africa since 2004 (Ibid.; Atkinson, 2007, Johnston & Bernstein, 2007, Botes et al., 2007a;b; Bond & Dugard, 2008; Allen & Heese, 2009; Heese & Allen, 2009). Such protests have exponentially increased in frequency since 2009 (Allan & Heese, 2009; Gouws et al., 2009; Sinwell et al., 2009; Nleya & Thompson, forthcoming). Many of the protests have been violent while fewer have entailed non-violent resistance, such as in the case of Sannieshof (Gouws et al., 2009).

The burgeoning of services-related unrest and local protests in South Africa since 2004 seems to attest to forecasts of water scarcity-related conflict. While some of such protests have entailed non-violent resistance, such as in the case of Sannieshof (Gouws et al., 2009), many have often been violent. The exponential increase in 2009 in the number and frequency of violent protests has raised questions over implications of rampant protest action on national socio-political stability. However, the extent to which social protests constitute a threat to socio-political stability remains subject to debate (Houws, 2008). Evidence also suggests that the problem of social protests presents a more complex interplay of factors than simple chains of causal relationships (Heese & Allen, 2009).

3.4 CAUSES OF SOCIAL PROTESTS

Factors cited as contributing to social protests include poor service delivery, privatization of service delivery, marginalization of the poor and the persisting legacy of inequality in access to water. Exacerbating factors include dysfunctional relationships between citizens and government, and even among government departments (Nemeroff, 2005). Although the 'service delivery' hypothesis, which posits that service delivery problems are at the core of this tumultuous trend (Atkinson, 2007, Johnston & Bernstein, 2007, Botes et al., 2007), has gained prominence in characterizations of social protests, a number of scholars (Hart, 2008, Atkinson, 2007, Johnston & Bernstein, 2007, Botes et al., 2007) dispute this hypothesis on the basis that it fails to account for a number of other causative and influencing factors.

3.4.1 SERVICE DELIVERY HYPOTHESES

A number of hypotheses have been put forward to explain the phenomenon of social protests. The most prominent of these is the 'service delivery' hypothesis, which posits that service delivery problems are at the core of this tumultuous trend (Gouws et al., 2009; Hart, 2008; Hough, 2008; Atkinson, 2007; Johnston & Bernstein, 2007; Botes et al., 2007). Hart (2008:692), in particular, posits a particularly striking hypothesis that these fissures form part of greater struggles over the definition and meaning of liberation and freedom on the one hand and simultaneously reflect the 'expressions of betrayal—intensified and sharpened by obscene and escalating material inequalities, and the crisis of livelihood confronting many in South Africa today'. In another article, Hart (2009) argues that amid complexity of the South African local government terrain, the site for service delivery is the "impossible terrain of official efforts to manage poverty and deprivation in a racially-inflected capitalist society marked by vicious inequalities which, since 1994, have become simultaneously de- and re-racialized."

According to Huchzermeyer (2004), the neglect of conditions faced by people in former Bantustans and the proliferation of informal settlements in urban centres point to failures of the regulatory paradigm of planning. Huchzermeyer's argument is that for so long as access to land by urban poor remains regulated and release rates remain below demand levels, land occupations are inevitable, no matter what amount of draconian force and legal machinery. This is aptly demonstrated in the mushrooming of informal settlements well into the post-apartheid era, a process that is closely tied with increases in service delivery backlogs in urban centres.

The 'service delivery' hypothesis has been questioned, however, by various scholars (Hart, 2008; Atkinson, 2007; Johnston & Bernstein, 2007; Botes et al., 2007), who argue that the service delivery hypothesis has limitations when used as a sole explanatory variable for the burgeoning of social protests. Such scholars cite a number of other causative and influencing factors. In a similar vein, Heese & Allen (2009) comment that contrary to popular perceptions, Municipal IQ data suggests that protests do not necessarily take place in the poorest municipalities. Data also shows that protests do not typically take place in municipalities or wards with the worst backlogs in service delivery (Ibid.). Lack of simple correlations in the occurrence of water services related protests raises an important methodological question about whether or not such unrest can be predicted.

In an attempt to gain clarity on the validity of service delivery hypotheses and the complexity of protest issues and factors, this review conducted a rapid appraisal of empirical case studies and anecdotal evidence of social protests. Table 3 presents findings from an appraisal of twenty-seven (27) water related social protests that occurred between 2001 and 2009. Of the cases surveyed, twenty (or 74%) relate to conflicts emanating from service delivery issues, while the remainder relate to privatization of water services. Service delivery issues include:

- Gaps between expectation and the state's capacity to meet demand;
- Xenophobic attacks;
- Lack of financial and technical capacity in municipalities;
- Lack of transparency in municipalities; and
- Corruption in service delivery

Of the seven (7) cases of privatization related conflicts, the following issues emerged:

- Water as a human right, and related issues of cost recovery and water cut-offs;
- Lack of consultation; and
- Cholera outbreaks

TABLE 3 AN INDICATIVE SURVEY OF WATER-RELATED SOCIAL PROTESTS IN SOUTH AFRICA

Year	Topic	Author	Reporting Institution	Date	Reason	A/P
2001	Development in the time of cholera	Sanders & Chopra	Business day	07-Feb-01	Service delivery	Article
2003	Johannesburg water's operation Gcin'amanzi in Soweto is a fraud!	APF	APF	02-Sep-03	Privatisation	Protest
2003	Chance meeting highlights the challenges facing S.A	Battersby	Pretoria News	24-Feb-03	Service delivery	Article
2004	The battle over water in South Africa	Bond	Africa Files		Privatisation	Report
2004	Orange Farm, South Africa: the forced implementation of prepaid water meters	Public Citizens	Public Citizens	Jun-04	Privatisation	Protest
2004	HRC warns that poor quality of rural water is life threatening	Molwedi	Sunday Independant	27-Jul-04	Service delivery	Article
2005	The struggle against water privatisation in South Africa	Dale	APF/CAWP	13-Jan-05	Privatisation	Protest
2005	Treatment plant trouble residents of Klapmuts	Powell	Cape Times	22-Nov-05	Service delivery	Unrest
2005	10 year review of local government	Chipkin & Mafunisa	HSRC	2005	Service delivery	Article

2006	Soweto starts its water war	Groenewald	Mail&Guardian online	24-Jul-04	Privatisation	Protest
2007	The new struggle: service delivery-related unrest in South Africa	Botes et al.	CDS	2007	Service delivery	Report
2007	Northern Free State community to march tomorrow over water issues	Natalie	APF	18-Sep-07	Service delivery	Protest
2008	Dam dirty		Financial Mail	28-Nov-08	Service delivery	Article
2008	Water crisis ' a rights issue'					Protest
2008	So many questions	Barron	Sunday Times	30-Nov-08	Service delivery	Article
2008	Disease of corruption	Muller	Daily Dispatch	05-Dec-08	Service delivery	Article
2008	Water: fondong modern solution	Asmal	Daily Dispatch	18-Nov-08	Service delivery	Article
2009	Wave of township protests in South Africa	Brooks	AFP	21-Jul-09	Service delivery	Protest
2009	South Africa discontent spread	Fischer	BBC News	22-Jul-09	Service delivery	Protest
2009	The reasons behind service delivery protests	Burger	Institute for Security	05-Aug-09	Service delivery	Article
2009	A report on the current 'service delivery protests' in South Africa	The Research Unit, Parliament of RSA	Parliament of RSA	Aug-09	Service delivery	Report
2009	South Africa: violent protests "worrying but not surprising"		IRIN	23-Jul-09	Service delivery	Protest
2009	From revolution to rights in South Africa	Mangena	JWTC	01-Sep-09	Privatisation	Article
2009	When life-giving water becomes a death threat	Geldenhuys	SERVAMUS	01-Mar-09	Service delivery	Article
2009	Bisho's water crisis bungle		Dispatch online	23-Sep-09	Service delivery	Article
2009	Watch out	Pile	Financial Mail	27-Mar-09	Service delivery	Article
2009	Water: South warning Africa recognises access to water as a human right but this is under threat	Ashton	Cape Argus	16-Apr-09	Privatisation	Article

LEGEND

Cases where social protests are associated with water service delivery issues

Cases in which issues of privatization constituted a key factor

For further insight on the service delivery hypothesis, the study also rapidly appraised the distribution in 2009 of disputes declared by urban-based rate-payers' organizations, which were affiliated to the National Taxpayers Union (NTU), over poor municipal delivery of water and related services (Table 4). The appraisal showed that although disputes were found in all provinces of South Africa some provinces, such as the North West and Free State, showed a greater prevalence of disputes than others.

The extent to which organized mobilization, mainly by social movements and to a lesser extent by NTU, contributes to the spread of social protests has been debated. For example, it is not clear to what extent the diffusion of social protests from the Free State Province to other parts of the country was due to such organizations or to the role of the media. Myers (2000) argues that information technologies form a vital linkage in the transmission of messages about protests. The role of the new information technologies such as internet, email, cellular phones is that of increasing accuracy when reporting their plans, activities, goals, and ideology to constituents (Myers). It has also been postulated however that the mass media, especially television and radio have played an important role in the dissemination of protests (Booysen, 2007). Oliver & Maney (2000) argue for the existence of a triadic interface between politics, media and protests, pointing that the media is not a neutral cataloguer, but is an integral part of politics and protest, interwoven with events.

Without in-depth understandings of factors influencing such disputes, this study refrains from making further inferences, other than that such non-violent protest plausibly points to possible dissatisfaction with water and related services.

TABLE 4 NATIONAL TAXPAYERS UNION (NTU) MEMBERS (VILLAGES/TOWNS) THAT HAVE DECLARED DISPUTE

(* means the villages/towns withold municipal rate payments)

	Dorp	Kontakpersoon	Tel No	e-pos adres
*	Barberton	Andy Nuns	082 880 7469	rpcommittee@icon.co.za
	Barkly-Wes	Chris Viljoen	084 551 9103	pierre@cilliers.com
	Beaufort Wes	Louis Reynolds	082 474 8550	lpr@isat.co.za
*	Bethlehem	Danie Eichstadt	082 336 2353	danieeic@absamail.co.za
*	Bloemhof	Deon Beukes	083 453 8687	beukesd@lantic.net
*	Britstown	Marina van Zyl	-	arVanZyl@justice.gov.za
*	Calitzdorp	Hennie Smit	083 236 8070	marasmit@absamail.co.za
*	Carnarvon	Charl Vermeulen	082 968 3606	cfv@webmal.co.za
	Colesberg	Johan Matthee	082 406 8248	atthee@oldmutualpfa.com
	Cullinan Boere	Louis Meintjies	082 461 7262	louis@agriwebsa.com
	Cullinan Dorp	Steve Kloppers	012 734 1140	stevek@lantic.net
*	De Aar	Charel Marais	082 416 4717	stanmor@telkomsa.net
*	De la Reyville	Marius vd Merwe	082 825 7557	doxatr@lantic.net
	Delportshoop	Chris Viljoen	084 551 9103	pierre@cilliers.com
	Deneysville	Mark Spruit	082 447 1422	jaqui.spruit@vodamail.co.za
*	Edenville	Wally Taylor	082 894 6886	
*	Ekurhuleni Metro	Jaap Kelder	083 208 9314	info@zanli.co.za
*	Frankfort	Barney de Klerk	082 4962541	barney@lantic.net
	Hartebeespoortdam	Pieter Rautenbach	082 377 6032	rauties@lantic.net
*	Hanover	P.C. Venter	-	pcventer@hotmail.co.za
*	Hennenman	Cobus Visser	083 630 7631	cobus@cuny.co.za
*	Heilbron	Elize Laubscher	082 416 8950	fzn@absamail.co.za
*	Kroonstad	Gerrit van Schalkwyk	056 212 9623	vansrik@telkomsa.net
	Ladysmith Natal	Anthon Bakker	083 611.1927	aebakker@telkomsa.net
*	Ladismith Kaap	Louis Nel	073 271 3719	nellita@telkomsa.net
*	Louis Trichardt	Herman Snith	-	hsmith@lantic.net
*	Maclear	Johann Stassen	082 922 2909	umngaf@eci.co.za
	Mooirivier	Hayden Soobramoney	083 485 1583	ratecom@lantic.net
	Mooirivier Farmers	Tony le Roux	033 263 1404	mrfa@lantic.net
	Middelburg (Kaap)	Engela Kruger	049 842 3935	gde@adsactive.com
	Oranjeville	Mark Spruit	082 447 1422	jacqui.spruit@vodamail.co.za
*	Ottosdal	Engela Pretorius	076 639 0089	construct@lantic.net
*	Phalaborwa	Roelf du Plooy	082 870 0596	rduplooy@oldmutualpfa.com
	Pretoria	Salie Vorster	082 923 1622	pbbv@gmail.com
*	**Sannieshof**	**Carin Visser**	**083 442 5409**	**flowers2die4@lantic.net**
*	Smithfield	Ounooi Badenhorst	051 683 0010	smithfieldforum@gmail.com
	Sutherland	Jannie Symington	023 571 1035	sym@hantam.co.za
	Swartruggens	Wilhelm Roscher	082 493 9977	wr@goggaconnect.co.za
	Tulbagh	Niel de Jager	083 522 8666	acdejager@absamail.co.za
*	Ugie	Pieter Hills	082 775 5889	hills@therugby.co.za
*	Van Wyksdorp	Pieter Lourens	076 144 3387	mikeandcarol@vodamail.co.za
*	Ventersburg	Maxie Badenhorst	083 654 9593	maxtrust@absamail.co.za
*	Villiers	Pieter vd Westhuizen	082 922 3876	pdv.west@vodamail.co.za
	Welkom	Aubrey Nysschens	082 565 0241	ratepayers@goldnet.co.za
*	Williston	Dennis Viviers	053039103135	coetzeereitz@webmail.co.za
	Windsorton	Chris Viljoen	084 551 9103	pierre@cilliers.com
	Warrenton	Brink van Zyl	082 874 9656	helizeliza@hotmail.com

TOTAL: 47

3.4.2 DYSFUNCTIONAL RELATIONSHIPS BETWEEN WATER USERS AND GOVERNMENT

Literature shows that perspectives on the nature of dysfunctional relationships between water users and government are diverse. While empirical studies often reflect case-specific features, overviews by organizations, such as Municipal IQ, IDASA and the Centre for Sociological Research (CSR) of the University of Johannesburg, have distilled certain salient features from a plethora of protests.

According to studies by the Municipal IQ, a large part of the problem igniting protests has been very poor communication between representatives of metros and communities (Allen & Heese, 2009). This is confirmed by a key finding of CSR researchers' comparison in 2009 of four 'hot spots' in two different provinces namely, Piet Retief and Balfour in Mpumalanga Province and Thokoza and Diepsloot in Johannesburg. Sinwell et al. (2009) found that the four protests only occurred after unsuccessful attempts by community members to engage with local authorities over issues of failed service delivery.

IDASA's trenchant analysis of dysfunctional relationships between citizens and government is that the current framing of the crisis as one of 'service delivery' in itself reinforces these dynamics. Nemeroff (2005) characterizes this tendency as follows:

> *When government has not met expectations, citizens have responded by blaming it and demanding that it perform better. Government officials in many cases have responded to this by disengaging from citizen groups or shifting blame, leading to increased frustration among citizens who have felt even more out of touch with government. The result is a self-reinforcing cycle that leads to poorer delivery, because officials are even less willing to communicate with the public or co-operate with each other. In addition, it has increased frustration within a public that sees long-standing problems going unsolved. Finally it has led to disregard for the law, and in some cases violent protests by people rebelling against a system they do not feel respects them*.

With particular respect to informal settlements, Municipal IQ findings are that poor communication between water users and government is partly due to practicalities associated with constituency-based political representation (Allen & Heese, 2009). The authors incisively deduce that, in effect, informal settlements contain "neither the number of registered voters nor the local branch lobbying strength of more formalized areas". Due to the fluidity of informal settlements, residents of such areas do not necessarily present themselves as organized communities with representative leaders. Allen & Heese comment that to an extent, however, inclusion of informal settlement dwellers in local governance and planning processes requires far more work than in more formal areas of metros.

While empirical research tends to exhibit case-specific peculiarities rather than generalized features, which accounts for the diversity of views, some case studies show that scholars working in commonly-shared geographical spaces can have differing perceptions on dysfunctinality of relationships between water users and government. For example, while Botes et al. (2007 in Atkinson, 2008) state that lack of public accountability has been identified as the single most important cause of the violent municipal protests in the Free State Province, Atkinson (2008: 13) contends that lack of transparency is arguably the single

most important reason for the protests. Such differences of perception should not, however, obscure the overarching fact that social protests are sometimes caused by weaknesses in the governance of water service delivery. From such vantage point, it is possible to see the link between problems of communication, accountability, transparency, representation, participation and engagement, among others.

3.5 DYNAMICS BETWEEN WATER SCARCITY AND SOCIO-POLITICAL STABILITY: THEORETICAL REVIEW

This section reviews Gurr's theory of political violence (Gurr, 1970 in Gurr, 1985:61) and Tilly's theory of collective action (Tilly, 1978 in Gurr, 1985:62). The review outlines and then contrasts the two theories.

Gurr calls attention to the effects of economic crisis on individual perceptions of relative deprivation. He postulates that at the onset of scarcity in advanced industrial societies, people's expectations of continued material progress will remain high. Simultaneously, capabilities will fall, actual material progress will worsen and, in so far as scarcity is perceived to be a permanent condition, prospects for future gains will remain dim. Scarcity-induced economic decline should lead to increases in the intensity of deprivation. On the one hand, the pronounced the decline in the short-run, the more intense the deprivation. On the other hand, the more gradual the scarcity-induced stasis and decline, the lower the intensity of deprivation since expectations will gradually adjust to new realities. Gurr further postulates that, if goal gradients are correct, then people who have experienced or anticipated the greatest recent improvements are likely to feel the most intense deprivation. In advanced industrial societies, such people include the organized working class and not the *lumpen proletariat*, upwardly mobile minorities and immigrants not the under-class, and perhaps white collar workers and elements of the lower middle-class, especially those who are upwardly mobile from the working-class backgrounds. According to Gurr's construct, the intervening psychocultural variables, which are said to shape manifestations of deprivation-induced anger, may at first deflect anger away from political institutions, where such institutions are widely perceived as democratic and therefore retain substantial legitimacy among even those suffering from hardship. However, negative aspects of such perceptions include intensified labour-related conflicts, increasing hostility toward minorities and politically-unpopular groups, and possibly an increase in anomic individual behavior among the most deprived, which is manifest in high and rising rates of interpersonal violence, substance abuse and predatory crime. This review presents a pre-empirical assessment of the extent to which the recent wave of South African social protests can be characterized in terms of Gurr's theory of political violence.

By contrast, Tilly's theory of collective action (1978 in Gurr, 1985) minimizes the importance of individual motivations and ideology and instead emphasizes the processes by which challenging groups mobilize for collective action and the conditions which determine their interactions with other contending groups, including governments. Tilly postulates that economic decline potentially affects several aspects of mobilization, beginning with the interests of a collectivity. These relate to the shared advantages and disadvantages of collective action. Under economic decline, advantages of collective action by established contenders will increase, because strong groups committed to collective action will be more

favoured in competing for advantages than weaker groups and people acting individually. Initially, perceptions of growing common interest are likely to increase organizational cohesion and leaders' capacity to mobilize group resources for collective action. The propensity for mobilized groups to actually initiate collective active, however, depends on opportunities. Tilly's view is that such opportunities are a function of a group's power relative to other groups seeking access to resources controlled by governments, the balance between potential costs and gains of collective action (i.e. repression versus facilitation) and the extent to which other groups are either vulnerable to new claims or threaten to make claims that would harm the group in question. Effectively, therefore, this suggests firstly that groups which mobilize most effectively in response to scarcity-induced decline are likely to be the most powerful and thus most likely to initiate collective action. This, according to Gurr (1985) holds true at least for challenging groups that do not enjoy 'low-cost' access to government. A second implication is that governments are also more likely to have limited resources at their disposal, which increases the likelihood that they will respond to challenges with repression – since it is less costly in the short-run – rather than facilitation. Ultimately, however, the relative costs of collective action are likely to rise, and the deciding factor will be the balance between opportunity and threat. It might be worth noting Tilly's proposed asymmetry (according to Gurr, 1985) whereby 'a given amount of threat tends to generate more collective action than the "same" amount of opportunity'. In other words, since threatened loss of position or material well-being are highly likely consequences of scarcity, especially for less advantaged group, those which organize and mobilize are likely to take collective action even if the balance of repression and facilitation is unfavourable. This is because the costs of inaction will probably be even greater.

Although both Gurr's theory of political violence and Tilly's theory of collective action provide useful lens for understanding the phenomenon of water-related social protests, the latter formulation enables inferences about the forms of collective action that have arisen in the context of South Africa's prevailing political economy and implications for socio-political stability. According to Tilly (1978 in Gurr, 1985), a revolutionary situation occurs where three conditions prevail. These include, firstly, coalitions of contenders that emerge and make exclusive claims to legitimate power; secondly, significant segments of the population that are committed to those claims; and thirdly, government that cannot or will not suppress the alternative coalition. If economic decline is severe and persistent, it becomes increasingly likely that challengers will form coalitions among themselves in order to press their claims and resist repression more effectively. In Tilly's view, it is also increasingly likely that uncommitted victims of privation will be prepared to support claims of the emerging coalition, provided its ideological appeals and programmes are plausible. Tilly further asserts that governments besieged by growing claims and declining resources become more susceptible to defections among their supporters, and when elements of the elite or the armed forces abandon the government, the third proximate condition of revolution is satisfied (p.63). Gurr (1985) comments that deprivation and mobilization theories of political violence support general inferences similar to those of Tilly's theory of collective action. The former further identify the most likely principal protagonists of political violence to be the less advantaged groups, which had experienced improving conditions prior to deprivation or which had some prior collective interests and organization.

The above theoretical frameworks conceive instability in terms of a revolutionary change of government as a result of 'collective violence' (Gurr, 1970 in Gurr, 1985) and 'collective

action' (Tilly, 1978 in Gurr, 1985) due to economic decline and "deprivation-induced anger" (Gurr, 1970 in Gurr, 1985). In the case of South Africa, the current wave of social protests takes place against a background of unresolved historical inequalities, unmet expectations and domestic and global economic downturns. However, the debate on implications of water scarcity for socio-political stability remains unresolved. According to Houws (2008), there are two diametrically opposed strands of argument. The first is that violent unrest at local government level is part of a wider problem that has the potential to develop into a revolution. The second view is that public violence associated with service delivery protests does not represent a fundamental threat to the stability of South Africa, but could be contained through adjustments to current policy and its implementation (Ibid.). Theoretical frameworks, such as Gurr's theory of political violence and Tilly's theory of collective action, provide useful constructs for analyzing and inferring about possible trajectories of social protest action. While these frameworks provide requisite conceptual clarity to dynamics of water scarcity and socio-political instability, a limitation is that they do not fully delve into the nuances that underpin individual and collective action in the diversity of South African-specific contexts. Towards this end, this study explores the concept of 'social water scarcity' as a complementary framework for deepening understandings of dynamics between water scarcity and socio-political instability.

3.5.1 SATISFACTION AND PROTEST THEORY

Satisfaction and protest literature provide useful entry points for analyses of the phenomena of 'service delivery protests'. A cursory scan of literature seems to indicate that these two forms of literature have not been previously combined. The objective of this section is to therefore engage with and summarize key points into a framework that can synthesize the dynamics of water scarcity and socio-political stability in South Africa.

3.5.1.1 SATISFACTION

Satisfaction relates to the perceived difference between aspiration or expectation and achievement, ranging from the perception of fulfillment to that of deprivation (Diener, 1994; Deicbmann & Lall, 2003). The main determinants of self-reported well-being are circumstances, aspirations, comparison with others, and "baseline happiness" of the individual with first two of these factors relating to the level of service and expectations (Blanchflower and Oswald, 2003). The following list summarizes key issues in the satisfaction literature:

- Personality factors play an important role in satisfaction (Diener et al., 2003).
- Inter-group comparisons play an important in satisfaction – those with relative better access to better goods and services are likely to be happier (Deichmann & Lall, 2003).
- The disconfirmation model indicates that if performance is higher than expectations then satisfaction occurs (Boulding et al., 1993)
- The performance model posits counter intuitively that satisfaction increases with higher performance and expectations (Boulding et al., 1993)

3.5.1.2 PROTEST LITERATURE

Protest politics in South Africa have a long history and have been deployed differentially in different historical periods. Whereas protests formed an important vehicle during the fight against apartheid, their rebirth and propulsion to the centre of struggles of the post apartheid dispensation have come as a surprise to many. A majority of these protests, so-called 'service delivery protests' are reported to emanate from dissatisfaction with municipal service delivery and problems relating to lack of communication between council and councilors on the one hand and citizens on the other. Literature on protests can largely be divided into two propositions, firstly, the Grievances and Relative Deprivation Theory and, secondly, the Resource Mobilisation Theory.

The role of grievances in mobilisation has been widely debated in literature (Opp, 1988; McCathy & Zald, 1977; Klandermans, 1984). Classical theorists, notably Aristotle, Tocqueville and Karl Marx, have long posited that anger with material conditions and the resultant aspirations for better life by the underclass are the ultimate sources of revolt. Marx and Angels define collective action as an outcome of social structure rather than individual choice. They argue that contradictions between social classes are a historical truth and inevitable. This thesis has found expression in psychology literature which propounds that frustration leads to aggression. Seminal here is the work of Ted Robert Gurr (1970 in Gurr, 1985), who posited that the actualisation of political violence is preceded by politicisation of discontent stemming from emergence of discontent.

Observations that protests fail to occur in some instances despite profusion of grievances have led to the development of alternative theory namely, the Resource Mobilisation Theory (Opp, 1977; Opp, 1988; McCathy & Zald, 1977; Klandermans, 1984). Conventional wisdom dictates that grievances and affinity to movement ideology precipitate in collective action. However grievances are often held for long periods of time without them erupting into collective action (Tilly, 1978; 1979 in Tindall, 2006). Similarly, ideological affinity to goals of movement increase scope for acceptance of a movement but not recruitment into collective action. What is needed therefore is for those who hold grievances to get recruited and mobilised. Contact with a recruiting agent has been identified as this missing link (McAdam, 1986; Klandermans & Oegema, 1987). However the exact mechanism that links collective action and social networks is not clearly understood (McAdam, 2003 in Tindall, 2006). McAdam (1986) developed a model for high cost/high risk activism in which he postulates that the key drivers of mobilization are the media, the alignment of individual-movement values, and the development of ties with other activists. In the same vein, Schusman & Soule (2005: 1098) find that individuals belonging to many organizations are more likely get involved in protest action.

3.5.2 TURTONIAN THEORETICAL AND CONCEPTUAL MODELS

3.5.2.1 SOCIAL WATER SCARCITY AND DEMOGRAPHIC TRANSITION

> *The story of meeting the challenges of water scarcity is a social story. It is a story of societies employing different means of adapting over time, at different stages of scarcity, and in response to different perceptions of what constitutes challenges to be met…* (Ohlsson & Turton, 1999)

Towards a theoretical explanation of dynamics between water scarcity and socio-political stability, Turton & Ohlsson (1999) draw from Malin Falkenmark's (1987) Malthusianist perspective on population growth as a key driver of water scarcity and Homer-Dixon's notion of adaptation. Turton & Meissner (2002) build upon earlier work by Turton & Ohlsson (1999) and Ohlsson & Turton (1999) and attempt to conceptualize the South African case in terms of the international Social Charter's notion of a balance between government, water service providers and the public. They put forward the notion of a 'hydro-social contract', which is an unwritten contract that exists between the public and government. The scholars propound that a hydrosocial contract comes into existence when the individual is no longer capable of mobilizing sufficient water for their survival. At such point, the contract acts as a mandate for government to assume responsibility, a basis for institutional development and a determinant of "what the public deems to be fair and legitimate practice". From this perspective, Turton & Meissner (2002) characterize instability in terms of a shift from a Hobbesian to a Lockean form of 'hydrosocial contract'.

Using the Witwatersrand area as a motif for their argument, the scholars (Turton & Ohlsson, 1999; Ohlsson & Turton, 1999; Turton & Meissner, 2002) put forward a model depicting a demographically-induced water demand curve with three distinct trajectories. The first trajectory is characterized by an abundance of water, while the second and third trajectories are respectively typified by water scarcity and increasing water deficit as population pressure increases. The scholars distinguish between 'first-order' and 'second-order' scarcity. First-order scarcity relates to "water as a natural resource" and its availability relative to population over time. Second order scarcity relates to the ability of a social entity to cope with or adapt to increasing demands caused by water scarcity.

The scholars postulate that as a given population grows and uses more water, initial abundance of water changes into scarcity. Such a transition acts as a "trigger" to government to deliver more water through supply-side coping and adaptive strategies, such as construction of hydraulic infrastructure such as large dams and large-scale water transfers. A demographically-induced consumptive curve drives this phase of "heroic engineering" (Platt, 1999 in Turton & Ohlsson, 1999) or "hydraulic mission" (Reisner, 1993 in Turton & Ohlsson, 1999).

Turton & Ohlsson and Turton & Meissner interpret the state's focus on large hydraulic infrastructure in the first transition as an urge to control, which removes the possibility of individual self-help, perpetuates dependency on the state to meet people's individual needs, gives a free-hand to the technocratic elite to engage in large-scale hydraulic engineering projects and effectively creates a Leviathan state. The Hobbesian form of hydrosocial contract, which prevails during this phase, closely resembles elements of Thomas Hobbes' philosophical writing of 1651 and is characterized by a Leviathan or all-powerful state whose dominance during the 'first transition' often results in a bi-polar configuration of relations between government and the water-consuming public. When demographically-induced demand reaches a second transition point along the trajectory, 'water deficit' occurs and conflicts and social instability ensue. Hydropolitical dynamics during the 'second transition' lead to an emergence of a Lockean form of hydrosocial contract, which resembles elements of John Locke's philosophical works of 1690 and is characterized by a triangular configuration between the government, water-consuming

public and special interest groups, such as non-governmental organizations (NGOs) and civic society.

In the case of South Africa, Turton & Meissner (1999) and Turton & Meissner (2002) conceive the first transition as coinciding with the pre-1994 colonial and apartheid state-centrist development of a mining-industrial complex in the Witwatersrand. During that era, the individual lost self-provisioning capacity as all significant aquifers became exploited and water services became centralized within the state and parastatals, such as Rand Water (RW). Supply-side management approaches, such as inter-basin water transfers, were adopted to cope with rising demands imposed by rapid urbanization and to avert water deficit. Since the prevailing political systems were based on a rationale of 'Cultural Darwinism', a "racially defined political elite gained hegemonic control over the balance of hydropolitical privilege in society" (Ibid. 2002:12). Effectively, the "white minority gained access to key decision-making structures, which in hydropolitical terms meant that the balance of privilege in society started to manifest in the form of unequal access to clean water and sanitation services" (Ibid.).

Emergence in the second transition of a Lockean hydrosocial contract in South Africa coincides with ascendance of the post-apartheid state. During this phase, national constitutional imperatives and water sector reforms provided frameworks for the redress of inequalities in water supply and management. In particular, the Constitution's Bill of Rights enshrined the universal right to sufficient food and water and to an environment that is not harmful to people's wellbeing. The emergence after 1994 of a plethora of rights-based NGOs and civic society organizations (CSOs) is seen as resonant with the 'birth of a new social consciousness' at international levels. Various scholars (Movik, 2010; Swain, 2000) have pointed to a number of flaws about the foregoing conceptualizations.

Critical Appreciation and Discussion

Ashok Swain (2000) questions Turton & Ohlsson's conceptual basis upon Malin Falkenmark's (1987) Malthusianist view of population pressure as a key driver of increasing water scarcity and notion of a 'water barrier', which constitutes a limitation to the economic growth potential of developing countries and thus a potential source of conflict and social instability. While Turton & Ohlsson (1999) consider Falkenmark's notion of a water barrier to be "an extremely valuable contribution to the debate", Swain (2000) observes that the water barrier approach has limited applications for Southern Africa. Swain comments that this approach, which measures the water adequacy of different countries using a simple index of annual per capita freshwater availability, fails to take into account transboundary water sources and emphasizes the role of population whereas per capita demand for water depends on economic activities, type of agriculture, livestock practices and lifestyle. Furthermore, the water barrier approach hides the seasonal and local nature of water scarcity, and fails to capture the different forms of water use among various regions of the world (Ibid.).

Synne Movik (2010) questions the basis of Turton & Meissner's conceptualization of the relationship between water users and the state, which is viewed in terms of the occurrence of two permutations of hydro-social contract namely, the Hobbesian and Lockean forms. She observes that the stability of the state during the first transition seems to largely

depend upon the continued gatekeeping roles and practices of state-contracted engineers in controlling access to water, while the inclusion of civic society as a third force in the second transition checks the power of the state and weakens the Leviathan. Movik argues that, while Turton & Meissner's analysis offers an intriguing framework to understand how change has occurred over time, such a rendition "fails to take into account an aspect of crucial importance to the exercise of government authority, namely policy-making and legislation". Instead of moving towards a more decentralized form of governance, as envisioned in the Lockean hydrosocial contract, the hydrosocial contract that has emerged from South African water reforms is "reversing to a more authoritarian form of government". From a tenurial perspective, Movik bases her argument upon a view that the government's intention to control and monitor all aspects of water use, which is done through maintaining a database of all users and their abstraction rights and through issuing permits, represents a move towards rather than away from a centrist Hobbesian state of affairs. Movik's argument resonates with a proposition by Ted Robert Gurr (1985).

In examining political consequences of scarcity and economic decline, Gurr (1985:51) proposes that substantial and persisting increase in the scarcity of widely-sought resources in contemporary societies tend to create greater material inequalities within and among societies, intensify internal and international conflict, and a significant shift from open toward more closed and authoritarian political institutions. While Gurr does not specifically address Turtonian frameworks, his proposition effectively counters the notion of a shift in South Africa from Hobbesian to Lockean forms of hydrosocial contract. His argument draws from contrasting views of William Ophuls (1977 in Gurr, 1985) and Stretton (1976 in Gurr, 1985).

Ophuls seeks a new political order that is "premised on frugality and stewardship but subordinate to political institutions characterized more by communalism than individualism, authoritarianism rather than liberty, and reliance on 'natural aristocracy' rather than egalitarianism". By contrast, Stretton adopts a socialist perspective and is more concerned with the outcomes, namely maximizing equality, minimizing class differences and maximizing the quality of life, than with the political institutions and processes that embody these outcomes. According to Gurr, the main thrust of Stretton's argument is to devise social policy which will enhance the balance between freedom, equality, productivity and environmental protection. Two general points on which Ophuls and Stretton agree are, firstly, that the onset of scarcity in prosperous societies leads to an intensification of conflict and, secondly, that a different kind of politics – new values, policies, institutions – are required to overcome the malignant effects of scarcity.

From the views of Ophuls and Stretton above, Gurr asserts that "any design for political change in response to the stresses of increased scarcity which fails to take account of evidence about the nature of political man and political institutions is unlikely to be plausible in the eyes of its beholders, and still more unlikely to lead to action, or policies, that have intended effects (whatever they may be)" (p. 54). Although Gurr is mainly concerned with the impact of scarcity in advances industrial democracies, his argument seems to have broader implications for less developed countries, including South Africa.

This report queries the prominence given by Turton & Ohlsson (1999), Ohlsson & Turton (1999) and Turton & Meissner (2002) to demographic factors in their conceptualization of

South Africa's problem of water scarcity. Although water demand indisputably increases with population growth, to characterize South Africa's water scarcity problem largely in terms of 'over-population' would be to downplay the importance of power relations that have historically created structural inequalities in access to water resources and services. It is worth noting that Falkenmark's (1987) water barrier approach, which forms a central tenet in Turtonian models, echoes perspectives by the Club of Rome's 1972 *Limits to Growth* report. At the time of its publication, this report was criticized for its narrow emphasis on economic factors to the exclusion of poverty, inequality and social costs of industrial development. From that point of view, a demographic emphasis effectively sanitizes the persisting legacy of the country's pre-1994 political economy.

While the scholars allude to power relations, their focus in both the first and second transitions remains firmly entrenched upon relations between the state and water users and fails to broaden to include an examination of relations among privileged and disadvantaged water users. Such an oversight, in our view, does not recognize an important locus of stakeholder power dynamics, particularly with respect to 'resource capture' and post-apartheid constitutional and legal imperatives for redistributive water sector reforms. We argue that power relations and livelihoods, rather than demographic factors, should be central tenets of frameworks for deepening understandings of dynamics between water scarcity and socio-political stability.

Despite flaws and limitations, pioneering attempts by Turton & Ohlsson (1999), Ohlsson & Turton (1999) and Turton & Meissner (2002) to conceptualize, from a social dimension, sub-national dynamics between water scarcity and socio-political stability contribute to the building of grand theory and provide a springboard for interrogating South African water scarcity issues. Indeed, a number of issues seem to indicate a need to explore alternative ways of shaping relations of authority with respect to water resources. Firstly, the historical legacy of inequality in access to water for productive use persists amid contexts of pervasive poverty and a gradualist approach that lacks of meaningful transformation regarding Water Allocation Reform (September 2010). Secondly, inequalities in access to adequate water services and the human right to water persist in both urban and rural contexts (Bond & Dugard, 2008). Thirdly, questions have been raised about the capacity of the South African state to exert control over water resource management (Movik, 2010; Van Koppen, 2010) and water services (Tapela, 2007). Thirdly, water needs have featured prominently among factors driving the escalating service delivery related social protests (Bond & Dugard, 2008). Fourthly, Turton's more recent (2008) conceptualization of ongoing social protests, which has been largely viewed as controversial, has re-opened scholarly debate on the dynamics between water scarcity and socio-political stability.

3.5.2.2 WATER SCARCITY AND SOCIAL PROTESTS

Turton (2008) views water scarcity in qualitative rather than quantitative terms. The scholar considers water quality deterioration to be manifest in problems such as acid mine drainage, eutrophication, negative health impacts of toxic microcystins produced by cyanobacteria, endocrine-disrupting chemicals and partially metabolized anti-retroviral (ARV) medication, contamination by radionuclides and heavy metals, and loss of dilution capacity for maintenance of surface and ground water quality. From such a perspective, he envisages dynamics of water scarcity and socio-political stability in terms of a Trialogue

Model in which three fundamental drivers have historically shaped and will continue to shape socio-economic development processes. These drivers are climate, spatial development pattern and historical legacy. While acknowledging that water scarcity is largely due to both climatic influences and prevailing inequalities in water allocation, Turton identifies historical legacy as the "most insidious and potentially volatile" of the three drivers. This is because its consequences include:

- The propensity to resort to mass violence when expectations exceed the capacity of government to deliver;
- The legacy that "has left a country with no coherent sense of nationhood, prone to popular rhetoric that reflects crudely defined racial stereotypes" and a majority of citizens who are "mired in endemic poverty, with little prospect of escaping that trap" and without massive government planning and support; and
- The "systematic erosion of investor confidence, punctuated by bouts of extreme violence such as the recent xenophobic attacks, which cause great harm to the perception of the international community that South Africa is a viable destination for foreign direct investment" (p. 5).

In Turton's view, South Africa's "social pathology", characterized in the three bullet point above, emanates from a combination of various sets of significant social trauma over the course of the country's history. These include the extreme violence of the Second Anglo-Boer War, out of which the country of South Africa emerged, "social traumas" that accompanied nineteenth century changes to pre-colonial Xhosa and Zulu socio-political organization, and the prevailing legacy that is "based on violence and the disrespect of human rights". The pessimism in Turton's characterization is reminiscent of the "doomsday approach", which emphasizes over-population and over-exploitation of resources as main causes of resource depletion and conflict.

Critical Appreciation and Discussion

According to Swatuk & Vale (2000), the doomsday approach has been advanced by theoretical works of Thomas Homer-Dixon. Homer-Dixon assumes that people are by nature self-interested actors. He argues that in a context whereby change induces resource scarcity, two processes are offset. These are 'resource capture' by those with the means to do so and 'economic marginalization' of those without. Homer-Dixon postulates that failure to adapt to changes in the resource regime results in various social problems, which in turn might offset conflicts, most often at the sub-national level. Homer-Dixon qualifies his argument by stating that the causes of resource-related conflicts involve a more complex interplay of factors than simply resource scarcity, and that many communities will seek out strategies for cooperation before they opt for conflict.

Beyond questions about characterization of the South African water scarcity and socio-political stability problem, this report considers that the social dimension of Turtonian constructs falls short of capturing the poignancy of social aspects of water scarcity endured by the majority of South Africans. Notions of adaptation and coping are largely applied at the level of the state and scant attention is given to coping and adaptation strategies employed by ordinary people, many of who use water outside the ambit of the state (Tapela, 2009; Sithole et al., 2009). For greater relevance to challenges facing South Africa, there is a need to broaden focus to include lived realities of the majority of historically

disadvantaged individuals and groups, who continue to be marginalized in terms of access adequate water services and effective roles in the management and governance of water resources.

The view in this report is that while Turton's social pathology hypothesis and Trialogue Model provide a useful starting point for developing understandings of social dimensions of water scarcity. However, characterizations of the rise since 2004 of violent protest action in many localities within South Africa seems indicate that social aspects of water scarcity require more nuanced analyses than those provided by existing pioneering theoretical works.

3.6 KEY DRIVERS IN WATER SCARCITY RELATED PROTESTS

The foregoing review of satisfaction and protest literature suggests that it is important to define what institutional performance would relate to. In many instances, performance is problematically equated to improvements in access to safe water (Zerah, 2000; CALS, 2009). Some of the problems relating to water supply, even when infrastructure in situated within 200 metres from the household, related to poor quality water, old and deteriorated networks, poor operation and maintenance, high tariffs (sometimes too low), intermittent supplies, water restrictions and disconnections after installation of supplies (Zerah, 2000) and difficulties in access at night due to threats to personal safety and security among others (Thompson & Nleya, 2008). Added to these problems, comparison with more affluent neighborhoods creates feelings of relative deprivation. Table 5 highlights some of the expectations and actual performance indicators for water supplies in South Africa. and should be understood in the context of the so called water ladder (RSA, 2003), which starts with people being moving from lack of infrastructure to the installation of basic water services (communal water taps within 200 metre radius of home), followed by yard taps and finally the internal taps.

Drawing from the satisfaction literature, it is plausible to argue that higher expectation of service delivery from the post-apartheid government. In South Africa's case, service delivery is more than a development and anti-poverty policy. It is, perhaps more importantly, a means of redress. Under successive colonial and apartheid governments[1], the majority of black people were stripped of livelihood assets and simultaneously denied means of accumulation (Carter & May, 2001). Reconstruction and Development Programme (RDP) therefore sought to redress racial inequalities in access to service delivery. Towards this end, Section 1.4.2 of the RDP stated:

> *The first priority is to begin to meet the basic needs of people – jobs, land, housing, water, electricity, telecommunications, transport, a clean and healthy environment, nutrition, health care and social welfare.* (South Africa, 1994)

[1] Legassick (1995) and Wolpe (1995) both argue that apartheid did not represent a new policy but a tightening of instruments developed under the preceding segregation period.

TABLE 5 WATER SERVICES EXPECTATIONS AND PERFORMANCE IN SOUTH AFRICA

Aspiration/Expectations	Performance	Examples of protests
High quality microbiological and chemical purity of water	Quality satisfactory in metropolitan municipalities and other urban centres but declines to sporadic and endemic purification deficits in other municipalities	Delmas, Mpumalanga[1] Diepsloot, Johannesburg
Reliable water supplies	Reliability of supply largely satisfactory in metropolitan municipalities and declines to intermittent supplies due to operation and maintenance problems in some smaller local municipalities	Diepsloot, Johannesburg Sannieshof, Tswaing Municipality Philippolis, Free State.
Universal individual household level connections	This level of connection is largely limited to urban formal houses to exclusion of rural and informal settlements who rely on standpipes and unprotected sources	majority of informal settlements rely on communal standpipes
Affordable Water tariffs	Free basic water policy and indigent policies implemented by many municipalities provide some relief which may be inadequate in case of large households	Phiri case, Johannesburg
Easy access to water points (internal or yard plumbing)	Largely limited to formal housing schemes to exclusion of informal settlements and rural areas	Rural and informal settlement dwellers largely rely on communal standpipes

As stated in the discussion above, water services have often been cited as important to protest generation. Routinely though, water services are observed to be not the only grievance in protests. Since social protests occur almost exclusively in poor black neighborhoods, they characteristically encompass more than one grievance at a time, which clouds the central issue of concern.

3.7 ROLE OF ORGANIZATION AND MOBILIZATION

It appears that many of the more visible and violent protests have been characterized by relatively high levels of organization, involvement of organized working classes and in contexts of perceived deprivation, unmet expectations and uncertainties relating to national and global economic downturns. This resonance with theories put forward by Tilly (1977 in Gurr, 1985) and Gurr (1970 in Gurr, 1985). Documentary evidence shows that social movements, such as the Coalition Against Water Privatization and Anti-Privatization Forum

(CAWP/APF) and *Abahlali base Mjondolo* (ABM), have engaged with various water related issues, such as privatization, marginalization of the poor and dysfunctional relationships. These movements demonstrate high levels of organization and a robust ability to pursue a diversity of objectives and mobilize massive protests, many of which are violent, in a diversity of socio-economic contexts mainly within major cities, smaller towns and peri-urban areas but also in rural areas such as Sundays River in the Eastern Cape (CAWP/APF, 2008). For example, CAWP/APF's objectives for mobilizing a mass protest action against the City of Johannesburg and Johannesburg Water (a water service providing utility) in 2006 were to pressure the respective authorities into engaging further with communities, to highlight importance of the Phiri legal case and to further mobilize communities. The scope of CAWP/APF's concerns extends to issues of water quality and cholera in particular (CAWP/APF, 2009). By contrast, ABM's organization of protracted popular protests in informal settlements, such as Kennedy Road in Durban, have included frustrations over a series of the government's broken promises regarding improved access to housing, electricity and water (Bryant, 2005; ABM, 2005); threats of living without water where the onset of winter, lack of electricity and reliance on highly flammable fuels give rise to a high probability of fire (ABM, 2005); grievances about marginalization emanating from Durban Municipality's Elimination and Prevention of Re-Emergence of Slums Act of 2007 (ABM, 2007; 2009); and increasing perceptions of relative deprivation as the 2010 World Cup tournament draws near (ABM, 2009).

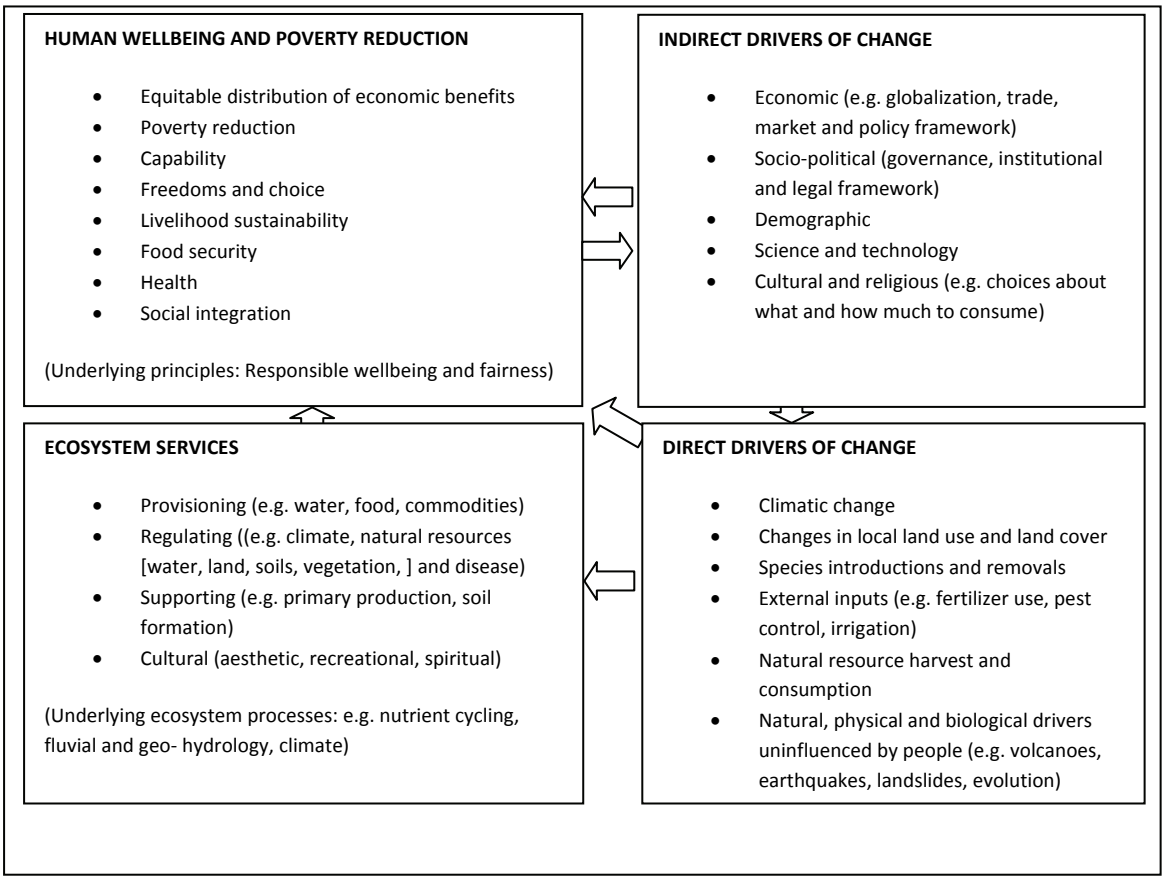
3.8 DYNAMICS OF PERCEIVED DEPRIVATION

3.8.1 APPLICATION OF GURR'S THEORY OF POLITICAL VIOLENCE

Perceptions of deprivation by Kennedy Road residents echo Gurr's (1970 in Gurr, 1985) proposals on the intensity of deprivation. Gurr uses scarcity-induced economic decline in 'advanced' societies as a motif for his theory of political conflict. He proposes that such decline should lead to increases in the intensity of deprivation. The steeper the gradient of decline in the short-term the more intense the deprivation. Conversely, the more gradual the scarcity-induced stasis and decline, the lower the intensity of deprivation since expectations will gradually adjust to new realities. Assuming that Gurr's goal gradients are correct, it is reasonable to expect then that people who have experienced or anticipated the greatest recent improvements are likely to feel the most intense deprivation.

Transposing Gurr's formulation to the South African context, expectations of improvement would seem to be associated with urbanization and with dwellers of recently-established informal settlement in particular. Previous experiences of improvements can typically be linked to historically privileged individuals and groups, such as white South Africans in general, but can also apply to "upwardly mobile" (according to Gurr) black proletarian classes with relative long histories of urban residence and higher levels of water services than in rural and peri-urban areas. Those with the greatest recent improvement could characteristically be found both among black urban residents who have long histories of living in older and relatively better serviced townships and black urban residents who have experienced recent (post-1994) improvements in quality of life and access to water, irrespective of where they live. It is worth noting that these categories are amorphous and water users are able to traverse the porous boundaries as a result of various factors.

Factors affecting mobility across different categories of experience and expectation of water scarcity largely coincide with drivers of water scarcity, such as 'resource depletion', population growth and structural factors, which are identified by various scholars (Turton, 2008; Falkenmark et al., 2007; Turton, 1999; Pallett, 1997; Rudengren et al., 1997; Falkenmark & Lundqvist, 1995; Ohlsson, 1995). Resource depletion could be due to deteriorating water quality as a result of pollution, contamination, eutrophication and reduced dilutive capacity (Turton, 2008; Falkenmark et al., 2007). Demographic factors could be due to either structural effects, such as interactions between population growth and institutional response failure, or environmental effects, reduced physical availability of water relative to demand by the local population. Other key drivers (Figure 4) inducing mobility are economic factors, such as growth and decline (Gurr, 1985), climatic change (Falkenmark et al., 2007), technological innovation and institutional reforms (Turton & Meissner, 2002). Studies by various scholars (Allen & Heese, 2009; Atkinson, 2008; Gouws et al., 2007; Bryant, 2005) seem to confirm Gurr's assertions regarding the role of antecedent experiences and expectations of improvement in shaping perceptions about deprivation.



(Adapted from Southern African Millennium Ecosystem Assessment Regional Report, Eds. Bohensky et al., 2004)

Figure 4 HUMAN-ENVIRONMENT RELATIONSHIPS

Although Gurr's theoretical framework has applications for South Africa, context-specific complexities of dynamics around perceived deprivation require greater rigor of analysis.

Such rigour is demonstrated, for example, in analyses by Allen & Heese (2009) and Atkinson (2008) of expectations associated with demographic changes relating urbanization. Similar rigour is evident empirical analyses by Gouws et al. (2007), Tapela & Sigenu (section 4.2, chapter 4 of this study) and Atkinson (2008), which examine perceptions of relative deprivation in terms of past experiences and current expectations for water services.

3.9 REVIEW OF SOUTH AFRICAN CASE STUDIES

Implicit within Allen & Heese's (2009) analysis, "influx of poor migrants to cities" due to pull factors, such as job opportunities in urban areas perceived to be centres of pronounced economic growth, is driven by expectations of a better quality of life and greater opportunities. Disillusion sets in as "most migrants find themselves unemployed, living in one of many hundreds of informal settlements on the periphery of these large metros, effectively marginalized from both access to economic opportunity, as well as housing and services" (Ibid.). Effectively, unfulfilled expectations, particularly in informal settlements, become a possible cause for social protests.

By contrast, Atkinson's (2008) analysis shows that in-migration into the small urban centre of Philippolis is not driven by expectations (i.e. pull factors), but rather by push factors. These include labour-shedding caused by wage and land rights legislation for farm workers, consolidation of farms caused by globalisation-induced economic hardships experienced by farmers, drought and conversion of crop and livestock farms into game farms. From that point of view, it seems plausible that poor people who migrate into Philippolis have relatively lower expectations than those migrating into informal settlement due to pull factors, such as analysed by Allen & Heese (2009). However, this possibility does not remove the probability that a move into an urban centre like Philippolis can in itself create expectations that have no direct bearing to people's decisions to move. Such expectations might arise from perceptions that livelihood opportunities in source areas (i.e. farms) have become foreclosed while opportunities in even small urban centres remain unexplored. In the absence of any possible losses in the former areas, the latter cannot be anything but more attractive. A common thread that emerges from both Atkins and Allen & Heese's analyses is therefore that expectations emanate more from a goal gradient, in this case between two points namely, the source and receiving areas, rather than from centripetal forces exerted by urban areas or centrifugal forces exerted by economically-depressed rural areas.

Cases of Philippolis (Atkinson, 2008) and Sannieshof (see Section 4.2, Chapter 4 of this report) provide insights into group dynamics arising from perceptions of deprivation that are underpinned, on the one hand, by historical and recent experiences of improved services and, on the other hand, unmet expectations. The former are associated with both white and black people living in established and newer formal residential areas, while the latter pertains to new immigrants who reside in the recently emerged informal settlements. In each of the two case studies, perceptions of a 'water crisis' served to bring about consensus on need for improved service delivery among water users, whose historical and socio-economic differences have hitherto constituted intractable divides. In the case of Sannieshof, the water crisis arose from perceived deterioration of water quality due to contamination of domestic water supplies by sewage waste from a poorly-managed sewage

treatment works, and a concomitant lack of financial and technical capacity in both Tswaing Local Municipality, which is the WSP, and Ngaka Modiri Molema District Municipality, which is the WSA. In the case of Philippolis, the crisis was "multi-faceted" (Atkinson, 2008).

Whereas by 1998, Philippolis' long-standing water shortages due to droughts associated with the El Nino-La Nina Oscillatory System had been resolved through institutional coping strategies, a number of factors contributed to the emergence of a water crisis in 2008. These included rapid in-migration of poor black people after 1994, restructuring of local government in 2000 and the resultant lack of capacity to deal with both the transaction costs of reforms, service delivery and planning for increasing demographic needs for water and other services. The net effect was that earlier supply-side strategies, such as construction by Bloemwater (i.e. the WSP) of bulk supply infrastructure enabling Philippolis to obtain water from the Orange River and drilling of seven supplementary boreholes by the municipality ceased to be sufficient. Problems of water scarcity became compounded political dynamics arising from a politicization of water services planning issues. As these became conflated with water issues, residents became largely cast into two main racially-defined political parties namely the African National Congress (ANC) and the Democratic Alliance (DA). Meanwhile, water outages continued sporadically and elected councillors maintained a stand-off. Amid the persisting governance vacuum, inertia set in among both elected councillors and technical employees of Kopanong municipality. When the water crisis reached its zenith in December 2008, no violence erupted. Despite what Atkins characterizes as conditions for 'a perfect storm', what emerged rather was "a public response that alternated between a stoic patience, truculent fortitude, rising anger, and general agreement that the municipality had degenerated into a complete basket case".

The lack of a violent response in Philippolis echoes the non-violent response of residents of Sannieshof. Although Sannieshof's economic, social, political and demographic characteristics and dynamics, as well as water service planning challenges, resemble those of Philippolis, there are some differences. Whereas residents of Philippolis have harboured a quiet storm, fewer black than white residents of Sannieshof, who are members of a local branch of the National Taxpayers Union (NTU) known as Sannieshof Inwoners Betalers Unie (SIBU), have declared a legal dispute against responsible municipalities. Such protest manifests in a withholding of municipal rates by SIBU members, who have established a trust account for deposits of all received payments and effectively established also a *de facto* water services governance structure that co-exists parallel to the democratically-elected municipality. A curious peculiarity about Sannieshof is that the town's non-violent protest has been most visibly driven, at least in the public political action space, public media and in the law courts, by a one-woman act!

Perceptions of relative deprivation have also been observed in contexts where people with relatively high levels of water scarcity, often associated with informal settlements, live in close proximity to those with higher levels of access to adequate water services (Allen & Heese, 2009; Nleya, 2009). Nleya (see Section 4.3, Chapter 4 of this report) examines the case of two groups of relatively poor urban residents of Khayelitsha township of Cape Town. The scholar observes that, informality in some sections of the township has lagged behind state-driven processes of housing property rights formalization in other parts of the township. Both types of areas are often located adjacent to each other. The formalization process has resulted in an increasing socio-economic divergence between shack-dwellers

and house owners. The former are mostly people who have recently immigrated from the largely water scarce rural communities of the Eastern Cape Province.

Prior to the formalization of property rights, these groups commonly shared informal access to water, electricity and sanitation services, which they mostly did not pay for. Perceptions of deprivation between the two groups were not markedly different. With onset of selective formalization of property rights in Khayelitsha, the new property owners perceive a significant reduction of deprivation. Such perceptions have raised expectations of further improvements of quality of life and access to services. Homeowners consequently seem to deduce that their access to further reductions of deprivations will depend on their continued compliance with government rules, such as avoidance of illegal connections and payment for services. Consequently, adaptive strategies of the new property owners include the exclusion of shack-dwellers from informal access to service infrastructure that was hitherto shared. A manifestation of this shift of strategy is the emergence of 'enclosures' of water access points, for example. Homeowners increasingly view such infrastructure as a private resource. Such a view appears to be linked to their individual investments in housing infrastructure. Besides this, homeowners' willingness to pay for water supply and sanitation services, albeit in terms of maintenance, appears to give them the prerogative to exclude others. By contrast shack-dwellers, who live in close proximity to the new homeowners, have been cast into deeper levels of deprivation of water and sanitation services.

Some of the lived consequences of Khayelitsha shack-dwellers' exclusion include the indignity of using open spaces for ablutions, hardships associated with lack of secure and adequate access to water and frustrations due to unfulfilled expectations and socio-economic marginalization. In terms of Gurr's postulation, Khayelitsha shack dwellers represent the group that has experienced improvements of conditions of deprivation and then been cast back into deeper deprivation. This and the unfulfilled expectations of a better quality of life contribute to highly intense perceptions of deprivation.

By comparison, homeowners have recently experienced improvements in living conditions and robustly safeguard against any potential threats to their perceived condition of reduced deprivation. The physical proximity of formalized and informal settlements in Khayelitsha and the increasing divergence in access to water and related services and socio-economic wellbeing combine to create a steep gradient between the two groups of residents. Such gradient seems to contribute to the intensity of deprivation experienced by shack dwellers after the selective formalization process.

3.9.1 WHAT DISTINGUISHES VIOLENT FROM NON-VIOLENT PROTESTS?

A question that must be asked, perhaps, is: What distinguishes dynamics of non-violent urban protests, such as those of Philippolis and Sannieshof, from the majority of violent urban protests? If Turtonian trajectories of population growth-versus-scarcity (1999), Hydrosocial Contract (2002) and Trialogue Model (2008) are applied, a simpler answer could be that the latter have a propensity to resort to violence, owing to a historical legacy that was based on violence and the disrespect for human rights and that persists in pervasive structurally-induced water scarcity, among other deprivations. Taken from Gurr's theory of

political conflict, differences in manifestations of protest action in these violent and non-violent cases might easily be ascribed to the "intervening psychocultural variables", which are said to shape manifestations of deprivation-induced anger, and which may at first deflect anger away from political institutions, where such institutions are widely perceived as democratic and therefore retain substantial legitimacy among even those suffering from hardship (Gurr, 1970 in Gurr, 1985).

By extension, the incidence of xenophobic attacks in 2007 and the prevalence of violent crime in the more violent contexts might also be ascribed to Gurr's postulations about negative aspects of interpretations of democracy, which include intensified labour-related conflicts, increasing hostility toward minorities and politically-unpopular groups, and possibly an increase in anomic individual behavior among the most deprived, which is manifest in high and rising rates of interpersonal violence, substance abuse and predatory crime. Tempting as the near-perfect fit such theoretical and conceptual framework offer, evidence suggests, however, that there is a more a more complex inter-play of variables than is immediately palpable. The less obvious and less understood of such variables is often depicted as the "Third Force".

3.9.2 DIFFUSION OF PROTESTS: COPY CAT OR THIRD FORCE?

The notion of a Third Force has been variously applied to social movements, covert political agendas, internal insurgents and political careerists within the ANC and, by implication, the less visible organizations supporting social movements. During the 2004 to 2005 wave of protests, government is said to have engaged the intelligence services to probe the possibility of a 'third force' in the escalation of protests in South Africa (Hough, 2008). Historically, the term 'third force' was used by the ANC leaders in the anti-apartheid struggle to refer to an alleged existence of a covert group responsible for the violence in the townships. The Truth and Reconciliation Commission (TRC) identified the Third Force as a loose group of security operatives and right wing groups (TRC, 2003). The re-emergence of the Third Force in post-apartheid discourse needs to be examined. It is beyond the scope of this review, however, to delve into a rigorous characterization of this amorphous entity. The review briefly touches on some of the less visible protest variables that have contributed to a resuscitation of the spectre of the Third Force. The objective is to contrast manifestations or lack thereof of notions of the Third Force within selected contexts of protests. One context of violent context is reviewed namely, Kennedy Road informal settlement in the Durban Metropolitan Council. Empirical findings from a context of non-violent protest namely, the small town of Sannieshof in the North West Province, is presented in Chapter 4 of this report.

3.9.2.1 EXAMPLE OF KENNEDY ROAD INFORMAL SETTLEMENT, DURBAN

In the case of Kennedy Road, protracted and violent protests have been organized by ABM, which managed to mobilize in effective ways mass action and popular support. On the one hand, ABM has refused to be cowed by police brutality or to be swayed by political negotiations. On the other hand, government has resolutely refused to accede to demands by ABM and Kennedy Road residents, such as demands for a reversal Durban Municipality's slum clearance policy and, in particular, the Elimination and Prevention of Re-emergence of Slums Act of 2007. These institutional frameworks are seen as reinforcing structurally-

induced scarcity of water and contributing to a breach by government of Kennedy Road dwellers' human right to water and constitutional guarantees for redress and equality. Tensions that have ensued between the politicians in government and leaders of ABM have escalated into open conflict, manifest in the arrest of ABM leaders and allegations of death threats to the chairperson of ABM, S'bu Zikode. Responding to counter-allegations by some political actors about a Third Force behind Kennedy Road protests, S'bu Zikode sarcastically but poignantly asserts:

> *There definitely is a Third Force. The question is what is it and who is part of the Third Force? Well, I am Third Force myself. The Third Force is all the pain and the suffering that the poor are subjected to every second in our lives. The shack dwellers have many things to say about the Third Force. It is time for us to speak out and to say this is who we are, this is where we are and this how we live. The life that we are living makes our communities the Third Force.*

If Zikode's argument is valid, what connects protests in South Africa is not an amorphous entity or shadowy group but similar conditions of deprivation that the poor face across South Africa. Cronje (2009), writing in the South African Institute of Race Relations website, postulates that even though current protests have been directed at local government, they may shift to the national government at the Union Building, Parliament and ANC headquarters. He further states, however, that such a shift would require inspiring leadership to emerge within the protest movement that could galvanize the protesters into a single movement across the country.

Tilly's (1977 in Gurr, 1985) proposition seems to provide a useful lens for examining the notion of a Third Force in the case of ABM and Kennedy Road. Tilly proposes that if economic decline is severe and persistent. It therefore becomes increasingly likely that 'challengers' will form coalitions among themselves in order to press their claims and resist repression more effectively. Conditions of 'economic decline' in highly industrialized societies of the north differ from South Africa's the historical legacy of inequalities in access to bases of power and productive wealth and prevailing economic marginalization of the poor in informal settings. The latter characteristics have largely endured irrespective of global and local economic declines and growths. In using Tilly's construct to examine dynamics between water scarcity and socio-political instability, economic differences are probably not as significant as Tilly's depiction of protesters as 'challengers'. Wherein the South African constitution guarantees freedom of expression, including the freedom to engage in demonstrations, the term challenger is problematic in that it seems to straddle the fine line between dispute and confrontation. From the perspective of dispute, such term implies an objection or a questioning of power and authority. From the perspective of confrontation, the term denotes a facing up to power and authority. Given Hough's observation that objectives of many of the social protests have more to do with pressurizing government to act in certain ways rather than instituting a revolution, the Tilly's use of term challengers should be viewed with caution.

Tilly asserts that governments besieged by growing claims and declining resources become more susceptible to defections among their supporters, and when elements of the elite or the armed forces abandon the government, the third proximate condition of revolution is satisfied (p.63). Given that ABM constituency draws largely from popular mass support

rather than from the privileged elite or armed forces, it is not possible at face value to see how this social movement can constitute a Third Force. Given that stakeholder interests are not always visible and therefore require more effort to elucidate, a thorough examination of Third Force allegations in the case of ABM is out of the scope of this report.

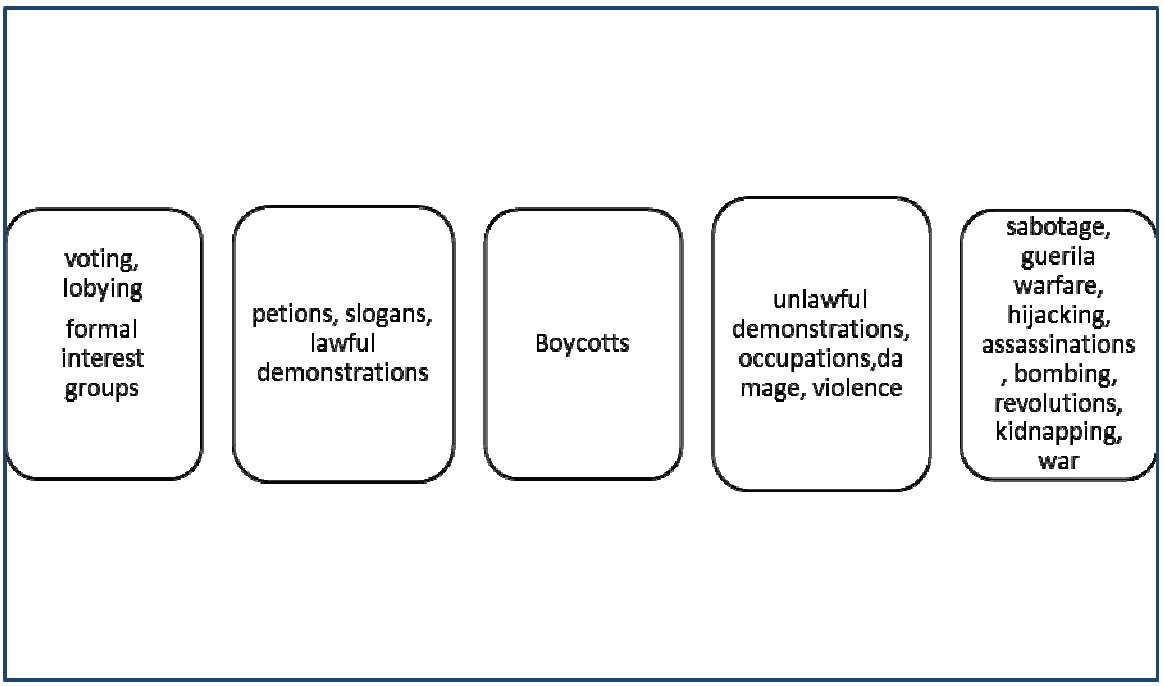
What is clearer, however, is that the intensification of violence following forceful control of Kennedy Road residents by the police bears out Tilly's (1977 in Gurr, 1985) postulation of an asymmetry whereby 'a given amount of threat tends to generate more collective action than the "same" amount of opportunity'. Similar phenomena have been reported in case studies of the small town of Balfour in Mpumalanga Province and the township of Thokoza in Johannesburg (Sinwell et al., 2009). Such cases might seem to confirm Tilly's rationale that governments are more likely to respond to challenges with repression when they have limited resources at their disposal, since such responses are less costly than facilitation in the short-run. However, in the case of South Africa, where reforms towards redistributions of economic resources have fallen far short of government targets and people's expectations, often for other reasons than lack of resources *per se*, there is a need to examine the extent to which lack of resources influences government policing agencies to resort to forceful means of controlling social protest.

3.10 SOCIO-POLITICAL STABILITY

There seems to be a diversity of perspectives on socio-political stability. In common usage, however, socio-political instability seems to be related to the existence of disorder, volatility or flux in the society, which manifests as a lack of peace. Blanco & Grier (2009) state that political instability includes all events which pose a major threat to the political and economic system of a nation which can be categorized into events that reveal citizen discontent with the political system, such as general strikes, riots, and anti-government demonstrations, on the one hand, and, on the other hand, extreme violent actions either by opposition elements or by the government in response to such opposition, such as guerilla warfare, assassinations, coups, and purges. From such viewpoint, features commonly associated with instability include weak institutions, the existence of a strong parallel or extra-legal economy, high susceptibility to violence, forced displacement, social exclusion, highly vulnerable livelihoods, and serious poverty. Tilly (1978 in Gurr, 1985), Gurr's (1970 in Gurr, 1985) and Hough (2008) implicitly define instability in terms of revolutionary change.

Hough (2008: 2) observes that a wide spectrum of concepts is often linked to 'revolution'. This includes internal war, rebellion, anti-colonial wars, guerilla warfare, coups, insurrection, terror, insurgency and riots. In some instances, the concept of 'internal war' or 'rebellion' is used as a general umbrella term that embraces, for example, revolutions, civil wars, coups, riots and strikes (Greene, 1974 in Hough, 2008). According to Hough, manifestations of political violence, both in terms of mass and small group political violence, can be arranged in an escalation ladder, depicting rising degrees of intensity. With particular regard to mass political violence, Wilkinson's (1977 in Hough, 2008) classification is that the first stage consists of riots and street violence, followed by armed rebellion or resistance, followed by revolution and civil war. Similarly, Marsh (1974 in Dalton 2002:61) categorizes citizen action as a progressive process, beginning with routine activities such as voting and membership of

citizen groups up to blatantly violent actions such as hijackings, assassinations, and war as reflected in Figure 5.



Adapted from Dalton 2002:61.

FIGURE 5 INTENSIFYING POLITICAL ACTIVITY

Concepts of 'insurgency' and 'revolutionary warfare' are often used interchangeably, as shown in definitions by scholars such as Snow (1996 in Hough, 2008) and Baylis (1977 in Hough, 2008). Snow defines insurgencies as civil wars, whereby the term refers to "organized armed violence between groups within a state for the purpose of overthrowing and replacing an existing regime, or to secede from an existing state". Baylis's definition of revolutionary warfare refers to one form of revolutionary activity, which is protracted struggle during which irregular military tactics are combined with psychological and political operations. According to Baylis, alternative forms of such activity include a revolutionary coup or a mass uprising.

Hough explains that 'terrorism' could either be the main method of warfare or a component of broader insurgency. In the former instance, terrorism could be of a revolutionary or sub-revolutionary type, the latter of which is not aimed at overthrowing a government but rather coercing government to change certain policies. In the case where terrorism forms part of a broader insurgency, its purpose is mainly to engage with security forces thus helping to create a climate of fear and collapse. Surmising that relatively few protests that start with terror develop into full-scale insurgency, Wilkinson (1977 in Hough, 2008) asserts that many protests "simply do not have the critical mass (in terms of popular support) and other resources for such a campaign, and some also have little or no external support.

3.11 DISCUSSION

In conceptualizing socio-political stability in the South African context, it is worth noting that demonstrations are expressly protected in the Section 17 of the Constitution, which states that 'everyone has the right, peacefully and unarmed, to assemble, to demonstrate, to picket and to present petitions'. Hence, although protests might appear to be an organized and consolidated expression of anger against government, they are also a manifestation of awareness by South African citizenry of the democratic right to freedom of expression. Notwithstanding the constitutional provision above, socio-economic instability might arise when unlawful demonstrations are accompanied by property damage and violence, which pose major threats to the political and economic system of the country. Such characterization resonates with former President Thabo Mbeki's the response to runaway protests in 2005:

> *We can say with confidence that none of these instances present an immediate danger to our democracy. But they do reflect and seek to exploit the class and nationality fault lines we inherited from the past, which if ever they took root, gaining popular support, would pose a threat to the stability of our democratic South Africa.*

The above characterization provides a useful vantage point from which to reflect upon water-related social protests that have become rooted in popular grassroots support. Given the implicit view that socio-political instability is closely associated with revolutionary change (Gurr, 1970 in Gurr, 1985) and Tilly (1978 in Gurr, 1985), this report suggests that any analysis of the three proximate conditions of revolution in South Africa should be guided primarily by provisions within the national constitution. Analysis of the alignment between proximate conditions for revolution and provisions of the constitution, however, is beyond the scope of this study.

This study's working definition of social water scarcity considers that such scarcity occurs when people perceive the quality and quantity of available water to be inadequate for their needs, uses, expectations and aspirations. This increases their vulnerability to risks and shocks associated with insecure access to water. Under such conditions, water scarcity and water use detract from their capabilities to ensure livelihood sustainability. Social water scarcity suggests therefore that preparedness of planning requires a wide-ranging view of water scarcity contexts, clearer understandings of micro-level water issues and meso/macro-level institutional responses and options that are appropriately geared towards ensuring water and livelihood security.

Although debates on the service delivery hypothesis are important, there is a need to broaden perspectives on causes of social protests to include water security aspects, which are critical to livelihood security. Literature suggests that water security is closely linked to the multiple and interrelated aspects of people's livelihoods, not only in social protest contexts but also in water scarce localities with no tangible evidence of protest action. There is therefore a need for debates to go beyond the parameters of visible protests, which are mostly urban-based, and to scrutinize also the 'off-stage' coping and adaptive strategies that characterize the majority of water scarce contexts in South Africa.

This entails unpacking the social dimensions of water scarcity and water use so as to develop clearer understandings of how water insecurity affects people at local levels. This also entails deepening understandings of people's expectations regarding water services and the requisite planning responses and options. Since literature suggests that the multi-faceted water scarcity and water use issues are inextricable from livelihoods issues, preoccupation with disassembling the importance of water services relative to various causes of protest action seems a futile pastime. Rather, it seems more useful to turn analyses of social protests towards finding planning mechanisms to enhance satisfaction, reduce deprivation-induced vulnerability and avert risks from water insecurity. Some potentially useful methodological questions could include the following:

- If water-related protest action can be viewed as a signal of people's refusal to accept risk, what are the thresholds of tolerance and acceptance both in areas with tangible social movements and areas with less tangible forms of social protests?
- Irrespective of conflation, contagion or contamination (i.e. infiltration of external interests e.g. "the Third Force"), what conditions and thresholds predispose individuals and groups in socio-economically differentiated water scarce contexts, such as urban and rural areas, informal and formal urban settlements and high, middle and low income areas, to mobilize and engage in social protests and other forms of collective action?
- How can water services planning pre-empt and avert the breaching of such thresholds?

CHAPTER 4: WATER RESOURCE ISSUES IN WATER SCARCE CONTEXTS: CASE STUDIES

4.1 INTRODUCTION

This section presents findings from empirical research in five purposively selected rural and urban case study sites. These are Sannieshof, Khayelitsha, Cala, Giyani and Mbuzini.

Based upon this study's research hypothesis, conceptual framework and definition of social water scarcity (Chapter2 of this report), an underlying view by this section is that water 'security', in the broader sense of the term (see Buzan, 1997), rather than water 'conflict' should ideally be the basis and end-goal for addressing social water scarcity. The section also considers that while relationships between the state and water users and among various water users are critical to determining distributions of structurally-induced water scarcity and abundance, it is also important for institutional responses to be based upon clearer understandings of people's multiple water uses and needs. From such perspective, focus by this section is on empirical findings on people's adaptation and coping strategies, on the one hand, and institutional responses vis-à-vis water services and resource management planning and implementation towards meeting both human and socio-economic rights to water, on the other hand.

A subsidiary intention of this section is to test a tenet inherent in hypotheses by a number of scholars (Atkinson, 2007; Johnston & Bernstein, 2007; Botes et al., 2007; Gouws et al., 2009) that a discrepancy between people's perceptions and institutional responses, in terms of policies, laws, standards, structures and processes of water service provision, is often at the core of violent and nuanced social water scarcity-related protests (see Chapter 3 of this report). The presence or absence of protest action is noted in all selected case studies.

Despite that much of the ongoing water-related protest action and associated debates revolve around issues of service delivery, this section deliberately breaks away from the confines of service delivery hypotheses by various scholars (Atkinson, 2007; Johnston & Bernstein, 2007; Botes et al., 2007; Gouws et al., 2009) and instead straddles the artificial divide between human and socio-economic rights to water, which emanates largely from the dualism in South African water laws. These are the Water Services Act (Act 108 of 1997) and the National Water Act (Act 36 of 1998). This approach was informed by a recognition of the complexity of livelihoods and therefore the need for MUS approaches in water governance, resources management and services development planning (Van Koppen et al., 2006; Maluleke et al., 2005; Cousins et al., 2007; Cousins et al., 2006; Moriarty et al., 2004). Hence, although empirical research secondarily sought to test prevailing the service delivery hypothesis, the study was not limited by such hypothesis.

4.2 RESEARCH METHODOLOGY

Qualitative and quantitative methods were used as appropriate to each case study context. Two units of analysis were 'community' and 'household' levels. At the community level, principal data collection methods included focus group discussions, meetings and interviews

with key resource persons. At the household level, a few households were selected in each study site for in-depth interviews, with the aim of gaining in-depth qualitative and/or quantitative understandings of issues. At the institutional planning level, data was collected through in-depth interviews of key resources persons, such as technical officers responsible for Water Services Development Plans (WSDPs). Logistical factors dictated that the study come up with indicative insights rather than findings based on quantitative statistical rigour.

Community- and household level field studies included the qualitative and quantitative mapping of formal domestic water use and informal water economies. Such mapping analyzed and documented case studies of social water scarcity, water uses and processes of securing water access in endogenous (or local, customary; either individual or communal) and exogenous (publicly supported usually communal) infrastructure development.

Attention was given to geographical contexts characterized by 'social scarcity of water' (see Chapter 2 of this report). For analytical rigour, a 'control group' approach was used in the selection of case studies. Attention was therefore given to, on the one hand, cases in which social protests and movements had emerged around water scarcity, use and service delivery issues and, on the other hand, cases demonstrating a lack of such phenomena despite pervasive water scarcity. The latter group included cases whereby local responses had not evolved into definable social protests and movements. Criteria selecting case studies were guided by findings of the literature review (see Chapters 2 and 3 of this report). In order to accelerate processes of gaining community entry and thereby achieve planned output within the short time frame for empirical research, study sites were purposively identified through consultations with municipalities, civic society organizations and research institutions with a history of working in relevant contexts.

4.3 CASE OF SANNIESHOF, NORTH WEST PROVINCE

4.3.1 INTRODUCTION

This section presents the case of a small town called Sannieshof in the North West Province, where a team of researchers conducted empirical research from 26 to 29 November 2009[2]. Sannieshof has experienced critical levels of water scarcity, both qualitatively and quantitatively. Black and white residents commonly perceive such scarcity to be due to structural factors mainly relating to problems of governance and institutional failure. Sannieshof residents have voiced their discontent and adopted interesting non-violent strategies of dealing with social water scarcity.

Initially, this section presents the background to Sannieshof. This is followed by a discussion of the socio-economic profile of the town, which highly influences water delivery plans. After this, findings from surveys conducted in Sannieshof in November 2009 are outlined. Methods used in field surveys researcher included a focus group, in-depth interviews and questionnaires. Findings address issues of access to water in terms of quantity, quality and people's involvement in planning, implementation, monitoring and maintenance of water resources and infrastructure; water use, expectations and aspirations of community members. The section then gives an overview of some of the coping strategies from the

[2] Research conducted by Kholisa Sigenu, with support from Barbara Tapela and assistance from Portia Ngxangane

community and plans by government. Finally, conclusions and recommendations are made towards further planning for water delivery, monitoring and maintenance in Sannieshof.

4.3.2 BACKGROUND TO THE CASE STUDY

Sannieshof is a small town in the North West Province of South Africa. The province has a total population of about 4 million people. North West Province covers an area of 116 320 km² and is landlocked between the Free State Province, Gauteng Province, Northern Cape Province and Botswana. Although the province is landlocked, it shares its resources with areas outside its boundaries. For example, it contributes approximately 6% to the National GDP (DWA NW: 1). It is a predominantly rural province with a low population density. Population dynamics of this province are, however, changing. People are settling in townships instead of moving back to the homelands and remaining in local farms. Secondly, the province has a problem of unequal and "pocket" development, with large disparities between its urban and rural sections. The province is currently faced with huge service delivery backlogs and is characterized by insufficient bulk infrastructure thus impacting on the eradication of the water service delivery backlog.

Within North West Province, Sannieshof is situated in the Central District. The town is located in Tswaing Local Municipality, which falls under Ngaka Modiri Molema District Municipality. The local municipality is the water services provider (WSP) while the district council is the water services authority (WSA). The fact that the local and district municipal area is predominantly rural, with a low population density, means that there is lack of revenue, difficulty in mass service delivery and limited financial viability.

Sannieshof has three (3) residential areas namely, Sannieshof central residential area, Agisanang Sections One and Two, and Agisanang Section Three, also known as "Pelhindaba". Sannieshof central residential area is a former 'white suburb', while Agisanang Sections One and Two are parts of a post-1994 formal low-cost residential area occupied mostly by black people. Pelhindaba is a recently established informal settlement.

According to Gouws et al. (2009), Sannieshof's history is intricately linked to the history of the geographical area within the North West Province. The area has a unique cultural identity that has evolved in what used to be the Western Transvaal. Sannieshof is in a region that has a long tradition of conservative Afrikaner political sentiment. Many white Sannieshoffers are in fact descendants of the founding fathers of the town who were mostly Anglo-Boer War guerrilla fighters (Tempelhoff, 2009). Black residents, however, have largely settled within the town more recently, mainly after 1994 with an accelerated rate of settlement in the past few years.

Like many other small South African towns, Sannieshof has not been widely known outside provincial boundaries. Despite this, the town has historically been famous for two main reasons. Firstly, it was established in a politically significant area. The town is located on a farm where General J. H. De la Rey (1847-1914), who was a famous commander of the Boer troops of Western Transvaal during the Anglo-Boer War of 1899-1902, defeated the British (Gouws et al., 2009). Secondly, the town has been famous for its economy. Sannieshof once had the biggest maize silos in South Africa (Ibid.). During the past few years, however, Sannieshof has received bad publicity.

Residents of the town have taken non-violent action against the municipality due to poor service delivery. Main sources of discontent have been related to water supply and sanitation (Tempelhof, 2009: 5). As a result of a 'declaration of dispute' by members of a local organization of ratepayers, which is affiliated to the National Taxpayers Union (NTU), Tswaing Local Municipality has joined North West Province municipalities that have come under the spotlight as a result of little or non-existent service delivery.

4.3.3 SOCIO-ECONOMIC PROFILE

4.3.3.1 POPULATION CHARACTERISTICS

The population of Ngaka Modiri Molema District Municipality (NMMDM) is estimated at 858 876 people and households are estimated at 209 045 (DWA: 2009). Tswaing Local Municipality serves a population of about 114 157 people in the following towns: Delareyville, Ottosdal and Sannieshof. Sannieshof itself has a population of about 46 400 people. According to key respondent 'Ramagaga', who was interviewed in November 2009, this population is expected to grow even further due to the ongoing mushrooming of informal settlements.

According to the Tswaing Local Municipality Integrated Development Plan (IDP), this local authority has a predominantly (72%) young population that is aged less than 35 years and has a predominantly (96%) black African population. This shows that the municipality has a youthful population that consists mainly of historically disadvantaged individuals (HDIs). Implications of this are that a significant amount of social spending is required in the municipality. Age and race statistics of the broader local municipality apply to Sannieshof.

Households in Tswaing municipality consist of an average of five (5) members or less. Gender composition of population is such that the proportion of females in the municipality is slightly higher (51.6%) than that of males (48.4%). This difference in gender needs to be considered and catered for at all times when planning for water service delivery.

The above statistics highlight some of the challenges facing Tswaing Local Municipality. The fact that the population of this municipality is highly dependent and poor means that a robust and dedicated plan is required to reduce poverty, unemployment and inequality while improving quality of life and ensuring sustainability of livelihoods.

4.3.3.2 EDUCATION

Levels of education in Tswaing Local Municipality are relatively low, with a small proportion (15.8%) of people holding a matriculation certificate while the majority has primary level or no formal or education. This poses a challenge for the municipality, which has difficulty in finding skilled workers that meet affirmative action requirements.

4.3.3.3 ECONOMY

Main economic activities in Tswaing Local Municipality range from agriculture (60%), mining (20%) and tourism (10%) (Tswaing Local Municipality Amended IDP: 2007-2011). The combination of primary industries and low literacy levels result in generally low incomes for

the majority (82%) of households, who earn less than R1 500 per month. A small proportion (8.8%) earns between R1500 and R3 500 per month.

The rate of unemployment is lower (34.2%) than that of most similar provinces in South Africa, such as Limpopo, Eastern Cape and KwaZulu-Natal. Unemployment statistics, however, mask the fact that there are probably fewer people in the economically active group. According to the IDP, the non-economically active population is 45%.

4.3.4 POLITICAL DYNAMICS AND IMPLICATIONS FOR MUNICIPAL SERVICE DELIVERY

Since 1994, Sannieshof and Tswaing Local Municipality have been affected by the troubled post-apartheid politics of the province. According to the ANC NEC Task Team (2009), the North West Province is experiencing a high level of intra-organisational demobilization and tension. During the early years of democracy, the North West Province had to bring together a diverse group of people from Western Transvaal, Northern Cape, Eastern Cape and the former Bophuthatswana. This has resulted in factions in the province, including a suspected 'TALIBAN' group.

The TALIBAN group is suspected to have wreaked havoc in provincial governance. Much of the impact has been felt at local municipal level, such as in Tswaing Local Municipality. The impact on local government described in the NEC report (2009) is as follows:

- Loss of institutional memory and human capital as most (90%) of the Mayors, Chief Whips, Municipal Managers and key Directors were not returned to their posts as a result of infighting.
- Prescribed roles and functions of municipal office bearers were collapsed into political committees in every municipality against sound governmental practice.
- Many municipalities employed large groups of general workers as rewards for their support during conferences. This impacted negatively on the budgets of especially small municipalities like Tswaing. Municipal budgets were eroded by inflated wage bills at the expense of service delivery.
- Lack of control by the provincial government over municipal functionaries and profiled service providers, many of whom had highly suspect capacity.
- In-fights between councils and the administration resulted in ineffective and sometimes dysfunctional councils and too weak and highly politicized workforces, which in turn impacted negatively on service delivery.

Furthermore, there has been a problem of fraud and corruption, which includes nepotism and irregular appointment of staff; irregular awarding of tenders; taking of bribes and kickbacks from service providers; abuse of resources like credit cards, council property and vehicles; and irregular sale of land and council property. Secondly, there are dysfunctional caucuses, troika and council committees. This makes it more difficult for the municipalities to be transparent and for councillors to communicate with their communities. Thirdly, there is no good corporate governance. Policies are simply not implemented, and there is no accountability for the ongoing irregularities. Fourthly, there is internal financial mismanagement. This includes irregular payments of learning stipends and wasteful expenditure. Fifthly, there are labour issues. These include lack of skills development

programmes or committed training in many municipalities and selective training that benefits only a small majority in municipalities. Discrepancies have also been noticed between existing organograms (where these do exist) and appointment of staff. There is also the problem with the inflation of the labour force with general workers, who are neither properly qualified nor properly utilised by the municipality. Lastly, and probably the most important fact is the problem with service delivery. Municipalities have not been capable of managing their finances or to budget for meeting basic service delivery priorities. There are also incidences of favouritism by councilors in the assignment of projects to their wards, resulting in the IDP being meaningless and communities being deceived by being used for political objectives.

The NMMDM and the TLM have been highly implicated in most of the problems highlighted above. This is quite clear because people in the TLM have been experienced a non-existent service delivery and management has been quoted as being non-responsive. What does this mean for water delivery in this town?

4.3.5 WATER SCARCITY AND WATER USE ISSUES

The study found that Sannieshof residents do not have adequate access to water. Water scarcity is due to both structural and environmental causes. Sannieshof water users have to deal with poor water quality, which results from pollutants and contaminants, and insufficient quantities of water. Infrastructure for water supply is inadequate for the demands of a growing population. Available infrastructure has not been properly maintained. A particularly pressing issue, according to respondent Sannieshof residents, is the need for a proper water and sanitation plan. Water delivery issues of Sannieshof are best understood in the context of water resources in the North West Province. This section begins with an overview of Sannieshof's water sources and proceeds to examine water service delivery issues. Particular attention is given to people's experiences and voices regarding water scarcity. Effectively, the account adopts a social stance in examining the linkage between water scarcity and people's expectations and aspirations for water service delivery.

4.3.5.1 WATER SOURCES

Sannieshof falls under the Lower Vaal Water Management Area (LVWMA). It depends on underground water for domestic water resource. Ngaka Modiri Molema District Municipality is the Water Service Authority and Tswaing Local Municipality is the Service Provider. The North West Province is therefore a water scarce province and the water is becoming increasingly stressed.

The province is generally an arid area, with low mean annual rainfall and high rates of evaporation. Water resources are constrained by unpredictable rainfall, low annual runoff, few surface water storages, human impacts within catchments, such as mining-related water pollution, and various structural factors. North West Province relies mainly on surface and ground water sources, which are largely integrated and interdependent. The dolomite geology provides 'eyes' and springs that constitute sources of several major rivers within the province, such as Great Marico, Mooi and Molopo Rivers.

There are two major catchment areas within the borders of North West Province. These are the Limpopo and Vaal River catchments. The Vaal catchment area is divided into Upper, Middle and Lower Vaal. The rivers and streams are characterised by highly variable runoff, which increases from East to West and which makes direct utilization by runoff or river abstraction unfeasible, with an exception of small consumers abstracting water from major rivers. There are twenty-eight (28) large impoundments within the province. Water from these impoundments is mainly used for domestic, agricultural, industrial and recreational purposes. The North West Province also depends on inter-basin transfers since it shares borders with three other provinces and Botswana.

Although there is some surface water in the province, groundwater is regarded as a more viable source of water. Groundwater is, in many instances, the only source of water for rural people in the region. According to the State of the Environment Report (2002), more than 80% of rural communities in the province depend on groundwater as a sole source of domestic water.

The quantity of water in the province is compromised by abstractions and water storage systems, which interfere with the river flow. The quality of the water on the other hand is negatively affected by impoundments, pollution of surface water by industrial affluent, acid mine drainage, agricultural fertilizers and domestic sewage. The Marico and Molopo Rivers in the Central District Council are mostly polluted by the treated and untreated domestic sewage. Shortage of surface water and the inter-linkage of ground and surface water sources make it imperative to safeguard and monitor groundwater resources, in particular.

4.3.5.2 WATER SERVICES DELIVERY ISSUES

Research shows that Sannieshof has been experiencing social water scarcity in terms of quantity and quality. Pelhindaba is abuzz with residents who carry water drums, seeking sources of water from early in the morning until very late at night. Judging by the time they spend collecting and conveying water, it might appear that Pelhindaba residents use much higher quantities of water than other residents of Sannieshof. However, these water users suffer the most severe water scarcity within the town. They have invested in twenty (20) litre drums and go-carts for conveying water from communal water points, which are located often more than two hundred metres (200 m) away from homesteads (see photo on page 10). This is despite that official data portrays good water services delivery. The DWA Water and Sanitation National Information System (WS NIS) database indicates that almost all (99.6%) of Sannieshof residents have access to water at greater than RDP standards, while most (95.5%) have sanitation at greater than RDP standards. Municipal IDP data on water access (Table 6) affirms DWA statistics. The validity of official statistics, however, has been strongly contested by residents in this municipality, particularly in 2005.

TABLE 6 WATER SUPPLY SERVICES IN TSWAING LOCAL MUNICIPALITY AND NGAKA MODIRI MOLEMA DISTRICT MUNICIPALITY

Water Access	Tswaing %	NMMDM %
Inside the house	13	18
In the yard	32	25
Community Stand	27	18
Community stand over 200 m	18	17
Borehole	8	15
Spring	0.1	0.1
Rain tank	0.2	0.4
Dam/Pool/Stagnant Water	0.1	0.3
River/Stream	0.1	0.6
Water Vendor	0.1	2.2
Other	1	3.7
Total	**100**	**100**

Source: Ngaka Modiri Molema District municipality IDP

According to respondents, Sannieshof as a community depends on underground water for supply. This water is pumped into two (2) reservoirs. These reservoirs then pump water into six (6) local boreholes. According to a key respondent, Mrs Carien Visser, there is only one strong borehole, and that is borehole 'Number 6'. Water is then transferred into taps. Some Agisanang residents receive water inside houses and through yard taps. Others receive water from yard taps only. Residents from Pelhindaba, on the other hand, access water from communal taps or 'stand pipes'. Pelhindaba is reported to have three taps (Tempelhof, 2009), which service a population of more than six hundred (600) households[3]. During groundtruthing interviews with Pelhindaba residents, however, respondents pointed out that there were ten (10) communal taps but only two (2) are actually functional. Figures 6 and 7 show the two taps that were actually functional. The rest of the communal taps dried up a while ago.

All respondents agreed that they had had a water point breakdown at some point over the past year. Reasons mentioned by the respondents are listed in Table 7. A common reason was that the supply system broke down above and below ground. According to one respondent, the system broke as a result of lack of maintenance by the municipality. Respondents further stated that when there is a breakdown of water supplies, a fire engine

[3] Interview with Carien Visser, held in Sannieshof on 26 November 2009).

belonging to the town's fire department was used to deliver water to residents. However, such water is not sufficient in term of quality and quantity (Focus group, 2009).

FIGURE 6 ONE OF TWO FUNCTIONAL TAPS IN PELHINDABA, LOCATED CLOSE TO A PRIMARY SCHOOL

FIGURE 7 A SECOND FUNCTIONAL TAP IN PELHINDABA, LOCATED CLOSE TO THE COMMUNITY HALL

TABLE 7 REASON FOR BREAKDOWN OF THE MAIN WATER SOURCE

AGISANANG	PEHLINDABA	SANNIESHOF
• System broke above ground	▪ System broke above ground	• System broke above ground
• Children break the taps	▪ Rusted	
• Lack of diesel/petrol	▪ Water point went dry	

Findings by the study were also that there has been a great deal of conflict regarding the quality of water in Sannieshof. Since 2007, the Sannieshof community has experienced water quality problems in their town. This was confirmed by management of the internationally acclaimed Barberspan Bird Sanctuary. The quality of water in the area is heavily impacted on by unmanaged raw sewage. Although there were no laboratory test results to confirm this, many respondents stated that the Sannieshof oxidation pond has been highly implicated in water pollution of this area. Perceptions of pollution were largely aesthetic. Respondents from Pelhindaba stated that, "There are black elements in the water that comes out of the communal tap"; "We have heard that there is a problem with the water"; and "The water is smelly sometimes". Respondents from water services management institutions also acknowledged that there was a huge problem with sewage that seeps underground and affects groundwater. However, there seemed to be a 'blame game' regarding who was responsible for the causing problem and solving it. This was evident in statements such as:

> *There is water pollution in Sannieshof. This problem started years ago. The water in this area is not polluted only by the Sannieshof sewage system but by upstream sewage systems as well. It is actually a miracle that we have not experienced any water borne diseases yet* – Municipal Manager.

4.3.6 COMMUNITY STRATEGIES FOR DEALING WITH WATER SCARCITY: NON-VIOLENT ENGAGEMENT

In 2005, Sannieshof residents experienced one of their worst nightmares. They went for four (4) days without water. After that, the Sannieshof community came together to form a social movement called Sannieshof Inwoners Betalers Unie (SIBU). In 2006 this organization, which was informal then, initiated communications with the Tswaing Local Municipality and received no response from the municipality. In 2007, SIBU was formally established. Despite this, according to both SIBU and the local municipality, communication had not been very successful. The municipality stated that SIBU kept shifting goal posts while SIBU argued that it had not seen any proper delivery from the municipality. Due to unresolved challenges of engaging with the municipality, SIBU had since adopted a 'hands on' approach to tackling issues of poor water management in the town.

4.3.7 INSTITUTIONAL RESPONSES TO WATER SCARCITY

4.3.7.1 TSWAING LOCAL MUNICIPALITY

Tswaing Local Municipality's municipal manager, Mr Dakota Legoete, agreed that there were major problems regarding water resources in Sannieshof. His major concerns included:

- The rapidly growing population in Sannieshof. According to the manager, this growth had not been predicted for his town and was therefore "interfering" with existing water service delivery plans;
- Climate variability, which influenced assurance of water quantity in the municipality;
- Water pollution in Sannieshof, which is attributed to lack of planning from those who were managers before him. The municipal manager also attributed water pollution to pollution problems from upstream towns, such as Ottosdal. While Sannieshof's waste water treatment plant was in need of attention, if sewage was not monitored from upstream, Tswaing Municipal efforts downstream would be to no avail;
- Lack of sector departmental planning. For example, there was no proper coordination with the Department of Human Settlements; and
- Lack of funds was a major problem. The manager acknowledged the value of a DBSA initiative of R80 million to boost technical capacity in the municipality. However, he was concerned about the lack of active involvement of the province and district government in capacity building through investments in the training of requisite personnel.

4.3.7.2 DEVELOPMENT BANK OF SOUTHERN AFRICA TECHNICAL SUPPORT

According to DBSA Technical Expert, Ms Nosihle Mbonani, water service delivery challenges related to five core issues. These were water supply, municipal staffing, water services development planning, roles of DWA and institutional coordination. Each of the issue is outlined below.

Water Supply Issues

Sannieshof uses groundwater which is pumped through using electricity. When there are disruptions with the electricity, there are water disruptions. The water is also not purified. It is extracted straight from the ground, into the boreholes and into supply. A critical challenge was that there were no regulatory policies at all in Sannieshof. At the time of the study, there were rural villages with lower than RDP standards of water supply and reservoirs were empty. In formal low-cost housing areas of urban centres, such as Agisanang in Sannieshof, the majority of water users had RDP standards of water supply and sanitation. Such areas were composed largely of new settlements of people who had been displaced from the farms due to increasing mechanization and land reform related uncertainties. Most (approximately 60%) of the residents of settlements such as Agisanang were unemployed. Regarding informal urban settlements, such as Pelhindaba in Sannieshof, there were no existing policies to deal with the mushrooming of communities or plans for the ever expanding informal settlements. There was also no list of indigent households. As a result,

poor residents were paying the same water tariffs as commercial water users within the town. Consequently, such settlements experienced a general lack of social services.

Municipal Staffing Issues

A key challenge to water services delivery was Tswaing's lack of human resources capacity. Although the municipality had a technical director, who was responsible for management of operations, there was a vacuum between this functionary and manual labourers, who had low skills levels. DBSA played an advisory role and transferred technical skills but there was no one to whom such skills could be transferred in the municipality. This was because politicians and the municipality were deploying people with no skills. Trade Unions also had a stake in maintaining such a *status quo.* In effect therefore, both the unions and political dynamics were halting progress, and there was no real effort or commitment to impart skills to people. Those with skills were refusing to settle in a rural area with disincentives, such as 'inadequate' salary packages.

Planning Issues

No water services development plans (WSDPs), plans for improving the sewage treatment works and plans for the upgrade of infrastructure were in place for Sannieshof. Plans that were supposed to have been place since 1994 were not there. In attempting to provide technical expertise, DBSA staff had had to find their own way around municipal planning records and procedures, particularly archival town planning records. Although national level political leadership, in particular the Minister for the Department of Cooperative Governance and Traditional Affairs (DCGTA), Mr Sicelo Shiceka, had intervened in municipalities within the province, municipal business tended to go back to normal or worse after visitors had gone back to Gauteng.

In the view of the respondent from DBSA, the key to solving to the problem of water service delivery lay in sound Financial Management. Ongoing constraints were that the municipality did not generating any income (at the time of the study). There was not enough 'equitable share'. The budget on paper was not a reflection of the experiences on the ground. There was not much money to do anything and the municipal personnel were therefore rendered ineffective. Money received from the rates paid by water users was normally used to upgrade settlements with poor endowments in water and sanitation infrastructure so that they could reach RDP standard. Given the high dependency ratio, unemployment rates and rapid growth of informal settlements within Tswaing, lack of funding made it difficult to upgrade facilities in Sannieshof. This had caused and reinforced difficulties in water and sanitation services delivery and ultimately led to the formation of SIBU, which declared a dispute with the municipality, withheld collected rates and independently fixed water infrastructure. The poor sanitation system complicated issues further as the sewage pond was located close to an aquifer while domestic water was not purified. In the view of the DBSA respondent, it was a miracle that there had been no water borne disease outbreak in Sannieshof. This view was echoed by most of the respondents interviewed by researchers.

Funding issues were also affected by the relationship between the local and district municipality, which was complicated by lack of a proper system to monitor funds. Consequently, the local municipality used its own funds to implement water services

delivery but was later not able to claim such expenditure from the district municipality, which is the WSA. There was also no service level agreement between the two municipalities, and no organogram to guide staffing to ensure that the local municipality recruited sufficiently qualified staff to manage finances.

4.3.7.3 DEPARTMENT OF WATER AFFAIRS (DWA)

The Department of Water Affairs was mostly responsible for technical support and regulatory roles, hence the department had been requested to assist with the problem in Tswaing Local Municipality. With regard to the inadequate Waste Water Treatment Plant, DWA had agreed to assist. According the DWA NC Portfolio Committee (26 August 2009: 28), fifty-eight million rand (R58 million) was needed to solve the problem but the municipality had received R2 million of that amount.

4.3.7.4 COOPERATIVE GOVERNANCE BY VARIOUS INSTITUTIONS

Interventions to resolve the water and sanitation crisis in Sannieshof had brought together a number of institutions, including the Department of Cooperative Governance and Traditional Affairs (DCGTA), DBSA, DWA and the local and district municipalities. These had put in place plans to deal with the crisis.

DCGTA was responsible for ensuring efficient water services delivery. The department had been requested to assist with water and sanitation backlogs in Sannieshof. In 2005 the department reached an agreement with DBSA and other stakeholders. On 30 November 2009, a meeting was held by DCGTA and DBSA in which they discussed major challenges affecting municipalities. Such challenges included:

- Backlog in water and sanitation delivery since 2005. According to the backlog study, NMMDM is one of the District municipalities with a huge water backlog.
- Water loss as a result of old infrastructure
- Water is not always on top of municipal lists even though it is a basic service.
- Difficulty in planning due to migration and informal settlements which are mushrooming everywhere
- Need more support in upgrading water infrastructure
- Delayed projects because there are no drawings that show what has been done before to assist with new projects. There is lack of institution memory.
- Uncoordinated planning with other sector departments, for example, the Department of Human Settlements
- Policies such as Municipal Infrastructure Grant (MIG) and Bulk Infrastructure Grant (BIG) did not favour small municipalities. Bigger municipalities receive more favour because “they will impact on a larger population” as opposed to smaller municipality. This is improper as smaller municipalities are not even able to collect proper revenue.
- There are no investors in smaller towns because there are no basic services
- Water Service Authorities such as NMMDM do not have enough capacity or ability to recover costs. Power struggles are making matters worse.
- There is constant pressure that comes with elections.

DWA and DBSA's plan to assist with the TLM problem included:

- Plan with municipality. The biggest mistake often made by municipalities and government was that they plan for the people and then try to integrate them into the plan.
- Integrated planning including service providers, municipalities and communities
- Provide support and services
- Integrate policies such as revenue, MIG and BIG
- Strategy for mushrooming influxes
- Bridging finance for struggling municipalities whilst awaiting funding from Province.
- Dispatching technical experts to assist struggling municipalities
- Skills development for officials
- Deploy technical assistants to municipalities without technical capacity

4.3.8 DISCUSSION

The case of Sannieshof provides insights into group dynamics arising from perceptions of deprivation that are underpinned, on the one hand, by historical and recent experiences of improved services and, on the other hand, unmet expectations. The former are associated with both white and black people living in established and newer formal residential areas, while the latter pertains to new immigrants who reside in the recently emerged informal settlements. Perceptions of a 'water crisis' had served to bring about consensus on need for improved service delivery among water users, whose historical and socio-economic differences have hitherto constituted intractable divides. Notions of a water crisis arose from perceived deterioration of water quality due to contamination of domestic water supplies by sewage waste from a poorly-managed sewage treatment works, and a concomitant lack of financial and technical capacity in both Tswaing Local Municipality, which is the WSP, and Ngaka Modiri Molema District Municipality, which is the WSA.

At the time of the study, water scarcity resulting from perceived sewage contamination and inadequate infrastructure had not resulted in violent responses by residents of Sannieshof. This contrasted with violent protests that had emerged in Khayelitsha (see next section of this report). Sannieshof's economic, social, political and demographic characteristics and dynamics, as well as water service planning challenges generally resembled those of similar towns, such as Philippolis (see Deliverable One Review Report of this project). However, there were differences. Whereas residents of Philippolis had harboured "a quiet storm" (according to Atkinson, 2008), fewer black than white residents of Sannieshof, who were members of a local branch of the National Taxpayers Union (NTU) known as Sannieshof Inwoners Betalers Unie (SIBU), had declared a legal dispute against responsible municipalities. Such protest manifested in a withholding of municipal rates by SIBU members, who had established a trust account for deposits of all received payments and effectively established also a *de facto* water services governance structure that co-existed parallel to the democratically-elected municipality. At the time of the study, the majority of black residents of Sannieshof, particularly residents of Pelhindaba who suffered most from water scarcity, had not engaged in such non-violent protest or any form of violent protest. A curious peculiarity about Sannieshof was that the town's non-violent protest had been most visibly driven, at least in the public political action space, public media and in the law courts, by a one-woman act!

Although SIBU's protest action appeared benign enough in its non-violent nature, it had effectively contributed to the creation of a *de facto* governance institution parallel to the elected municipal council. SIBU's withholding of rate payments had enabled SIBU's membership to provide its own water services and thereby ensure assurance of supply. However, the same action had effectively 'fenced off' financial resources mobilized from the more affluent residents, thereby excluding the poorer residents from access to these public resources, through such mechanisms as cross-subsidization. Notwithstanding that the municipality had contravened, through institutional failure, legal responsibilities to ensure the human right to water to its constituency, the enclosure of financial resources by SIBU also had dire implications for redress of inequalities. More significantly, however, was the fact that the economic privileges and greater access to water and hydraulic infrastructure enjoyed by the majority of SIBU members were procured through state expenditure of public funding, both in the past and at present. SIBU's protest action therefore represented 'resource capture'. However, in the absence of an effective municipal governance structure, ANC representatives in Tswaing municipality and elsewhere had lost the moral high ground to sanction non-violent protest by SIBU.

4.4 CASE OF KHAYELITSHA, CAPE TOWN

4.4.1 INTRODUCTION TO THE CASE STUDY

Khayelitsha Township is located in the Western Cape Province, within the City of Cape Town Metropolitan Council. It is situated thirty-five (35) kilometres south of Cape Town central business district (CBD) and is bordered by the N2 highway to the north and False Bay to the south. Khayelitsha is the largest township in Cape Town. However, data on population size varies. Khayelitsha Population Register Update, which is a collaborative project involving community organisations and government departments, estimates that in 2005 the population was 406 779 (Maverick cc, 2006). By contrast, the Department of Water Affairs (DWA) Water Services National Information System (WSNIS) database indicates that Khayelitsha has a total population of 325 897 people. The discrepancy points to difficulties with determining population size, partly due to the rapid growth of informal settlements within the township. The township has a complex political, social and economic history, and the majority of residents live in chronic poverty. The township has been a site of numerous violent social protests against poor municipal service delivery, particularly in the recent past. Water has featured among reasons for protests.

DWA WSNIS statistics indicate that a small proportion (2.39% or 7775) of households have access to water below Reconstruction and Development Programme (RDP) levels, while the majority (97.61% or 318 122) have access at greater than RDP levels. A relatively small proportion (8.79% or 28 632) has lower than RDP levels of sanitation services, while the majority (91.21% or 297 265) has greater than RDP levels. Quantitatively therefore, Khayelitsha might be said to have a relatively low prevalence of water scarcity since most of the households have above RDP standards of access to water. This contrasts sharply with the relatively high prevalence of social protests.

Nleya et al. (2009) observe that there is a complexity of causal factors underlying social protests in Khayelitsha and similar sites. A recent study by these scholars found that:

- Service delivery grievances are not the only ones at the heart of protest, but deep rooted poverty, as exemplified by lack of income and dire livings conditions, is associated with higher levels of protest;
- Fear of crime is associated with higher protest levels;
- The level of community engagement through meetings, local organisations and street committees is a significant predictor of protests;
- Protests are higher for groups with higher levels of trust in the Presidency and parliament as well as the mayor and councillors, which indicates use of protest as a vehicle for active citizen participation rather than insurrection; and
- Influence of personal factors such as educational levels, employment, and age is largely ambiguous and affected by the complexity of the relationships.

On the basis of findings such as these above, this study sought to deepen understandings of linkages between water scarcity and societal expectations for service delivery, as well as the dynamics between water scarcity and social protests[4]. Focus was on two selected sites namely, Site B and Site C of Khayelitsha. Within these sites, attention is given to 'BT' Section of Site C and 'QQ' Section of Site B.

A hypothetical view by this study is that the historical political economy of pre-1994 South Africa and Cape Town metropolitan area, in particular, is a key factor underlying water scarcity and service delivery in Khayelitsha, but that contemporary institutional interventions have also not fully addressed people's needs, expectations and aspirations for water and related service delivery. From a historical perspective, Khayelitsha Township signifies failure by the apartheid government to restrict the flow of Africans into the Western Cape. Prior to 1994, the Western Cape region was intended to be an exclusive domicile for white and coloured populations. In 1983, half of Cape Town's African 'migrant' population of 250 000 was considered illegal and largely lived in informal settlements (Bishop, 1983). The exponential growth of Khayelitsha since its first settlement in 1985 has largely been due to a steady flow of people mainly from the Eastern Cape following removal of influx control legislation in 1986 and attainment of freedom in 1994. While there have been attempts since 1994 to provide formal access to water, housing and other services, the rapid growth of population in Khayelitsha does not appear to have been matched by adequate provision of municipal services.

Data from the 2001 national census reveals that more than half (57%) of Khayelitsha residents mostly live in informal settlements, about a third (30%) live in formal houses, while a small proportion (7%) lives in backyard shacks (City of Cape Town, 2005). With only 30% of the population of Khayelitsha living in formal housing, similar patterns are observed with regard to access to water and sanitation services. Roughly 30% of households have yard and in-house water and sanitation facilities. The majority (70%) of households is largely confined to use of communal taps or 'stand pipes' for water supply and inadequate or no access to sanitation. In a study of water services in Khayelitsha, Thompson & Nleya (2008) found that while most (63%) of those living in formal housing were happy with water supplies, more than half (51%) of informal settlement dwellers were dissatisfied. Similarly,

[4] Empirical study conducted by Ndodana Nleya, with assistance from Bukiwe Ntwana.

most (67%) of residents in formal housing were satisfied with sanitation services while the majority (84%) of informal housing dwellers were not. Satisfaction with water and sanitation services was therefore higher for residents of formal housing than for informal settlement dwellers. Lack of sanitation services in informal housing areas seemed to account for the bigger disparity in satisfaction levels between these two groups. The case studies in BT Section of Site C and QQ Section of Site B can be seen in the light of the above statistics.

4.4.2 BT SECTION OF SITE C: NEGATIVE IMPACTS OF FORMALIZATIONOF PROPERTY RIGHTS ON ACCESS TO WATER

4.4.2.1 BACKGROUND

The BT Section (hereafter referred to as 'BT') is an informal settlement that is sandwiched between Lansdowne Road and what were formerly the so-called double occupancy[5] plots in Site C, Khayelitsha. Much of this land forms part of a road reserve – the land between the road kerb and the front property line of private land encompassing the verge, footpath and strip of public space. Some of the residents have been settled in BT since 1988, which is three years after Site C double occupancy plots were allocated as part of measures to accommodate large numbers undocumented illegal black migrants in Cape Town, who could then be 'put under the gaze of the state'. In the double occupancy plots, the municipality provided a shared tap and a bucket toilet for the two households in the plot, who in turn often built shacks within the plot. In due course, almost every available open space in Site C became occupied by shack dwellers.

In 2009, twenty-one (21) years since their informal settlement in Khayelitsha in the late 1980s, Site C double occupancy residents became beneficiaries of a process to formalize property rights to housing. Amid intense lobbying, the Site C upgrade project materialized as part of City of Cape Town's Violence Prevention through Urban Upgrading (VPUU) Programme. Goals of the programme were to increase the safety of residents; strengthen measures to reduce crime and violence; upgrade low-income neighbourhoods; provide social and commercial services; strengthen community structures; and introduce a model of sustainable community-based management of local service nodes and empower the beneficiary population[6]. The housing upgrade entailed construction of low-cost RDP housing units in Kuyasa Section of Khayelitsha, removal of one of the two households in each double occupancy plot in Site C for resettlement in Kuyasa and re-demarcation and allocation of remaining erven in Site C to the remaining households. The latter have since been supported through government housing programmes to build their own homes. While housing development has brought relief to residents of double occupancy plots, a downside has been reduced access to water, sanitation and electricity services and thereby increased hardship for residents of BT informal settlement dwellers.

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[5] Site C was established in 1985 as a 'transit camp' with tents being provided for two households in each of the 160 m^2 to 180 m^2 plots. These households shared a tap, and a bucket system toilet, later upgraded to a flush toilet with electricity connections added as part of upgrading exercise after 1994.

[6] City of Cape Town. 2009. Khayelitsha Urban Upgrade Programme launched. In internet [www.capetown.gov.za], 29 May.

Prior to the upgrade, most of BT dwellers relied on their neighbours in double occupancy plots for access to water supplies, toilets and electricity[7]. Since 2002 at least, the double occupancy plots in Site C have been exempt from municipal rates, which include water and sewerage charges. This is due to valuations by a 2006 Municipal Evaluation Roll, which put the value of the majority of Site C properties consisting mostly of shacks at mostly between R3000 and R6000. Such valuations were well below the upper limit of R88 000 required to qualify for exemption from rates as specified in the City of Cape Town's Tariff Policy and the Rates Policy. Since residents in the double occupancy plots were exempt from municipal rates, they could allow neighbours living in the BT section to access water from their properties. In addition, BT residents could negotiate informal sub-connections[8] to the electricity grid with their neighbours in the double occupancy plots at a fixed monthly fee of R100 per month in many cases. Such payments were due on the first day of each month and failure to pay would lead to the connection being terminated (Malusi, 2010).

With the upgrade of housing and removal of one of the double occupancy households to Kuyasa, BT residents perceived and exploited opportunities to connect their shacks to services infrastructure left by removed households. However, the remaining Site C residents were unhappy about this and complained about BT residents to the municipality. In response, the municipality destroyed water and sanitation facilities after completion of each new Site C house. The municipality also disconnected illegally sub-connected electricity cables and moved in to have the perpetrators arrested. Electricity disconnections and arrests sparked a social protest by BT residents[9]. What compounded tension was that the new Site C home owners began to restrict public access to water and toilet infrastructure within their private properties. According to a respondent, Xolani[10], who resides in BT:

> *The construction of these houses has made our lives worse because the owners, unlike in the past when they lived in shacks, do not allow us to connect electricity from their houses...In addition they no longer allow us to use their toilets or fetch water from their taps since these are now internally connected. They accuse us of soiling their houses. They see themselves as better than us just because we live in shacks.*

While the transition towards reduced access to water and sanitation has been accompanied by a deterioration of relationships between Site C and BT residents and increasing hardship for BT residents, findings by the study were that electricity disconnections have been a more immediate grievance for BT residents. The latter has tended to be conflated with longstanding grievances, such as lack of adequate water, sanitation, electricity and housing. One BT resident, Justice Tshaka, explained, "We have no toilets, no water and no electricity,

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[7] Interview of 'Malusi' by Nleya, held at Site C Khayelitsha on February 08 2010.

[8] These sub-connections are frowned upon by the authorities and are illegal yet informal settlement communities are often willing to engage in this activity as it is often the only way of connecting to the grid outside of tapping into the overhead network which some residents do. Both these forms of connections expose residents to serious danger to electrocution.

[9] Interview of 'Malusi' by Nleya, held at Site C Khayelitsha on February 08 2010; Interview of 'Nomsa' by Nleya, held at Site C Khayelitsha on February 11 2010. Findings confirm those by Mbiza & Prince (2009).

[10] Interview of 'Xolani' by Nleya, held at Site C Khayelitsha on February 23 2010.

and we are being forced to connect electricity illegally," (Mbiza & Prince, 2009). Another BT resident, Zikhona Mgoduka, was cited by Pretoria News (2009) as saying, “We are striking because we want electricity, we want water, we want toilets. When we ask Mayor Dan Plato, he ignores us".

Apart from such conflation, protests coincided with the aftermath of 2009 elections, in which the Democratic Alliance (DA) won a clear majority in the Western Cape provincial elections thus usurping power from the African National Congress (ANC). The DA accused the ANC of political meddling through fomenting protests to undermine the DA-led Western Cape government. The new Premier, Helen Zille, said that the ANC "did it in the city when we won there, and they will do it in the province, now that we've won here” (Smook et al., 2009). The ANC responded by denying this charge and arguing that the DA was attempting to deflect attention away from its failure to deliver services to the BT residents. The ANC provincial secretary, Sipho Kroma asserted:

> *This latest conspiracy is a thinly-veiled attempt by the outgoing mayor and in-coming premier to deflect attention from poor service delivery by the City of Cape Town to poor people – and to falsely blame the ANC for violent service delivery protests in Khayelitsha*. (Pretoria News, 2009)

When probed about the role of political parties in mobilizing protests in Khayelitsha, interviewees remarked that the protests were simply a result of grievances that the community had and could not be attributed to maneuverings by political parties. For example, Nosimo, a 38 year old woman respondent who has been resident in the BT section for over 12 years explained that protests had occurred in the past as well, regardless of the political party running the city administration or the province[11]. She further said that protests had taken place during the time of former mayor Nomaindiya Mfeketo and, in any case Nontsomi Billie, who is the ANC Ward Councillor, had also been targeted during the current wave of protests ostensibly for failing to address the issues affecting the community. The respondent explained:

> *During our meeting with Dan Plato, the Executive Mayor (and a DA Councillor), we demanded that Billie to leave the meeting because she had failed to work with us to address our problems*[12].

For ethical and practical reasons, the study cross-referenced the general view by BT residents that the ward councillor was an “absentee councillor” with the councillor concerned. Ms Billie, the ward councillor, explained that many people did not understand that the position of a ward councillor is a part-time one, although many councillors dedicate virtually “whole days” towards solving ward problems. The councillor also alluded to low rates of attendance of ward meetings convened by herself, in her capacity as ward councillor. She stated:

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[11] Cape Town, and the Western Cape Province is arguably the most politically volatile city and province in the country since 1994 and have been run by the National Party, the DA, the ANC at some point or the other as voters shift their allegiances.

[12] Interview of ‘Nosimo’. by Nleya, held at Site C Khayelitsha on February 11 2010

The councillor does not do door-to-door, one-on-one meetings. I call a ward meeting at the community hall. People don't like going to the hall. People are invited but they don't attend.

The study could not establish clearly the role of social movements, in particular the Western Cape chapter of Abahlali Base Mjondolo, in mobilizing and organizing BT residents to engage in protest action. This social movement has been active in informal settlements in Cape Town, such as Joe Slovo, Macassar and TT, TR, RR and QQ sections of Khayelitsha.

Notwithstanding roles of political parties and social movements, as well as conflation of grievances, the following section examines how people living in BT experience water scarcity and lack of sanitation, from a social point of view.

4.4.2.2 SOCIAL SCARCITY OF WATER AND WATER SERVICE DELIVERY IN BT: VIEWS FROM LOCAL RESIDENTS

Findings by the study were that the water services situation in BT is precarious. While many other informal settlements in Khayelitsha are serviced with communal toilets, there are no toilets in whole of BT. Lack of ablution facilities has compelled residents to devise a number of strategies to meet sanitation needs. For many of the residents, the most attractive means of access to sanitation facilities is to ask from owners of erstwhile double occupancy plots for use of remaining external toilets in their yards. Such infrastructure, unfortunately, cannot be used at night because of property owners' security concerns and practices of locking such toilets overnight. During the night therefore, most BT residents use buckets, which are then emptied into drains along Lansdowne Road in the morning. A second option, which is largely used by male residents, is to walk across Lansdowne Road and the railway line to a thin corridor of small shrubs between the railway and a military base. Amid such challenges, most residents of BT section have insecure access to water. Those residing in the southern portion of BT access water through communal stand pipes along Lansdowne Road and are therefore better off than residents of the upper section, who have no communal water infrastructure and have to depend entirely on the benevolence of owners of former double occupancy plots in Site C.

Although the water services situation in BT section is unsatisfactory, residents downplay its significance while alluding to the importance of electricity in improving their lives. At face value, such prioritization might be perplexing, given that water is indispensable to human lives, livelihoods, food security and personal hygiene. However, perceptions of electricity as a more important need seem reasonable considering that lack of electricity often leads use of flammable fuels for cooking, heating and lighting, such as paraffin stoves and candles, which have been linked to devastating shack fires. Electricity is safer and also allows residents to use electrical gadgets associated with urbanity and modernity, such as refrigerators, electric stoves, television sets, radios and DVD players. These appliances were visible in all shacks visited, and symbolize achievement of aspirations for quality of life (QOL) and socio-economic standing. Nonetheless, the fact that water and sanitation issues continue to be conflated with demands for electricity indicates that BT residents consider adequate water and sanitation services to be important to realization of their socio-economic aspirations. Their protest action, which decidedly focuses on service delivery

issues shows that they have an expectation that the Cape Town Metropolitan Council, as a water and other services authority and provider (WSA and WSP), should guarantee.

4.4.3 QQ SECTION OF SITE B: NEGATIVE IMPACTS OF FORMALIZATION OF PROPERTY RIGHTS ON ACCESS TO WATER

4.4.3.1 BACKGROUND

QQ section is an informal settlement in Site B of Khayelitsha. The section is located on a strip of low lying floodplain between Lansdowne Road and Badi and Sihawu Crescents east of Bonga Drive. This strip of land, which lies underneath high voltage electricity power lines, is owned by Eskom, the national power utility. There are reportedly six hundred (600) families and a population of over three thousand (3000) people sharing eight (8) communal water standpipes (Poni, 2007). This gives a relatively high average density of approximately seventy-five (75) households per standpipe. There are no toilets in the whole of QQ section. The area is characterized by a relatively high prevalence of social protests. For example, there have been protests in 2005, 2007, 2008 and 2009. Such protests have related to 'service delivery' problems. The study sought to examine the linkage of such protests water scarcity and people's expectations of water service delivery.

4.4.3.2 SOCIAL SCARCITY OF WATER AND WATER SERVICE DELIVERY IN QQ: LOCAL PERCEPTIONS ON CAUSES OF PROTESTS

The main question posed to residents of QQ was "What is the main problem that is responsible for the intermittent protests in this area?" Although the main thrust of the research was to discover linkages between water scarcity and societal expectations for water services delivery, the opening question was posed in this way so as the gauge the importance of water scarcity issues relative to other challenges the community has to grapple with. Two interrelated issues emerged.

Firstly, it emerged that challenges in QQ relate to lack of toilet facilities and electricity. According to QQ residents, these services could not be provided because of the location of the informal settlement under electricity pylons. As a result, residents of QQ were demanding to be moved to a serviced site, where each household would be allocated its own plot (or "stand"), a toilet, a water tap and electricity connection. In their view, such a site would allow them to further develop their property in future. Some of the respondents from QQ section stated:

> *First of all, we don't have decent houses, toilets, electricity and refuse removal. Secondly, we therefore demand to be relocated to an area where each of us has an individual serviced plot of their own, with electricity, water supplies, and a toilet, an area that can later be upgraded with RDP housing or better* [13].

[13] Interview of 'Mthobile Qona' by Nleya on 16 February 2010.

The first thing is that we don't have toilets. We defecate into buckets inside our shacks. It is completely unacceptable for an adult to be defecating in inside living areas. The whole shack becomes smelly. My husband could even leave me because of the stink coming from my faeces[14].

We want to be moved away from this area because as you can see this place is filthy. There are no toilets and water[15].

In all interviews the residents stressed that the protests could not be attributed to once person organizing but should be seen as a community effort. The protest theatre it seems is viewed as a powerful method of 'forcing government to listen'.

We have a general community meeting when we don't get feedback and agree on the way forward. They hear us when we burn down Golden Arrow and close the N2 highway. We are not their puppets. We are full citizens. We voted. (Mthobile Qona, 16/02/2010).

An interesting part of the protests was pointed by one respondent, 'Akhona', who said that protests were carefully planned so as to have the maximum impact by involving media organizations.

When we protest, we tell the various media houses beforehand to cover our protests – electronic and print media. We don't start our protest before they arrive. It is pointless to protest in their absence. We want maximum impact for our efforts[16].

This indicates, at least to some extent, the 'triadic interface' of politics, media and protests identified in Oliver & Maney (2000), in which the media form an integral part of politics and protest, interwoven with events. The fact that the media is informed prior to protests and that protests do not start before journalists arrive indicates that media houses are not merely a vital component for dissemination of information on protests but also a key role player in the creation of protest.

4.4.4 ANALYSIS OF FINDINGS

4.4.4.1 COMPARATIVE ANALYSIS OF BT AND QQ SECTIONS

Sections BT and QQ show similarities in pervasive lack of water, sanitation and electricity services. However, the two cases show marked differences from Khayelitsha Township as a whole and even more significant divergence from the broader City of Cape Town Metropolitan area (Table 8). Such difference contradicts an overall view, such as portrayed by Municipal IQ's Municipal Performance Index (MPI), which ranks levels of service provision by the municipality among the highest in South Africa. Both the Municipal IQ's analysis of service delivery protests in South Africa in general (Allen & Heese, 2009) and this

[14] Interview of 'Thoko' by Nleya, held on 16 February 2010.
[15] Interview of 'Nokwayintombi' by Nleya, held on 16 February 2010.
[16] Interview of 'Akhona' by Nleya, held on 16 February 2010.

study's empirical research on BT and QQ reveal that there are anomalous pockets of poor access to water and related services within the largely well-provisioned metropolitan areas, such as Cape Town. This section compares and contrasts water and related service delivery issues in BT and QQ.

Firstly, both BT and QQ informal settlements lack adequate provision of social services, principally water supply, sanitation and electricity. Residents in both settlements mentioned these three most frequently, indicating that these grievances have not been attended to for a long time. Although residents of both settlements do not have formal access to housing, this requirement featured less frequently in responses.

Secondly, both settlements are located on land reserved for other uses. In the case of BT, the land forms part of a road reserve while in the case of QQ the land is owned by ESKOM and lies underneath high voltage electricity transmission lines. During interviews, residents of these two settlements underscored this fact and indicated therefore that they had been told that it would not be possible to provide better services in these respective areas. This point is confirmed by the Water Services Development Plan (WSDP) of the City of Cape Town Metropolitan Council (Box 1).

TABLE 8 BT & QQ IN THE CONTEXT OF KHAYELITSHA AND CAPE TOWN: PROFILES OF SELECTED SERVICES, 2010

	BT	QQ	Khayelitsha	Cape Town
Housing	All live in shacks	All live in shacks	Majority live in shacks	Majority live in houses
Water supply	Rely on a few communal standpipes with intermittent supply	Rely on a few communal standpipes	Majority rely on communal water supplies	Majority have in-house water supplies
Sanitation	Majority do not have access to toilets	Majority do not have access to toilets	Over a quarter do not have access to toilets	Majority have internal or yard toilets
Electricity	No formal electricity connection	No formal electricity connection	A quarter do not have access to electricity	Majority connected to electricity grid

Thirdly, although expectations are that the council, being a Category A municipality, will assume WSA and WSP responsibilities, the WSDP implicitly distinguishes between public land that falls under jurisdiction of the municipality, where the municipality has responsibility to provide services, and private land that is owned by individuals or other entities (such as ESKOM), which is outside municipal jurisdiction. In the former instance, impediments to service provision include uncontrolled growth of new settlements on un-serviced land, rural location of consumers where there is no access to bulk water and sanitation services and the very high dwelling densities in informal settlements, which often

make it impossible to either provide services or gain access into settlements for operation and maintenance purposes (Box 1). In the latter case, the last statement in Box 1 about "lack of willingness by land owners to allow the provision of services on their land for fear of encouraging further invasions" conveys a view that private property owners play a role in restricting access to publicly-funded water services infrastructure. Such a view seems valid, given unwillingness by ESKOM to provide waters and sanitation services to QQ residents. The view also seems to be confirmed by the observed reluctance by home owners of former double occupancy plots of Site C to allow BT residents to use water, sanitation and electricity services within the currently private plots. However, notwithstanding reasons given in the WSDP, the converse seems to be true that the municipality, as a public entity, might also be similarly unwilling to provide adequate water and sanitation to informal dwellers on municipal land, such as those of BT.

Box 1: Reasons for backlogs in informal settlements in Cape Town: Excerpt from the 2006 WSDP of the City of Cape Town

The lack of services in the informal settlements and certain rural areas are mainly due to the following:

- The uncontrolled mushrooming of new settlements, and expansion and densification of existing settlements – all on unprepared or un-serviced land;
- Consumers located in rural areas where there is no access to bulk water and sanitation services;
- The typically very high dwelling densities in informal settlements (on average about 140 dwelling units per hectare) make it impossible in many instances to provide either services inside settlements or access into the settlement for operation and maintenance purposes (In these instances it would normally not be possible to provide services at an acceptable level.); and
- The lack of willingness by some land owners to allow the provision of services on their land as they may not support or want to encourage the settling of informal residents on their land.

Source: City of Cape Town WSDP, 2006: 24

A counter-argument to the view in the WSDP that a key reason for lack of services is 'the uncontrolled mushrooming of new settlements and densification of existing settlements – all on unprepared or unserviced land' is that planning is still too fixated on regulatory 'orderly' urbanization rather than responding to needs of people (Tapela, 2006; Huchzermeyer, 2004). From such perspective, the level of informality in South Africa can be seen to be a direct result of a top-down apartheid planning system that was geared towards controlling the 'influx' of indigenous black Africans into 'white' South Africa. With the removal of influx control laws and, in particular, increasing urbanization since 1994, a critical challenge for municipalities, such as City of Cape Town, therefore is how to provide services without encouraging further invasion of undeveloped land.

4.4.4.2 CAUSES OF PROTESTS

Figure 8 lists some of the key determinants of protests in South Africa in general and illustrates that water services delivery issues are among a complexity of variables that underpin such protests. The Khayelitsha case study suggests that underlying causes of social protests are complex, inter-linked and variable. However, they can be classified into three

distinct yet interrelated categories of 'crisis' factors namely, governance, services and structural crises.

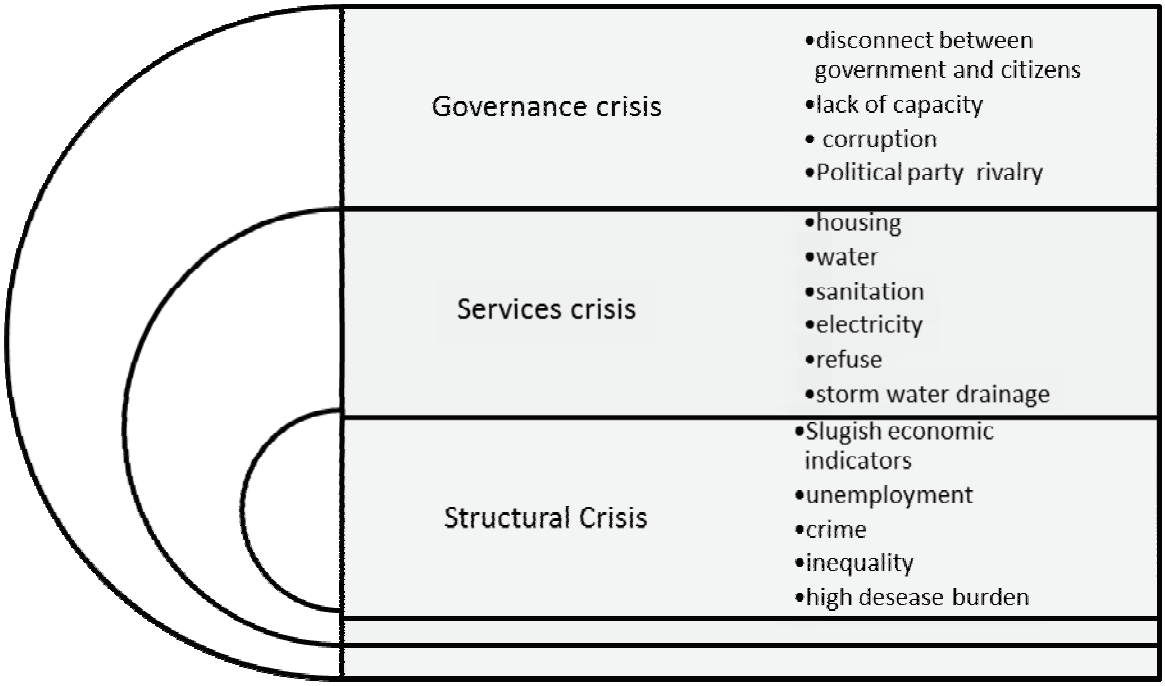


FIGURE 8 CAUSES OF PROTESTS IN SOUTH AFRICA

At the core of social protests are structural factors that divide South African society between those who 'have' and who 'do not have' means of self-sustenance and access to bases of social power and productive wealth. The latter are typically plagued by chronic poverty, unemployment, inadequate services, high disease burden and high incidence of crime. They are mostly found in informal settlements and many formal former 'black townships'. BT and QQ residents seem to represent this category of black people, who have largely been eluded or narrowly beneficiated by the change of state. By contrast, the 'haves' are generally wealthier and enjoy access to better services associated with former 'white suburbs'. It is also worth noting that such suburban services infrastructure was historically developed with public funding. There are incompletely addressed questions about reparation for past discrimination, elite capture of benefits and value from state investments and the constitutionally-sanctioned need for equitable distribution of benefits and redress.

While perpetuation of poverty and inequality appears to be at the heart of social protests in BT and QQ sections, in the case of BT in particular, inequality has become qualified principally between historically disadvantaged individuals (HDIs) living in close proximity within a low-cost housing area. Instead of the commonly highlighted cleavages between formerly white and black or high and low income neighbourhoods, formalization of property ownership in Site C has steepened the gradient of inequality in a more localized way. This is due to the selective beneficiation of residents of former double occupancy plots and simultaneous exclusion of informal dwellers of BT, coupled with the reluctance by new Site C property owners to allow public access to water sanitation and electricity infrastructure within their private property. These changes have cast these HDIs into two groups of those

who have and have not recently benefited from state-funded development interventions. Hardships have become more keenly perceived by the latter. Recent economic downturns and attendant job losses and food price increases, among other challenges, have probably reinforced the deepening insecurity and perceptions of unmet expectations.

Perceptions of relative deprivation have been observed in contexts where people with relatively high levels of water scarcity, often associated with informal settlements, live in close proximity to those with higher levels of access to adequate water services (Allen & Heese, 2009; Nleya, 2009). Both BT and Site C's former double occupancy plots are located adjacent to each other. Prior to the formalization of property rights, these groups commonly shared informal access to water, electricity and sanitation services, which they mostly did not pay for. Perceptions of deprivation between the two groups were not markedly different. With onset of selective formalization of property rights, the new property owners perceive a significant reduction of deprivation. Such perceptions have raised expectations of further improvements of quality of life and access to services. Homeowners consequently seem to deduce that their access to further reductions of deprivations will depend on their continued compliance with government rules, such as avoidance of illegal connections and payment for services. Consequently, adaptive strategies of the new property owners include the exclusion of shack-dwellers from informal access to service infrastructure that was hitherto shared.

A manifestation of this shift of strategy is the emergence of 'enclosures' of water access points, for example. Homeowners increasingly view such infrastructure as a private resource. Such a view appears to be linked to their individual investments in housing infrastructure. Besides this, homeowners' willingness to pay for water supply and sanitation services, albeit in terms of maintenance, appears to give them the prerogative to exclude others. By contrast shack-dwellers, who live in close proximity to the new homeowners, have been cast into deeper levels of deprivation of water and sanitation services. Some of the lived consequences of their exclusion include the indignity of using open spaces for ablutions, hardships associated with lack of secure and adequate access to water and frustrations due to unfulfilled expectations and socio-economic marginalization.

Drawing from Gurr's analysis (see Chapter 3 of this report), Khayelitsha shack dwellers, many of whom have immigrated from the largely water scarce rural communities of the Eastern Cape Province, represent the group that has experienced improvements of conditions of deprivation and then been cast back into deeper deprivation. This and the unfulfilled expectations of a better quality of life contribute to highly intense perceptions of deprivation. In comparison, homeowners have recently experienced improvements in living conditions and robustly safeguard against any potential threats to their perceived condition of reduced deprivation. The physical proximity of formalized and informal settlements in Khayelitsha and the increasing divergence in access to water and related services and socio-economic wellbeing combine to create a steep gradient between the two groups of residents. Such gradient seems to contribute to the intensity of deprivation experienced by shack dwellers after the selective formalization process.

Perceptions of relative deprivation by BT residents resonate with those of residents of Kennedy Road informal settlement in Durban (see Chapter 3 of this report). According to Gurr (1970 in Gurr, 1985), the intensity of deprivation depends upon the gradient of economic decline. The steeper the gradient of decline in the short-term the more intense the deprivation. Conversely, the more gradual the scarcity-induced stasis and decline, the lower the intensity of deprivation since expectations will gradually adjust to new realities. To transpose elements of Gurr's conceptualization to the case of BT, there have been no institutional mechanisms to guard against an abrupt onset of deprivation of water rights and informal access to sanitation and electricity for BT residents. Instead, a 'sledge-hammer' approach appears to have been used, through summary disconnections, criminalization of informal access and arrests of "perpetrators (or *izinyoka*). Such 'violence' by the state seems to have elicited "deprivation-induced anger" (according to Gurr, 1970 in Gurr, 1985) and a violent reaction through protests by BT residents. Such reaction is documented in many other cases, such as Kennedy Road in Durban.

The socio-economic divergence of BT and Site C residents can also be seen from Thomas Homer-Dixon's doomsday perspective, which assumes that people are by nature self-interested actors and argues that in a context whereby change induces resource scarcity, two processes are offset. These are 'resource capture' by those with the means to do so and 'economic marginalization' of those without (Swatuk & Vale, 2000). Homer-Dixon postulates that failure to adapt to changes in the resource regime results in various social problems, which in turn might offset conflicts, most often at the sub-national level. By gaining access to double occupancy plots in the late 1980s, Site C residents obtained the means to benefit from a state-funded upgrade programme. In the process they captured public-funded water, sanitation and electricity services infrastructure by restricting public access of into their newly-acquired private property. Formalization of property ownership might be seen therefore as having constituted the change that structurally induced 'scarcity' of water and other resources.

However, it is worth noting that Homer-Dixon qualifies his argument by stating that the causes of resource-related conflicts involve a more complex interplay of factors than simply resource scarcity, and that many communities will seek out strategies for cooperation before they opt for conflict. In the case of BT, it would seem as if shack dwellers initially sought assistance from their elected representatives but were not heeded. This is borne out by perceptions by two respondents, respectively that "We are striking because we want electricity, we want water, we want toilets...When we ask Mayor Dan Plato, he ignores us" and "During our meeting with Dan Plato, the Executive mayor, we demanded that Billie [Nosimo Billie, the Ward Councillor] should leave the meeting because she had failed to work with us to address our problems". However, there is also a complex interplay of factors involving allegations of political manipulation by competing parties and mobilization by social movements, such as Abahlali Base Mjondolo (ABM). At the same time, fears of crime by Site C residents might be real. Amid such interplay of factors, a consistent thread is institutional failure to deal with structurally-induced water scarcity in a context of rapid urbanization and informality.

Cases of BT and QQ indicate that those who migrate into urban areas have expectations of improved lives and livelihoods. Since many of the new black urbanites end up dwelling in recently-established informal settlements, robust institutional planning is required to

ensure that unmet expectations to not lead to deprivation-induced anger. Transposing Gurr's formulation to the context of Section BT and QQ, expectations of improvement would seem to be associated with urbanization and with dwellers of recently-established informal settlement in particular. While Gurr's 'previous experiences of improvements' can typically be linked to historically privileged individuals and groups, such as white South Africans in general, they can also apply to "upwardly mobile" (according to Gurr) black proletarian classes with both relatively long and short histories of urban residence and higher levels of water services than rural and peri-urban areas. Gurr's categories expectations, however, should be seen as amorphous and water users as being able to traverse the porous boundaries as a result of various factors.

Khayelitsha Sections BT and QQ are microcosmic of the socio-economic bifurcation that transcends virtually every aspect of South African society. The fact that the legacy of the country's historical political economy endures largely unchanged despite ascendance of the post-apartheid state in 1994 raises questions about the effectiveness of governance structures, practices and the accountability of actors placed in roles of responsibility for change management. Hence, while structural factors are at the core of protests, it is perceptions of crises in services and governance that seem to predispose local people towards protest action. Such perceptions partially provide the requisite tinder for trigger factors to ignite protest action.

Findings by this study are also that the linkage between water services and protests is largely mediated through the type of housing residents live in. The type of house – informal settlements and formal housing – is a good proxy for the level of service delivery. Formal houses tend to have internal or yard taps and toilets as well as electricity while informal settlements are generally lacking of toilets and electricity and rely on communal stand pipes for water supplies. Path analysis in Figure 9 shows the importance of various factors in the generation of protests activity in Khayelitsha.

A number of factors key elements in protest generation can be identified from Figure 9. These include:

- A direct and positive causation between poor service delivery and protests;
- Unfavourable perceptions of service delivery, which play an important role in protest generation;
- Attendance of community meetings, which is associated with higher participation in protests
- Higher levels of contact with government and municipal officials, which is associated with higher levels of protests
- Membership of organizations and higher interest in politics and current affairs, through access to various forms of media, which is also associated with higher levels of protests.

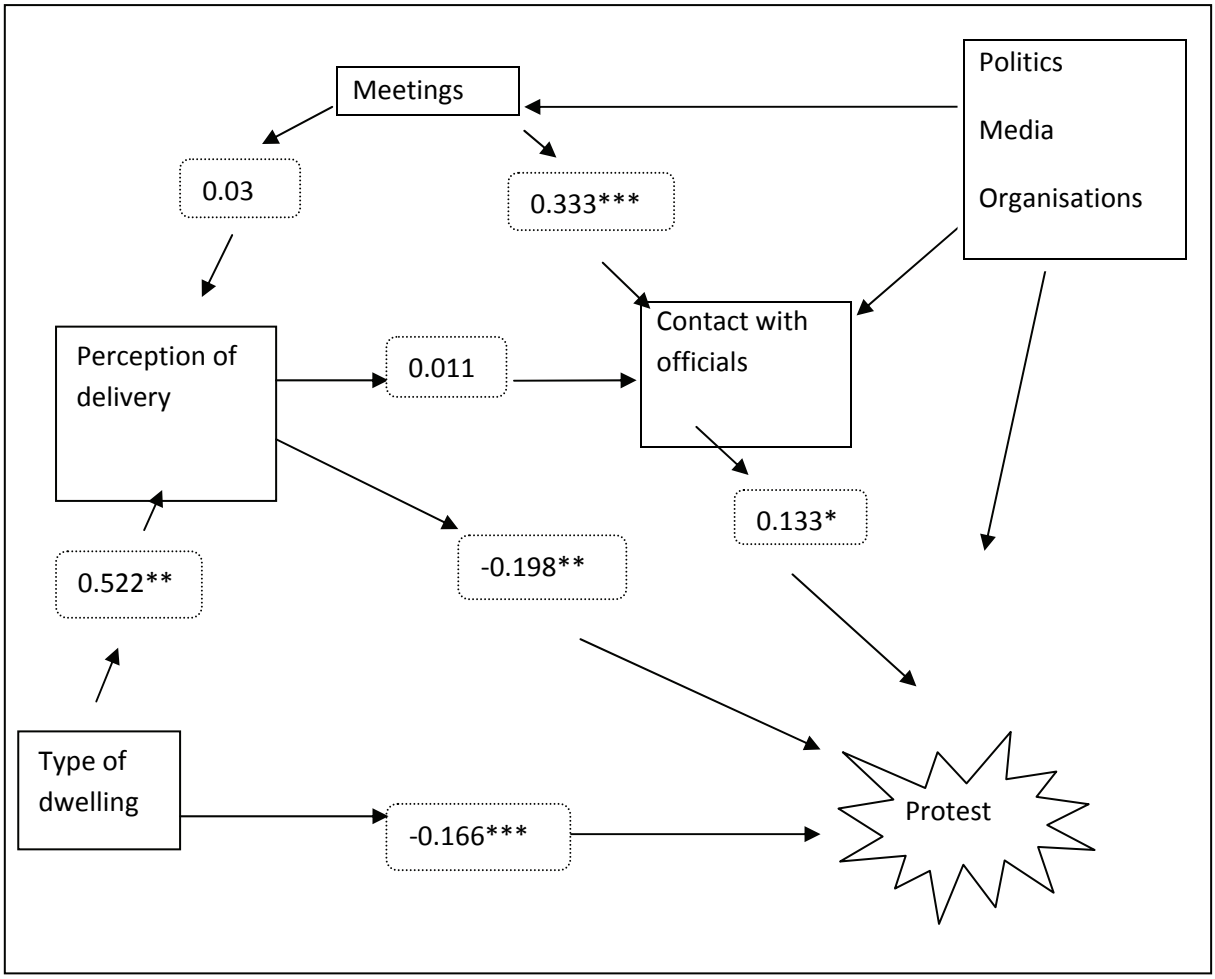


Figure 9 PATH MODEL FOR PROTEST ATTENDANCE IN KHAYELITSHA

The findings illustrated above demonstrate that the link between socio-political instability and social water scarcity is not always linear cause-and-effect, but operating in unpredictable ways and compounded by a complexity of factors, including poverty, historical context and degree of satisfaction with service delivery.

4.4.5 TESTING OF SERVICE DELIVERY HYPOTHESIS: discussion

The hypothetical view for the study is that social scarcity of water occurs when people perceive the quality and quantity of available water to be inadequate for their needs, uses, expectations and aspirations, which increase the vulnerability and risk profiles of households and communities. From this perspective, this section of the Khayelitsha case study tests a tenet inherent in hypotheses by a number of scholars (Atkinson, 2007; Johnston & Bernstein, 2007; Botes et al., 2007; Gouws et al., 2009) that a discrepancy between people's perceptions and institutional responses, in terms of policies, laws, standards, structures and processes of water service provision, is often at the core of violent and nuanced social water scarcity-related protests.

While the wave of recent South African water service delivery protests has been characterized by complexities that defy simple correlations (Allen & Heese, 2009), it seems plausible that socio-political mobilization occurs when, within the disjuncture between

people's perceptions and institutional responses, a certain threshold is crossed beyond which coping and adaptive capacities become stretched beyond limits of tolerance and acceptance. People therefore become 'agents of change'. They use their agency to draw on available social and political capital to amplify their voice or to exert *de facto* claims to perceived entitlements to water. Such agency might crystallize into tangible protest movements, especially in urban areas. Cases of BT and QQ sections of Khayelitsha confirm the study's hypothesis.

The Khayelitsha case study also provides insights that might make it possible, to an extent, to predict the likelihood of social protests in similar urban contexts elsewhere in South Africa. Figure 10 depicts four hypothetical scenarios that might occur with regards to linkages between water scarcity and people's expectations for water services. Two extremes and two intermediate conditions are illustrated. The first scenario is a case in which delivery of water and other services and governance are both considered by water users to be satisfactory. The second scenario depicts an opposite extreme whereby water users perceive both delivery of services and governance to be unsatisfactory. Intermediate between these two scenarios are two further scenarios (Scenarios 3 and 4) of mixed perceptions. The third scenario is characterized by perceptions of satisfactory delivery of services and unsatisfactory governance. The fourth scenario, by contrast, features perceptions of unsatisfactory services delivery and satisfactory governance.

When there is satisfaction with both services delivery and governance, it is unlikely that there will be protests. However, when dissatisfaction with services delivery coincides with dissatisfaction with governance, the likelihood of protests becomes higher. However, when there is water scarcity and unsatisfactory service delivery, according to Gurr's construct, intervening 'psycho-cultural' variables, which are said to shape manifestations of deprivation-induced anger, may at first deflect anger away from political institutions, where such institutions are widely perceived as democratic and therefore retain substantial legitimacy among even those suffering from hardship.

Effectively, perceptions of legitimacy of the political institutions might, at least for a while, be a stronger determinant of the probability of protests than governance, irrespective of whether the latter is viewed as satisfactory or not. In the cases of BT and QQ sections of Khayelitsha, there seems to be a complete dissatisfaction with services delivery in general and water and sanitation services in particular, as well as dissatisfaction with governance. A pertinent question is whether or not political institutions are viewed as legitimate or not.

There have been two recent (2008) political upheavals namely, "post-Polokwane" changes of political leadership within the ANC, which has so far been the predominant party in Khayelitsha, and replacement of the ANC by the DA in Western Cape municipal leadership. It is not clear to what extent political dynamics have contributed to triggering shifts from tolerance to protest. It is likely, however, that social movements such as Abahlali Base Mjondolo may have played key roles in organizing and mobilizing informal shack dwellers to protest against the scarcity of water and other resources, as well as unsatisfactory service delivery and poor governance.

FIGURE 10 MATRIX OF SATISFACTION WITH GOVERNANCE, WATER SERVICES AND OTHER SERVICES

It can be said that water scarcity, unsatisfactory delivery of services and dissatisfaction with governance all play important roles in the generation of protests in Khayelitsha. These variables interplay with other factors, such as poverty, inequality, unemployment, poor quality of life, perceptions of relative deprivation, rights-based struggles, power politics and unmet aspirations and expectations.

4.5 CASE OF MUYEXE VILLAGE OF GREATER GIYANI, LIMPOPO PROVINCE

4.5.1 INTRODUCTION

Muyexe village is situated on the western margins of the Kruger National Park, and about 15 kilometres to the north-east of the small rural service centre of Giyani. The village is located in Ward 18 of Giyani Local Municipality in Mopani District of Limpopo Province. Although the district municipality is both WSA and WSP, the local municipality has often informally assumed water provisioning responsibilities to alleviate water crises within the local constituency area. According to a deputy Water Services Manager of Mopani District Municipality[17], Giyani Local Municipality is among the most water scarce areas within the district and Muyexe village, in particular, is one of many villages experiencing severe water scarcity.

[17] Interview with Ms Albertine Rammalo, Deputy Water Services Manager, Mopani District Municipality, held in Tzaneen on 19 January 2010.

The village consists of approximately 900 households and a total population of about 3200 (DWA WSNIS, 2009). Salient features of the village socio-economic profile include high levels of chronic poverty, unemployment, very low levels of local economic development, low literacy and skills levels and poor access to social services, among others. Such profile echoes characteristics of many similar rural settlements in South Africa. In light of the low levels of socio-economic integration and development, the village has been identified as a 'presidential pilot' for the government's Comprehensive Rural Development Programme (CRDP).

The CRDP programme is driven by the newly-constituted Department for Rural Development and Land Reform (DRDLR) and was officially launched at Muyexe by President Jacob Zuma on Monday, 17 August 2009. Programme objectives are to facilitate processes that address specific and prioritised needs of communities in rural areas. Such needs include access to clean water, decent shelter, adequate sanitation and enterprises development support. The programme is based on the three strategic pillars namely, Agrarian Transformation, Rural Development and Land Reform. Community participation is stated as a central approach to CRDP implementation, particularly in needs identification, programme development and service delivery monitoring. Planned deliverables of the programme include, in Muyexe at least, employment and training of at least one person in each of the 900 households of (900) for the two year duration of the pilot project. The broader rationale for the programme, however, is captured in a keynote speech by the Minister of Agriculture, Forestry and Fisheries, Ms Tina Joemat-Pettersson, at the World Food Day Commemoration in Muyexe on 16 October 2009 (Box 3). It is worth noting that the minister began her speech by referring to the constitutional right to sufficient food and water. The grand plans for Muyexe have been met with critical scarcity of water, which threatens to derail the programme unless urgent institutional interventions are made.

This study set out to examine the linkage between water scarcity and people's expectations of water service delivery in Muyexe village. Empirical research was conducted in December 2009 and January 2010[18]. Field research methods included interviews with key resource persons, a focus group discussion, a questionnaire survey, follow-up interviews with selected households and representatives of community institutions, as well as cross-referencing and verification of data with municipal officials and formal documentary sources. Since an underlying concern for the project is to clarify the alignment or lack thereof between people's interests in water and institutional responses in planning, an attempt was made to combine bottom-up data collection with top-down verification and gathering of information. Particular attention was given to communal and individual household water sources, patterns of water use and conveyance and strategies adopted by Muyexe people to cope with or adapt to water scarcity. The last included private individual and communal investments in water infrastructure, on the one hand, and involvement in construction and or operation and maintenance of state-sponsored infrastructure.

[18] Research conducted by Barbara Tapela, with assistance from Elmon Chauke.

Box 3 Excerpts from a Keynote Address by the Minister of Agriculture Forestry and Fisheries on World Food Day at Muyexe, 2009

As stated in our Constitution Section 27, 1 (b) that, "every citizen has a right to have access to sufficient food and water"; and government MUST with all available resources protect this fundamental right.

...the people of this country mandated us to effect change on land and agrarian activities to ensure support to subsistence food production, expanding the role and productivity of modern small-holder farmers and maintain a vibrant and competitive agricultural sector.

We listened and prioritized government programme of action to focus on five areas: creation of decent work and sustainable livelihoods; education; health; rural development, food security and land reform; as well as the fight against crime and corruption, especially livestock theft.

Our approach is responding to your communal needs and therefore recognized that labelling your efforts as emerging is not the correct approach. We have therefore categorized enterprises into subsistence, smallholder and commercial. Subsistence farmers will be supported through agricultural starter packs that will include seeds and seedlings, fertilizer and livestock. To protect your crops and livestock, we will continue to roll-out the fencing project that will safeguard livestock. Already, we have rolled-out 50 km fencing costing R3.5 million for vegetables and crops, grazing land and the Buffer Zone [adjacent to Kruger national Park] in Muyexe.

Our primary intervention will therefore be support to farmers, enabling them to produce at levels that are able to keep our food prices low, and internationally competitive.

Within the rural areas, our key driving project is the Comprehensive Rural Development Programme (CRDP) which was launched by our Honourable State President on the 17th of August 2009 here in Giyani. This programme which has a holistic approach towards rural development is developed to ensure integrated participation of all spheres of government to ensure improvement in livelihoods and thus reduce food insecurity of both individual households and communities. **This holistic approach will also ensure co-ordinated planning taking into consideration all challenges facing the area like inadequate water resources**.

Today we return to Giyani on "World Food Day" to further demonstrate our commitment towards combating hunger, poverty and unemployment; and to say to the people of Giyani and the rest of South Africa, that we will not rest until we see the face of rural areas changing for the better.

4.5.2 RESEARCH FINDINGS

4.5.2.1 WATER SOURCES, USES, NEEDS, EXPECTATIONS AND STRATEGIES

Prior to 2002, Muyexe relied on both surface and ground water sources, depending on seasonality of rainfall and, in particular, incidence of drought. Surface water was obtained from the local Nsami Dam, which is a small earth dam located in neighbouring Makoxa and Ntomo villages[19]. At the time of the study, the dam was undergoing upgrading. A pump was used to abstract water from the dam and the water was then transported to the village via a pipeline that supplied communal water taps ('stand pipes') located at interval along the village road network. Before 2002, Muyexe had not had any serious problems with water. However, as from 2002, Muyexe had consistently experienced severe water scarcity due to, according to village respondents, three factors. These were lack of refurbishment of

[19] Interview with Chief K. B. Muyexe, held in Muyexe on 01 December 2009.

infrastructure by the responsible municipality, population growth within the village and persistent drought and/or low rainfall. This view was confirmed by officials of Giyani Local Municipality. In 2002, Nsami Dam dried up and both residents and government were compelled to adopt various coping and adaptation strategies.

Government strategies were geared towards alleviating scarcity-induced hardship. Such strategies included mobilization of funding through Mopani District Municipality's Disaster Management Programme and construction, after 2002, of fourteen (14) boreholes located at various points across the village. At the time of the study, field observation showed that the more recent measures to improve assurance of water supply by government included upgrading of Nsami Dam through raising of the dam wall, refurbishment of water pump, increase of capacity of the main supply pipeline, installation of new water reticulation pipes for communal water supplies and some work on some of the existing boreholes. During funerals, when household water consumption increased sharply, the municipality provided additional tanks of water to affected households. Such service, however, did not extend to any other similar events, such as weddings.

Organizations, such as Mvula Trust and Independent Development Trust (IDT), had initiated complementary support strategies, which involved construction of rain water harvesting (RWH) tanks in homesteads with iron roofing, often RDP houses. About seventy (70) households had benefited from RWH infrastructure supplied by the Mvula Trust project, with an additional fourteen (14) households gaining temporary employment from the project. By contrast, eighteen (18) households had benefited from an initial phase of the IDT project and a further forty (40) had been identified for envisaged beneficiation by a subsequent phase of the project. These efforts, among others, are part of a cooperative governance approach adopted by the presidential pilot project.

Village respondents, however, reported that exogenous interventions by the government and parastatal and non-governmental organizations had often fallen short of expectations. For example, beneficiaries of RWH infrastructure often experienced technical problems, such as leakages from and blockages of gutters. Due to the generally low amounts of rainfall received, water stored in tanks was often insufficient for both domestic and productive purposes, which RWH infrastructure was intended to supplement. Consequently, such water tended to be confined to supplementing domestic supplies. Respondents explained that they generally used the stored water for laundry, bathing and washing dishes but not for drinking and cooking since the water was not purified. Even then, supplies lasted not more than a few months. Regarding state-sponsored boreholes, respondents stated that construction of these had not been completed. The boreholes therefore did not provide sufficient water as expected by local residents. Contrary to Muyexe people's expectation, there were no pipes to connect the boreholes to communal taps. Given the severity of water scarcity within the village, some of the more affluent households had resorted constructing their own private boreholes within their homesteads, as a means to coping with water scarcity. According to village respondents, private borehole owners were generally viewed by the community as playing critical roles in assisting the majority of households, who had no alternative sources of water. Although such informal provisioning of water came at a cost, residents were willing to pay for the service since they appreciated both the costs incurred by borehole owners in installing infrastructure and operating electricity powered pumps and their own pressing need for water. Apparently installation of

a borehole cost R7000 for drilling and a further R500 per meter of drilling depth, which explained why such investments were made by the few more affluent households.

The relatively high frequency of droughts and low rainfall in the north-eastern bushveld region meant that the majority of Muyexe villagers, in attempting to cope with water scarcity, often had to buy water from people who had privately invested in boreholes. Since 2002, villagers had continued to buy water until present date, which is 2010. At the time of the study in December 2009 and January 2010, such water cost R1.00 per twenty (20) or (25) litre container. Depending on size of household, average daily water consumption commonly ranged from four (4) to six (6) 25-litre cans. Effectively, Muyexe water users paid between R4.00 and R6.00 for water per day, which amounted to between approximately R120.00 and R180 per month. In a village where chronic poverty and unemployment levels were high and incomes relatively low, costs of water supply for Muyexe villagers, as a proportion of total monthly expenditure, appeared to be higher than for the more affluent urban water users. While the latter tended to benefit from the free basic water allowance of six (6) kilolitres per day, as a human right, Muyexe water users did not. Levels of water use by Muyexe people were generally lower than consumption levels observed among water users with greater assurance of supply. This seemed to indicate that Muyexe people had learnt to adapt to water scarcity situations.

Other indicators of adaptation were a general abstinence from home gardening activities, which require significant amounts of water for irrigation. Relatively few households were observed to practice home gardening. Such households either had privately-owned boreholes or were beneficiaries of a vegetable gardening project that supplies RWH infrastructure and 2500-litre storage tanks. Gardens of the latter typically measured 10 x 20 metres in area. Home gardeners often used drip irrigation, which conserved water more effectively than sprinkler or flood irrigation. In general, villagers tended to rely heavily on commercially purchased food, which exposed them to risks associated with food price increases. During the dry season, livestock was allowed to drink “scrap” water that spilled and collected on the ground around boreholes. Generally, access to private boreholes was negotiated with owners of infrastructure, who also determined rules of access.

Reliance on borehole water tended to be more predominant during the dry season than during rainy seasons. The latter season provided respite since surface water became more readily available in rivers, such as Shingwedzi River a few kilometres to the north of the village, numerous pools scattered in the village commons and directly from Nsami Dam. Respondents reported that women and female children played greater roles than men and male children in conveying water for domestic purposes from these more distant sources. Women carried water using buckets balanced on their heads or wheelbarrows. To a lesser extent, however, men transported bulk water supplies by donkey-drawn carts or wheelbarrows. Concerns were expressed about the possible risks of drinking raw surface water. Cholera was a major concern, as well as undefined sources of contamination. Rainfall also provided water for productive purposes, such as crop production and livestock watering.

Other strategies adopted by Muyexe people included engagement through dialogue with the municipality. According to village respondents, villagers had kept on protesting verbally to the local municipality about protracted water scarcity. In the view of some of the

respondents, municipal officials did not seem to comply with the rules, regulations and principles set by national government. Principal among such principles was the "Batho Pele" principle, which states that officials have to put the interests of people they serve before their own interests. One respondent stated:

> *Presently, people are complaining about service delivery and other issues. They are tired talking about water and getting no solution to this matter. Since 2002, there has been no water in the village. It seems as if there is no solution to this crisis and no Samaritan who can come to help our village. People are dying due to water scarcity*.

The Technical Director for Water within Giyani Local Municipality[20] confirmed that Nsami Dam had been completely empty (or O% full) before onset of the 2009-2010 rainy season. At the time of the study in December 2009 and January 2010, dam levels had risen to 69.7% and fallen to 68.7% respectively. The slight (1%) reduction had been due to evaporation. Coupled with this, the raising of the dam wall and upgrading of the bulk water supply pipeline were underway. These two developments had raised people's expectations of greater water availability. However, such expectations had not been met because infrastructure upgrade was not yet complete. As a result, there was heightened dissatisfaction with water service delivery both in rural Muyexe and in urban settlement areas of Giyani, such as Mountain View and Nyagelani. The pressure exerted by the urban constituency had influenced the Executive Mayor to issue an ultimatum of 28 February 2010 as the deadline for resolution of water service delivery problems. As a result, the contractor responsible for infrastructure upgrade in Nsami Dam had accelerated project implementation by installing a pump for a raw water pipeline. The district municipality, through its Disaster Management Centre in Tzaneen, had acted in collaboration with DWA to equip existing boreholes with the components required for them to be fully operational. At the time of the study, two (2) of the fourteen (14) boreholes had been equipped, but were not working due to a misalignment of the safety slab. In effect, therefore, most (85.7%) of the existing boreholes remained incomplete.

With the protraction of water scarcity into the 'post-Polokwane' phase of governance, Muyexe villagers had adopted newer and more effective strategies for engaging with the district municipality through locally (Giyani) based Technical Services manager of Mopani District Municipality. Respondents alluded to the formation of a local 'Council of Stakeholders' that was formed in Ward 8 in May 2009. This structure had broadened local participation in community development related decision making and planning processes. The Council of Stakeholders included a wider range of stakeholders than previous Ward Committees. There had emerged therefore a broader base for monitoring of performance and accountability of elected representatives and Community Development Workers (CDWs). Stakeholders included community based organizations (CBOs) and interested individuals and groups. Muyexe village representation in the Council included the South African National Civic Organization (SANCO), garden and brick-making projects, livestock forum, retailers, taxi operators and others. These stakeholders were organized at local and

[20] Interview with the Technical Director for Water within Giyani Local Municipality, Mr F. R Nangammbi, held in Giyani on 18 January 2010.

ward level into various portfolios, each with a sub-committee. Institutional procedures followed by the Council of Stakeholders included the convening of meetings to identify needs and problems, prioritization of issues and inputs into the municipal Integrated Development Plan (IDP) process. Cross-referencing showed that the need to address Muyexe's water scarcity had been prioritized in the draft 2010/11 IDP of Greater Giyani Local Municipality. This study was not able to obtain the most recent WSDP of Mopani District Municipality to confirm whether or not this plan had prioritized water needs of Muyexe village, among others.

On the one hand, there was optimism about being afforded the opportunity to voice what they wanted to happen in their village, express their satisfaction (or lack thereof) with services they already had, participate in decisions that affect them and in ensuring accountability of the Community Development Worker (CDW) and elected Ward Councillor and Ward Committee. On the other hand, a few respondents expressed skepticism about government officials' commitment to the emerging decentralized governance framework. In the words of one key respondent "Government officials are doing nothing. They were moving up and down when they heard that Zuma was coming..."

4.5.2.2 LOCAL WOMEN'S PERCEPTIONS, EXPECTATIONS AND ASPIRATIONS FOR SERVICE DELIVERY

Views were elicited through interviews with both male and female members of Muyexe community. This section highlights views voiced by some of the women respondents:

The development that we see here involves only the RDP houses that are brought to the village, knowing that the RDP houses are for poor families and also to close the disaster gap. Our problem, however is that we have no water. How can a person survive without water? It is an essential source of life. Even if people want to develop their land, due to water scarcity it cannot happen…

We have a [health] clinic in the village. One person gave her home to the community for use as a clinic. There is also a satellite police station, which was brought to the village during the presidential pilot. Lastly, there is a [Department of] Home Affairs house to assist people of Muyexe with obtaining identity documents (IDs) and other documents. Notwithstanding all of this, our greatest problem is water…

The Ward councillor and community development council visited us to discuss development issues and also to solve the water crisis. We waited but later found that there was no solution. We have now lost hope of developing our land...

Presently the government has placed 'jo-jo' tanks in some of the homesteads. These tanks are for storing rainwater for washing and irrigating gardens. Some tanks are from IDT while others are from Mvula Trust. The tanks do not have water. Nonetheless the tanks are there, starving of thirst as there is no water…

We think about cholera and other diseases....as these might affect us [when using raw surface water]. Then population will go down…

The foregoing statements indicate that village women were not satisfied with much of what was happening in Muyexe at the time of the study. Service delivery around their village was considered to be very low. Perceptions were that government had prioritized other needs, whereas shortage of water gave them the biggest problem. Many of the women stated that it was pointless to cry for water because even if they cried, they had no platform to be heard. In any case, according to some of the respondents, the government knew about their crisis but the municipality or DWA were not doing anything for the village. For that reason, the women could not be satisfied while things were still in bad condition, when they were struggling to improve lives for their families, and when there was no happiness due to the shortage of water.

Muyexe women (and men) seemed to expect the government to at least assure adequate communal water supply as a basic minimum standard. This seemed to be informed by an awareness of physical constraints to water availability, such as low mean annual rainfall and prevalence of droughts, as well as the relatively high costs of procuring water from informal service providers who own private boreholes.

Beyond minimum expectations, Muyexe women's aspirations were well above survivalist levels of subsistence. Voiced aspirations indicated these women's strong desire to move beyond confines of reproductive roles, such as child care, towards greater involvement in productive roles. The following aspirations were documented:

- Most of the women stated that they would like to have gardens for vegetables in order to sell produce for a living;
- Some said that they would also like to plant fruit trees in orchards for sale, as a means to earn a living. At the time of the study, many of the villagers did not have fruit trees and could only harvest fruit from those trees found in the veldt, such as marula and various wild berries;
- Others said that if they could get water, they would establish small informal economic enterprises. Among such enterprises was a brickyard for the purpose of helping the community to speed development and a 'spaza' shop (general supplies kiosk). Such informal economic activity was seen as possibly bringing some income to women's households and to the broader community, as some local people would be employed.

These voiced aspirations were invariably tempered with expressions of constraints posed by water scarcity.

4.5.3 DISCUSSION

Perceptions by village respondents were that before establishment of a more decentralized governance framework, which is the Council of Stakeholders, Muyexe people's participation in local governance was largely restricted to attendance of meetings convened by traditional leadership. Despite that the IDP framework allows community participation through elected councillors, Community Development Forums and Ward Committees, most respondents did not perceive themselves as having been involved in municipal level planning.

Formation of the Council of Stakeholders appeared to have broadened local stakeholder participation. However, a number of respondents reported that most people in the village did not participate in most of the Council meetings but rather attended gatherings

convened by the tribal authority. These gatherings occurred only when there was information that leaders wanted to tell members of the community. Many of the tribal meetings, however, tended to side-step the water scarcity issue despite that this was a most pressing need for Muyexe people. Such oversight was not due to restrictions to freedom of speech, since community members were allowed to express their views freely. Rather, it was due to despondency over the prolonged scarcity of water and the equally protracted failure to find effective solutions.

While Muyexe's water scarcity has often been characterized largely in terms of a combination of infrastructure inadequacy, aridity of climate and population growth, it is also clear that dissatisfaction with water governance is at the core of perceptions of deprivation. The sense of alienation and despair, which is reminiscent of sentiments expressed in many marginalized rural contexts in the post-1994 period leading to the ANC Polokwane Conference of 2008[21], is articulated through one respondent's statement[22]:

The Ward councillor sometimes visited us to hear about our crisis. Even though he heard our crisis, he had nowhere to place it. There was no destination for our crisis, no response or solution, and no feedback to us from the government. The CDW would come, but would bring no development. There were barriers to community development in this village. Now [in the aftermath of the 2009 elections and launching of presidential pilot project] they [Council of Stakeholders] don't know how they can get involved in decision making for their community since there is no response to the water crisis from municipality and from provincial and national government. The government must do something about their workers [i.e. officials] before the community takes steps of protesting. Such action leaves death in its wake.

4.6 CASE OF MBUZINI, MPUMALANGA PROVINCE

4.6.1 INTRODUCTION

Mbuzini rural community is located in Nkomazi Local Municipality of Ehlanzeni District Municipality in Mpumalanga Province. The District Municipality is the WSA while the local municipality is the WSP. Mbuzini is situated in a remote eastern corner of South Africa, close to the intersection of political boundaries of South Africa, Mozambique and Swaziland. Mbuzini's only claim to fame is due to the fact that it was the site where an aeroplane carrying the first president of independent Mozambique, Samora Machel, crashed in 1986 in what is commonly alleged to have been a controversial act of subversion by the apartheid government.

[21] For example, Tapela, 2007; 2008;2009a,b; 2010.
[22] Statement translated verbatim from XiTsonga.

TABLE 9 MBUZINI RURAL COMMUNITY: TOTAL ESTIMATED POPULATION, AVERAGE HOUSEHOLD SIZE AND AVERAGE AGE PER SETTLEMENT, 2009

Region	Settlement	Population size	Average Household size	Households (statistician report)	Average Age
Mbuzini Communal Area	New Village	2609	5.7	416	23.8
	Mbuzini	4878.8	4.8	1021	27
	Durban	978.8	5.8	169	26.5
	Mabudzeni	1656.4	5.3	310	25.9
	Ndindindi	4500	5.3	854	26.1
	Bhaca	2494.1	6	418	23.5
	Thambokhulu	2803	4.7	601	24.4
	TOTAL	**19,920**	**5.2**	**3789**	**25.5**

Source: Ehlanzeni District Municipality, 2009. Nkomazi, 2009 QLGHS

Apart from a monumental museum that commemorates the tragic deaths of Machel and fellow passengers in that ill-fated flight, Mbuzini is a socio-economic backwater. Although there was visible socio-economic differentiation, owing to remittances associated with the high migrancy rates of the local male labour force, the general profile is one of relatively high levels of poverty. The total population of Mbuzini communal area is about 20 000 people (Table 9). The locally-resident population consisted of more (53%) women than men (46%) (Ehlanzeni DM, 2009). The community was sub-divided into seven (7) sections namely, New Village, Mbuzini, Durban, Mabudzeni, Ndindindi, Bhaca and Thambokhulu. Profiles of all sections were similar. Thambokhulu was physically cut-off from the rest of the community by a mountain range and, according to respondents, its gravel access road tended to discourage public transport. Mbuzini section was the largest of the seven sections (Table 9). For purposes of comparison and contrast, this study focused on Mbuzini and Thambokhulu sections. A similar approach was adopted in the case study of formalization and informality in Khayelitsha's BT Section of Site C in Cape Town (Section 4.4 of this report).

Field research was conducted in January 2010[23]. As in the case of Muyexe village in Greater Giyani (Section 4.5 of this report), the study set out to examine the linkage between water scarcity and people's expectations of water service delivery in Muyexe village. Field research methods used in Mbuzini included interviews with key resource persons, two focus group discussions, meetings with officials responsible for water services provision in the local municipality, spot interviews with water users found at various water points in the community and cross-referencing and verification of data with formal documentary sources.

[23] Research conducted by Barbara Tapela, with assistance from Elmon Chauke.

Primary data collection included both male and female respondents, with an emphasis on women water users. Village respondents included representatives of CBOs, government and non-governmental social services providers and ordinary water users. The combination of bottom-up and top-down methods of data collection addressed a key underlying concern for the project, which is to clarify the alignment or lack thereof between people's interests in water and institutional responses in planning. Particular attention was given to communal and individual household water sources, patterns of water use and conveyance and strategies adopted by Mbuzini and Thambokhulu residents towards coping with or adapting to water scarcity.

4.6.2 FINDINGS FROM MBUZINI SECTION

4.6.2.1 WATER SOURCES

Mbuzini Section relied on several water sources, and emphasis of source varied according to seasonality and amount of rainfall. Generally, there was a scarcity of water both in terms of quantity and quality, which residents seemed to have adapted to or cope with. Diversification of water sources was the main coping strategy, while a key adaptation strategy was to consume smaller quantities of water than often viewed as minimum daily per capita requirements for water.

The main source of water for Mbuzini section and the Mbuzini community as a whole was Nkomazi River, which is an international watercourse shared by South Africa, Swaziland and Mozambique. Water was transported by tankers (bowsers) from a direct abstraction point located forty kilometres (40 km) away on the banks of Nkomazi River. The water was used to fill up 5000-litre tanks located at various points in Mbuzini communal area. Nkomazi Local Municipality operated one (1) tanker, since two others broke down many months before. Respondents reported that during times of severe water shortage, the municipality contracted private service providers to augment tanker conveyance of water. The municipal tanker normally conveyed four (4) loads of 5000 litres of water per day. This gave a total conveyance of 20 000 litres for 20 000 people, over a total distance of 320 km per day. The first problem was that the costs associated with such provisioning were unsustainably high relative to the small per capita unit (one litre per person) of water conveyed. A second problem was that this water source was often inaccessible during the rainy season, when Nkomazi River became flooded. A third problem was with the supply of raw water directly abstracted from the river. Very close to Masibekela Treatment Works, which supplied water to neighbouring communities, such as Khomba-so, Goba, Vukuzenzele and Mbangweni, but not to Mbuzini. A major constraint was lack of infrastructure namely, a bulk water supply pipeline linking Mbuzini communal area to Masibekela Treatment Works. Plans were underway for government to construct such infrastructure.

A second source of water for Mbuzini Section was an earth dam located within a small local catchment. Rainwater that collected in the dam was used for both domestic and livestock watering purposes. While livestock drank raw water, water for human consumption was treated in a small local treatment plant located close to the dam. The plant was constructed in 2001 by Ehlanzeni District Municipality. The earth dam provided an inconsistent supply as water tended to dry up quickly due to seepage and evaporation. The problem of evaporation had progressively become compounded by dam siltation, which had reduced

the ratio between surface area and dam depth. At the time of the study, the dam had run dry and there had been no rainfall from March to December 2009. Expectations were that the rainfall that had been falling since December would fill up the dam. A project was also underway to dredge, widen and upgrade the dam. Some respondents, however, expressed skepticism over the effectiveness of this intervention. On respondent stated:

> *Mbuzini dam is too small. It is not fit to be called a dam, but a pond. Its capacity is very small. It runs dry in winter. There is no river or stream supplying water in the dam. The dam relies on rainfall and runoff only*.

It was also envisaged that when the planned bulk supply pipeline linking Mbuzini to Masibekela Treatment Works was completed, the pipeline would be linked to the local treatment works. A concern, however, was that this plant did not have sufficient capacity and was in dire need of repair. During a field visit, Mbuzini women were observed collecting aesthetically muddy water from a tap at the plant (Figure 11). Water scarcity in village settlements located at higher altitude (between 100 and 200 m above the valley floor) meant that women often had to descend to the water treatment plant at the bottom of the valley to collect water and the ascend steep slopes balancing buckets of water on their heads. Women often took such trips twice per day. While the women had become inured to such hardship, they were dissatisfied with finding that 'purified' water from the plant fell short of their expectations. They were concerned about time wasted, and that they would have to spend more time walking to alternative sources of water.

FIGURE 11 UNMET EXPECTATIONS: MBUZINI WOMAN DISCARDS 'DIRTY' WATER FROM AN INEFFICIENT LOCAL WATER TREATMENT PLANT, 2010

A third source of water for residents of Mbuzini Section was boreholes. There were four (4) government-funded boreholes located at various points across the whole of Mbuzini communal area. These boreholes serviced all six sections except Thambokhulu, which was separated from other sections by a mountain range. Water supply from boreholes was inconsistent due to seasonal fluctuations of the groundwater table. During dry seasons, drilling depths could go beyond a hundred (100) metres without reaching the water table.

Due to water shortage, government had installed two 5000-litre water storage tanks next to some of the boreholes. The tanks were regularly filled with water directly abstracted from Nkomazi dam by both the municipal tanker and private services providers sub-contracted by the municipality.

A fourth water source of water was natural streams. The streams were often used during wet seasons. There were concerns about health risks of using such raw water. Cholera was the most dreaded disease. The disease had affected community members before. Health nurses had responded by adding purification chemicals to drinking water. They had also taught people to boil water first and wait for it to get cold before drinking it. Although some people boiled the water before consumption, many did not.

A fifth source was mountain springs, which provided water throughout the year. Such water was considered to be purer than surface water. Due to hardships of carrying buckets up and down mountain slopes, however, spring water was often used during dry season water scarcity. Mbuzini women considered springs to be a critical safety net for the survival of many of the poorest households. However, the most vulnerable households found it difficult to use springs when they needed water the most. Such households consisted mainly of elderly people and/or young children as well as people infected with or affected by HIV and AIDS[24].

A sixth source of water was individual yard and in-house taps connected to the reticulation network. Such connections were either made legally or illegally. The municipality charged R170 for legal connections, but due to human resources capacity constraints formal connections took a long time to process. By contrast, illegal connections were quicker, and although the informal plumbers who provided this service charged a higher fee (R300) per connection, this was the favoured option for many households. The former option was tended to be used mainly by those with financial constraints. A major disadvantage with both legal and illegal water connections was that access to water was constrained by low levels of assurance of supply. Many yard and in-house taps were reported to have been consistently dry for a long time. Despite this, Mbuzini residents continued to invest in such connections in anticipation of future improvements in water supplies.

4.6.2.2 OVERVIEW OF PERCEIVED IMPACTS OF WATER SCARCITY ON LIVELIHOODS

All respondents stated that water was difficult to obtain in Mbuzini. Apart from negative impacts on quality of life and human health and nutrition, water scarcity affected livestock, which often died from lack of water. Brewers of African beer, who apparently provided a socially and traditionally valued service within Mbuzini Section, often failed to brew enough beer to satisfy demand. Beer brewing was considered to be a significant consumer of available water, with each of the numerous brewers using one hundred and sixty litres (160 L) on the first day and 160 L on the second day. Water-consuming small, medium and micro

[24] Focus group discussion with women and volunteers of Thandisizwe Home Based Care in Mbuzini Section, held on 20 January 2010.

enterprises (SMMEs), such as brick making and building construction, also suffered as water scarcity frequently delayed their projects. Home-based vegetable gardening activities were severely restricted, with negative implications for the poorest and most vulnerable of households.

FIGURE 12 MBUZINI WOMAN DOING LAUNDRY AT A COMMUNAL WATER POINT, 2010

Women reported that they fetched water from morning until late afternoon and, for reasons of personal safety, only during daylight. Younger women were mainly responsible for fetching water from boreholes and tanks, which were mostly located on the valley bottom. They used buckets and wheelbarrows to fetch water, often ferrying three (3) twenty-five (25) litre cans by wheelbarrow at a time. It took them several trips to fill up a 200 litre drum, which was the average household consumption per day. To save time, women washed household laundry at the water points (Figure 12). However, their access to water in the tanks was often restricted by community rules that divided access the two faucets according to whether a water user had a motor vehicle or not. Car owners had exclusive access to water in one of the tanks, which flowed via a pipe that could be inserted directly into 25 litre cans loaded on vehicles. The majority of non-car owning households had to queue for water at taps connected to one of the two tanks. In instances whereby such water ran out, vehicle owners were said to be unwilling to allow bucket carriers and wheel-barrow pushers access to water in 'their' tanks.

4.6.2.3 COPING WITH WATER SCARCITY: INDIVIDUAL AND COLLECTIVE STRATEGIES

Given the difficulties of obtaining water from natural springs, streams and communal water infrastructure, many poor households often re-used such water. Soapy laundry and bath water was diverted towards irrigating trees and shrubs in the homestead. Less soapy rinse water was re-used for bathing. Women commonly used wood ash, which was a freely available by-product of fire used for preparing household meals, to clarify the grey water. They added wood ash to 200-litre drums of raw water and waited until the suspended particles settled at the bottom of the drum, leaving water clear for re-use. Respondents attested to the effectiveness of this method in removing solid particles that clouded used

water. However, they were also aware that this measure was mainly of aesthetic value. They were therefore not naive about health risks associated with use of such water for cooking and drinking, and avoided such use.

Towards coping with insufficiency of state-sponsored communal supplies, a number of home-owners had made private investments in 5000-litre jo-jo water storage tanks located within their homesteads. Despite the relatively high costs associated with such infrastructure, investments were not confined to the more affluent households, but included a number of poorer households. This was made possible through informal fundraising and savings schemes, mostly involving collectives of women. Women formed groups and helped each group member in turn to amass enough money to buy a 5000-litre tank. Once the investment was made, the owner of the tank exercised complete control over access to water in her tank. Rules of access to such infrastructure were such that the tank owner had exclusive rights and excluded group members had no expectations of sharing use of collectively-funded infrastructure. Rather, they aspired towards owning their own infrastructure, to which they could exercise exclusive rights. In Mbuzini Section alone, approximately fifty (50) of the one thousand and twenty-one (1021) households had invested in 5000-litre jo-jo water storage tanks. Since there were no on-site boreholes or other water sources to fill up the tanks with, women asked informal water vendors, who had their own trucks or bakkies and who were mostly male, to fill up the tanks with raw water from local dams. Sources of such water included the local Mbuzini Dam and Masibekela Dam located closer to Nkomazi River. It cost between R450 and R500 to fill a 5000-litre tank.

4.6.2.4 LOCAL INSTITUTIONAL ARRANGEMENTS FOR WATER SERVICES MANAGEMENT AND GOVERNANCE

Mbuzini water users had devised local rules for managing communal water sources. When communal water taps broke down households who resided next to the tap would report the problem to local leadership or call for help from the municipality. Nkomazi Local Municipality had a car dedicated to attending to technical problems relating to water supply in the whole of Mbuzini community. Responses by municipal official were generally considered to be good.

Mbuzini water users also engaged with the municipality through their Ward councillor. When the community came across a water-related problem they could not solve, their representatives invited the Ward councillor and convened a residents' meeting. A loud speaker was used to call gatherings. Attendance of such meetings was good, with whole household participating.

4.6.3 FINDINGS FROM THAMBOKHULU SECTION

Water scarcity in Thambokhulu Section was reported to be higher than of Mbuzini Section. Respondents stated that the water scarcity problem was as old as Thambokhulu, which was established in the late 1950s with the resettlement of Ngwane people forcibly removed to make way for commercial farms. Those older than fifty (50) years recollected that they had lived with scarcity of water throughout their lives. In the early years of resettlement, around 1960, the relatively few homesteads were scattered around the lowlands and on mountain

slopes. People mainly relied on copious mountain springs that fed streams which in turn flowed into valleys. With betterment planning, population increase and decreasing availability of water from natural sources, water scarcity had deepened while institutional responses remained either inadequate or non-existent. Although Thambokhulu respondents considered that they had endured a protracted water crisis for decades, a manager of the Ehlanzeni District Disaster Management Programme was unaware of the problem.

4.6.3.1 WATER SOURCES AND WATER SCARCITY

The main source of water for Thambokhulu was Nkomazi River. Two (2) tankers belonging to Nkomazi Local Municipality were used to truck water daily into the village to supply a population of approximately six hundred (600) people. The tankers each made two trips to and from Nkomazi River and filled up 5000 L tanks placed at various points within the village. In the wet season from November to May, this water source seemed sufficient because villagers also relied on other sources. However, during the dry season as from June onwards, water from Nkomazi River became insufficient for community needs as supplementary water sources dried up. The wet season also brought physically-induced water shortages that occurred when the Nkomazi River became flooded, making it impossible for tankers to get close to abstraction points along the river banks.

Wet season supplementary sources included springs, streams, hand-dug wells, depression pools (i.e. empondments) and, for dry-land crop production, rainfall. Pools of water that collected in natural and man-made depressions provided a useful source for livestock watering. The quality of such water, however, was not good enough for domestic uses since it contained suspended soil sediment. Thambokhulu respondents expressed concerns similar to those voiced by Mbuzini respondents about the quality of water from streams. Since the sharing of wells by people and livestock increased the risk of water contamination. By contrast, springs provided clean water. However, they were located high up on mountain slopes and they tended to dry up as from April onwards. While respondents evidently perceived the security of access to adequate quantities of water from springs as limited by seasonal climatic and hydrological variations, they were satisfied with the perennial quality of spring water.

A third source of water was boreholes. There were three (3) boreholes in Thambokhulu. However, none of these provided adequate water due to the very low water table, particularly during the dry season. Respondents reported that after prolonged rainfall, one of the boreholes was able issue a consistent supply of water for a few weeks or months. However, water pressure was so low that it took eight (8) hours to fill up a 5000 L tank. The other two boreholes could at best provide intermittent and insufficient supplies. Although borehole water alleviated wet season water shortages that occurred when flooding of the Nkomazi River made it impossible for tankers to get close to the river banks, it fell far short of satisfying water needs of the local village population. Besides unreliable and insufficient supply, a second major problem with borehole water was its poor quality. Women respondents, in particular, emphasized that the water was too salty for all domestic uses. When the water was mixed with milk, the mixture foamed or frothed. When it was used for bathing, the water irritated people's skins causing them to itch. Laundry could not be washed clean as soap could not dissolve properly in borehole water.

4.6.3.2 SOCIAL WATER SCARCITY AND WATER USE: COPING STRATEGIES, VULNERABILITY AND RISK

From the foregoing sub-sections, it is evident that water scarcity in Thambokhulu was induced by a combination of environmental and structural factors and related to both inadequate quantity and quality of water relative to water use requirements. Social water scarcity seemed to specifically refer to the gendered social manifestations of environmentally and structurally induced scarcity. In particular, social water scarcity appeared to be linked to social vulnerability and risk associated with insecure access to water for both basic human needs and livelihoods generation. Such vulnerability and risk were often linked to coping strategies adopted in the absence of effective institutional mechanisms.

The study found that strategies to cope with the dry season lowering of water tables and reduced discharge from boreholes, wells and springs included increases in time spent on fetching water. This led to the development of long queues for access to trickles of water seepage from these sources. Women, who played greater roles than men in fetching water from unprotected sources, spent more time at these water points, with waiting times often extending well into the night. This exposed women to a range of risks to personal safety and security. Risks were more closely associated with sharing unprotected water sources with livestock than with vulnerability to night-time criminality and injury by wild animals.

With the progressive seasonal drying up local surface water sources, such as streams and empondments, women and domestic animals were compelled to compete for access to wells. Since thirsty livestock was prone to aggressively seek access to drinking water, it became risky for women to fetch water from unprotected water sources. To safeguard themselves, women had learnt to share water with the animals. Their coping strategies included letting animals drink first. If animals got to wells after women had begun collecting water, the women would scoop water into a bathtub (which doubled-up as a 'trough') for livestock to drink. Then they could continue to fetch water. When wells dried up between April and May, people allowed animals to drink water from crude troughs and spillages around communal water tanks, which were serviced by the local municipality using raw water from Nkomazi River.

Although both male and female respondents expressed concerns about women's vulnerability to personal safety and security risks associated with water scarcity and use of unprotected water sources, their views showed distinctly gender-specific nuances. Female respondents were concerned about women's personal safety and security as well as depletion of time resources available for women's productive roles, such as food production, and reproductive roles, such as childcare. By contrast, male respondents were worried that the length of time spent by women in fetching water, which often extended well into the night, exposed marital relationships to risks associated with infidelity, particularly HIV and AIDS. Vulnerability to such risk was seen in terms of erosion of livelihood assets and the eventual dissolution of households. Although female respondents acknowledged the validity of men's concerns about the security of marital relationships, they were reticent to openly discuss such issues.

Towards addressing concerns about protracted vulnerability and risk to water scarcity and water use, coping strategies by members of Thambokhulu community appeared to have recently expanded to include strengthening of socio-political organization and networks as a means towards engaging more effectively with water services institutions, specifically municipalities, and IDP processes in general.

4.6.3.3 RURAL COMMUNITY ENGAGEMENT WITH GOVERNANCE STRUCTURES AND ACTORS

Although Thambokhulu households had lived with water scarcity since their resettlement in Mbuzini communal area in the 1950s, it appeared that as from around 2008 the community had reached its threshold of tolerance and acceptance of water scarcity and inadequate water services. This development seemed to have been precipitated by a culmination of factors that not only raised people's expectation for service delivery but made it possible for trigger factors to potentially ignite deprivation-induced anger and possibly violence. While the exact pathways of this development could not be fully ascertained, owing to constraints associated with rapid appraisal methods of research, researchers used participatory context and situational analysis methods, such as time-lines and trend-lines, to trace landmark events within a focus group discussion with male and female members of Thambokhulu community. The results are outlined below.

According to focus group participants, the antecedent background to stronger socio-political organization for engagement with municipalities is that the issue of water scarcity in Thambokhulu had been raised repeatedly by village residents and their elected representatives. The Ward councillor had taken up the voiced need for secure access to water and presented it reiteratively in IDP processes. Evidence of the councillor's effective representation was that the WSDP had prioritized Thambokhulu need for water as well as similar needs for the broader Mbuzini communal area. However, with each successive year, when IDP implementation was reviewed, a discrepancy was found between plans and expenditure. Funding ear-marked for water services development in Mbuzini communal area in general and Thambokhulu community in particular appeared to have been spent on addressing other needs that local people did not consider to be of priority.

In 2004, the then-Deputy President Jacob Zuma had visited Khomba-so village within the neighbourhood of Mbuzini communal area. Khomba-so was envisaged to benefit from a new water supply scheme that consisted of Masibekela Water Treatment Plant and a bulk water pipeline supplying several other villages, such as Goba, but not any of Mbuzini's seven village settlements. Although participants focused on events within a time-line, it seems possible that perceptions of government beneficiation of neighbouring villages like Khomba-so might have contributed to perceptions of relative deprivation among residents of Thambokhulu.

As the water crisis deepened, responsible authorities determined that R51 million was required to develop the required hydraulic infrastructure. Around that time, former President Thabo Mbeki visited Nkomazi Local Municipality in July 2008. However, instead of being taken to communities that had had protracted water crises, the president was taken to Khomba-so, which had benefited from the recently completed Masibekela water supply scheme. The councillor for Ward 12, which includes Thambokhulu, resided in Khomba-so.

Not long after Mbeki's visit, engineers visited Mbuzini Water Treatment Plant, ostensibly to examine the plant and the small Mbuzini Dam located in Mbuzini village. Focus group participants did not have information on the exact purpose of this visit. They complained, however, that during the Mbeki era, they were often not consulted but their needs for water were assumed for them. After the former president's visit, they had waited in vain. Thambokhulu residents were evidently not happy about the perceived capture of water services development opportunities by an elected local political representative and marginalization by national political leadership.

On 15 August 2009, District Mayor Mabuza visited Thambokhulu and surrounding areas in connection with a municipal plan to supply water to outstanding village settlements in the vicinity of Mbuzini communal lands. Consequently, local residents were generally aware that the planned scheme entailed linking Mbuzini communal area to Masibekela water treatment plant via a bulk supply pipeline. They were also aware that their village would benefit alongside the six other village settlements comprising Mbuzini communal area. However, they were not very clear about the technical plans for distribution of piped water to both Thambokhulu and settlements located on the other side of the intervening mountain range. Nonetheless they knew that between 2010 and 2011 a water reservoir would be constructed on the summit of the adjacent mountain range to ensure sufficient water pressure. They also knew that the scheme as a whole would be constructed from 2010 to 2014. Thambokhulu respondents expected the planned scheme to resolve their water scarcity challenges.

Expectations for improved water services had restored a sense of optimism within the community. Expected levels of service delivery, according to participants, were at fifty (50) litres per person per day and not the current twenty-five (25) litres currently considered as the basic minimum requirement. From this, it seems possible that some of the residents of Thambokhulu might have been aware of the Phiri case (Durgard, 2006; Bond & Dugard, 2008) and other contestations regarding South African provisions for basic human water needs.

Expectations were underpinned by aspirations that included use of water from the planned bulk supply scheme to irrigate women's gardens for food security, among other livelihood strategies. It was not clear whether or not Thambokhulu community members had engaged with local governance structures and actors about the need for planners to accommodate their multiple water use requirements in infrastructure design. Nonetheless, aspirations for multiple uses of 'domestic' water supply seemed to run counter to single-use infrastructure design by planners. This reflected a possible discrepancy of perception between micro-level water users and planners at meso-/macro-levels (i.e. municipal, regional and national levels). What seemed requisite therefore was for planners to gain better understandings of the micro-level context, in terms of gendered livelihoods, poverty, unemployment, food insecurity and long-lived water insecurity. With improved understandings of why Thambokhulu women viewed the planned scheme as an opportunity to overcome their livelihood constraints, planners would need to adopt more responsive approaches to addressing micro-level needs for multi-use water services in this case.

Failure by meso-/macro-level planners to shift towards more nuanced and responsive approaches could mean that water supply scheme objectives to enhance water security at

micro-level might not be fully met. Indications (at the time of the study) were that Thambokhulu people were not likely to tolerate and accept unmet expectations and aspirations. The latter is borne out by anecdotal evidence that although Thambokhulu people had shown a remarkable degree of tolerance and acceptance of water scarcity and inadequate water services for nearly sixty (60) years since the 1950s, their tolerance and acceptance thresholds were close to breaking point (Box 4).

While the CDW's response (Box 4) demonstrated a clear lack of downward accountability, it seems also to hint at political dynamics underlying poor service delivery within Nkomazi Local Municipality. Issues of political interference through 'deployment' of ANC cadre were also raised by local water users and other stakeholders in the case of Sannieshof in the North West Province (Section 4.3 of this report). Respondents reported that people of Thambokhulu were unhappy about the invisibility and lack of accountancy of elected councillors and DWA officials to local communities. They stated that ward committee meetings were very rare and only took place during IDP consultations. One participant elaborated:

> *In between, we do not see the councillor. We suspect that the councillor does not represent us effectively but might be more interested in [his/her] payment.*

Respondents also alluded to repression of expression, whereby community representatives had to be polite and not freely express views of their constituencies. Whenever they raised people's concerns, some among local ANC leadership in the municipality accused them of being 'sell outs' ("*Lithengisa umasipala*"). Consequently, it was difficult to engage the municipality regarding service delivery problems.

Among the more pressing of such problems was the conflation by the municipality of water scarcity with other less pressing issues, which resulted in a blurring of priorities and thus loopholes through which benefits were channelled to certain projects and communities at the expense of others. A particularly sore point related to the channelling of a significant proportion of the municipal budget towards construction of the 2010 World Cup Mbombela Stadium in Nelspruit. One respondent asked, "How about us who live in remotes areas? Can we also benefit by getting twenty-four (24) hour access to water?"

Triangulation by researchers confirmed that, while seventy percent (70%) of the Municipal Infrastructure Grant (MIG) budget had indeed been earmarked for water services, a significant proportion of this allocation had been diverted towards construction of the world cup stadium[25]. Officials viewed this as a major set-back for water services delivery in the municipality. In the meantime, an indigent register was being compiled as part of longer term planning support to poor people in the constituency.

[25] Interview with the technical unit of Nkomazi Local Municipality, held on 20 January 2010.

4.6.4 LINKAGES BETWEEN MICRO-LEVEL WATER SCARCITY AND USE AND MESO-/MACRO-LEVEL PLANNING PERSPECTIVES: MBUZINI (DRAFT) RECONCILIATION OPTIONS

This sub-section examines linkages between micro-level water scarcity and water use issue observed by this study and meso-/macro-level planning perspectives by the draft Mbuzini All Towns Reconciliation Study. Such examination is necessitated by this study's findings of a possible discrepancy between needs for multiple uses of 'domestic' water supply by residents of Thambokhulu and Mbuzini villages and single-use infrastructure design by planners (see preceding sub-section of this case study). Mbuzini All Towns Reconciliation Study, which sought to develop a more effective future scenario-based planning approach to water services, provides a useful lens for testing this study's hypothesis.

Mbuzini's All Towns Reconciliation Study was part of a nationwide study initiated by the National Water Resources Planning Directorate of the Department of Water Affairs (DWA). An objective of the study was to provide 'first order' strategies for reconciling future water demands with water supplies within each given universe, in order to limit vulnerability and ensure resilience. A second objective was to use results of the Reconciliation Study as a basis for regular review of future water demand scenarios, and the available options and actions required to meet such demands. As a decision support framework for future scenario-based water resources planning therefore, the study represented an attempt to shift away from 'business as usual' and 'crisis management' approaches towards 'sustainable management' approaches (according to Rosegrant et al., 2000)[26].

The Mbuzini Reconciliation Study formulated first order reconciliation strategies based on an assessment of the current water balance situation and expected future water requirements in each given universe. From this baseline, the strategy mapped out a scenario-based course of actions to effect adequate future reconciliation of water requirements and water availability. These included demand- and supply-side interventions and options, with population growth as a key socio-economic variable. Supply-side options included measures to augment existing water sources, such as supplementary surface water schemes and groundwater abstraction. Demand-side options included Water Demand Management (WDM) and Water Conservation (WC) measures, such as reduction of infrastructure-related water loss.

Mbuzini reconciliation strategies also took into account various factors, such as characteristics of current and projected population growth and water consumption (at 'high' and 'low' rates), existing infrastructure, time and capital cost requirements for implementing an intervention, net effect of the water balance, availability of funding and managerial expertise and indications on who should be responsible for different aspects of strategy implementation, monitoring and adjustment.

The first set of scenarios mapped out future demand-supply scenarios in the absence of reconciliation options (i.e. 'business as usual' approach), which would eventually lead to

[26] See Deliverable 3 of this study (WRC K5 1940//3).

crises as both low and high rates of population growth and water consumption outstrip available supplies (e.g. Figure 13). The second set of scenarios mapped out future demand-supply scenarios in the presence of selected demand- and/or supply-side reconciliation options (e.g. Figure 14).

Future projections indicated that adoption of demand- and supply-side reconciliation options would result in a net increase in water availability that could be sustained until 2030 at the currently high (3%) population growth levels, and for longer at reduced future growth rates. Such projections suggested therefore that the proposed reconciliation strategies would effectively ensure sustainable water security for people of Mbuzini communal area.

While projections of future trajectories of water requirements and availability provided potentially useful insights for scenario-based planning, this study found that the utility of such projections was severely restricted by significant discrepancies between population data used in the draft Reconciliation Strategy and that groundtruthed and that used in IDPs by Ehlanzeni District Municipality, which is the WSA, and Nkomazi Local Municipality, which is the WSP.

A major problem was that future water projections by the Reconciliation Strategy started from a premise of significantly lower (60%) population size and, by proxy, water demand, than exists in reality. The Reconciliation Study predicated its water demand projections upon population growth figures projected by the 2001 census (shown as a bold red line in Figures 13 and 14). The census projected that the total population of Mbuzini communal area in 2008 would be 11 948. Ground-truthing by Ehlanzeni's Quality of Life and General Household Survey (QLGHS) showed that the population of Mbuzini communal area in 2009 was 19 920 (Table 9). Notwithstanding the few months' difference between the two population statistics, Mbuzini area's population and, by proxy, water demand was 167% higher than estimates used by the draft Reconciliation Strategy.

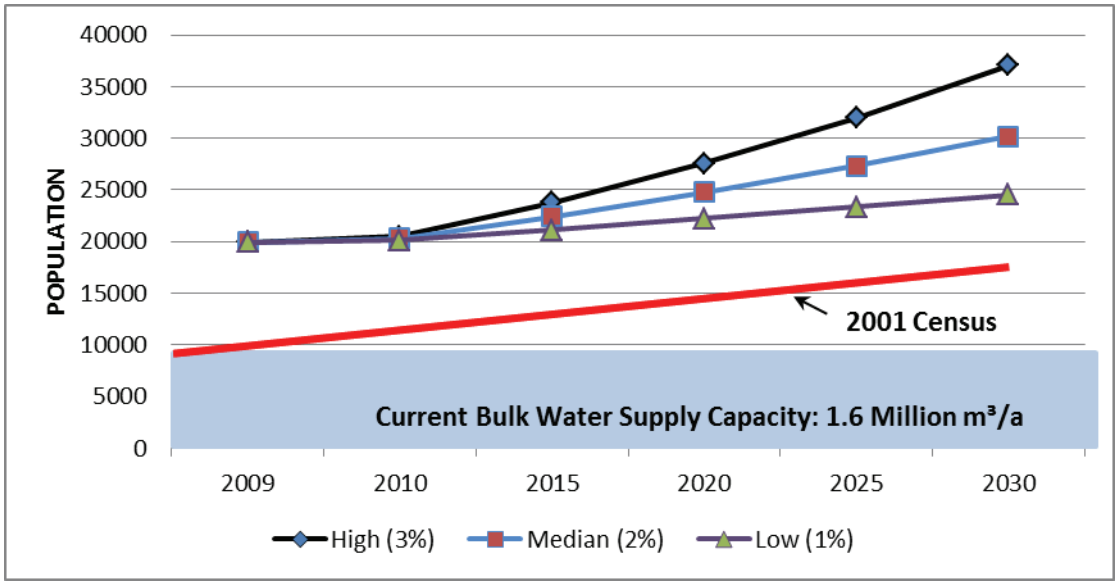
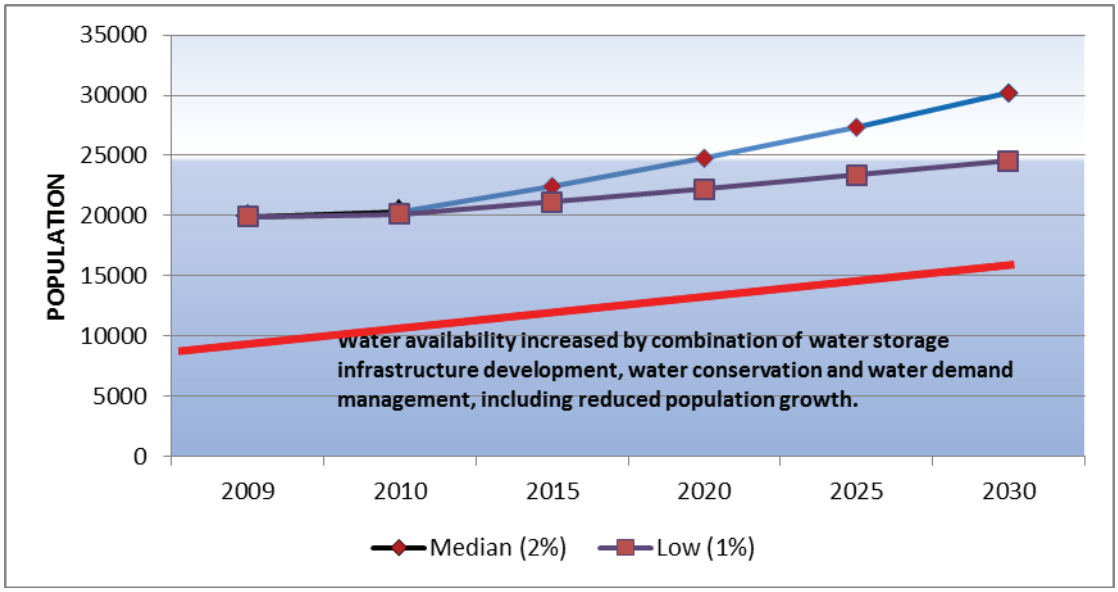


FIGURE 13 SCENARIO 1: NO RECONCILIATION OPTIONS ADOPTED*



(*NB: BOLD RED LINE in sketchy Figures 13 and 14 above represents 2001 Population Census projections, which were the basis of future projections by the draft Reconciliation Strategy. The other lines are this study's approximate estimates using the population growth rates) using groundtruthed data from the Ehlanzeni Municipality's QLGHS data.)

FIGURE 14 SCENARIO 2: ADOPTION OF SUPPLY- AND DEMAND-SIDE RECONCILIATION OPTIONS*

A possible implication of such discrepancy was that efforts by planners to more effectively ensure sustainable water security were likely to run aground due to under-estimates of current and future water requirements. To test this view, this study eliminated the Strategy's census-based population growth projections and instead used population data from Ehlanzeni's QOLGH Survey to reconstruct projections of high (3%), median (2%) and low (1%) population growth rates (Figure 13 and 14). These rates were the same as those used in projections by the draft Reconciliation Strategy. Although the test excluded the Strategy's underestimated population projections, it retained, in principle, the projected increase in water availability as a result of water augmentation measures, such as water storage infrastructure development, water conservation and water demand management, including reduced population growth. This provided a crude but useful tool for examining possible implications of using unreliable data in long term planning.

The test findings showed that draft Strategy underestimated the severity of existing water deficits. Findings also contradicted the Strategy's assumption that adoption of reconciliation options would ensure water security until 2030 at the currently high (3%) population growth levels, and for longer at reduced future growth rates. The test showed that while reconciliation strategies could prolong the time taken to reach the water deficit threshold at low, median and high population growth rates, Mbuzini's currently high water deficits would severely constrain prospects of sustaining water security in the longer term. Failure of reconciliation strategies was likely to occur much earlier than projected by the Reconciliation Strategy. At high population growth rates, water shortages would occur in 2015 rather than in 2030. At low growth rates, shortages would occur in 2030 and not later (Figures 13 and 14).

4.6.5 DISCUSSION

Implications of discrepancies such as outlined above are perhaps better seen in view of the observed hardships, risks and frustrations of people living with water scarcity and water use insecurity in Thambokhulu and Mbuzini villages. For meso-/macro-level planners, who might be far removed from micro-level realities, data discrepancies might be easily overlooked. For micro-level households and communities, such discrepancies constitute the critical difference between water and livelihood security, on the one hand, and being condemned to a vicious cycle of hardship and vulnerability to risks associated with water insecurity.

South Africa's constitutional imperatives for redress of historical inequalities and discrimination place ethical imperatives upon planners to ensure the effectiveness of institutional responses to water security requirements, particularly for the poorest and most vulnerable people. This includes ensuring that institutional responses are predicated upon sound governance principles, based upon clearer understandings of people's multiple water uses and requirements as well as expectations and aspirations for water services, and designed to proactively plan for changing resource availability scenarios. Findings from Mbuzini seem to confirm this study's hypothesis.

Cases of Mbuzini and Thambokhulu villages provide glimpses of some of the social aspects of living with water scarcity in rural contexts. Such insights add qualitative detail to the more common top-down, technicist and/or outsider perceptions of water scarcity as a physically and/or structurally induced phenomenon, that is driven by population dynamics, climatic change, economic and other factors. While such perceptions are often valid, they provide limited practical guidance for developing water services planning interventions that address water scarcity in ways that effectively integrate water resources management to achieve the required balance between social and economic benefits and ecosystem integrity.

These case studies also show that, contrary to single-use infrastructure design by conventional water services planning approaches (Van Koppen, 2009), and to views that compartmentalize water use into 'domestic' and 'productive' uses, rural people often use available water sources and infrastructure for multiple uses to ensure basic needs, livelihoods and food security. The study reiterates findings by various researchers (Cousins et al., 2007; Van Koppen et al., 2006; Cousins et al., 2006; Maluleke et al., 2005; Moriarty et al., 2004; Mendiguren & Mabelane, 2001). There is therefore a compelling argument for municipal service delivery to adopt MUS approaches that are 'demand responsive' and (Mendiguren & Mabelane, 2001) and that secure water for rural livelihoods (Maluleke et al., 2005).

The nearly-violent reaction by Thambokhulu water users to the CDW's response shows that:

- Urgent institutional mechanisms are needed to ensure that civil servants serve people in accountable and effective ways;
- Without such mechanisms, frustration with poor governance, combined with perceptions of relative water scarcity and the resultant perpetuation of poverty, inequality and livelihood insecurity, could easily be triggered into violent protest action;

- Such protest action could occur despite local people's awareness and anticipation of water services development plans and irrespective of perceived legitimacy of government leadership;
- Beyond good governance, it is imperative for government to prioritize and ensure human and socio-economic rights to water in informal economies, such as characterize many impoverished and marginalized rural contexts, such as Thambokhulu;
- In the absence of robust water services development planning and good water governance practices and satisfaction of rural people's water needs, violent protests might not remain the preserve of organized urban residents;
- However, violent protests might NOT necessarily cascade into rural areas, as people in many such contexts have often been observed to seek peaceable rather than violent means of water-related dispute resolution. It is important therefore to build upon rural people's tendency towards non-violent dispute resolution; and
- Improved alignment between people's water services needs, expectations and aspirations, on the one hand, and the responsiveness of institutional planning mechanisms, on the other hand, is requisite.

Needs for shifts in meso-/macro-level planning approaches therefore seem to confirm this study's hypothesis that institutional responses that are predicated upon sound governance principles, designed to proactively plan for changing resource availability scenarios and based upon clearer understandings of people's multiple water uses and requirements as well as expectations and aspirations for water services are more effective at ensuring water and livelihood security than those that are not.

4.7 CASE OF CALA AREA OF SAKHISIZWE MUNICIPALITY, EASTERN CAPE

4.7.1 INTRODUCTION

Cala is located in Sakhisizwe Local Municipality within Chris Hani District of the Eastern Cape Province. The district municipality is the WSA while the local municipality is the WSP. According to a key respondent[27] from the local municipality, eighty per cent (80%) of Sakhisizwe has access to water services at RDP standards or higher. This includes formal and informal settlements within and around the towns of Cala and Elliot. The remaining twenty per cent (20%) with lower than RDP standards mostly comprises rural areas in the hinterland to the town of Cala. It is almost impossible to understand the dynamics around water in Sakhisizwe without grasping the municipality's composition and history.

Sakhisizwe is a predominantly rural municipality, with seven (7) wards. The municipality combines the two small towns of Cala and Elliot, as well as their hinterlands. During the colonial and apartheid periods, Cala fell under the former Bantustan of Transkei, while Elliot was under the Cape Province in "white" South Africa. Cala was the magisterial town of the

[27] Interviews conducted by Prof Lungisile Ntsebeza.

Xhalanga District, which included about seventeen (17) administrative areas falling under the jurisdiction of chiefs. On the other hand, the hinterland of Elliot was made up of white privately owned large-scale commercial farms. When municipalities were consolidated into few and larger areas after the second local government elections in 2000, the two towns of Cala and Elliot, together with their hinterland, became one municipality.

In many ways, dynamics around water in this municipality, particularly in terms of access and planning, reflect this history. As will be seen in what follows, the town of Elliot has a much more developed infrastructure and has a more reliable supply of water for the residents of the town, black and white. This contrasts sharply with Cala, whose infrastructure was developed to accommodate a few white households and is now almost collapsing in the face of population growth. In the hinterland of Elliot, where land is held in private hands by commercial farmers, the Elliot municipality did not have a legal obligation to provide water for the farmers. They make their own arrangements for water. Given that these farmers were engaged in capitalist agriculture and, in addition, had access to state subsidies and electricity supply, white farmers had the wherewithal to make provision for their own water supplies through the construction of dams and boreholes. This was however not the case with the rural areas surrounding Cala, which, as will be seen were populated by poor people with very little investment by the state in the provision of water and infrastructure in general. Such differential access to water, however, is not captured in the DWA WS NIS database. The database indicates similarity and parity, respectively, in the high degrees of access to greater than RDP standards of water services in Cala (98.1%) and its two rural hinterlands (94.2%), on the one hand, and Elliot (94.2%), on the other hand.

This paper begins by examining the history of water availability, access and planning up to the establishment of the Sakhisizwe municipality. This is necessary in deepening understanding of the current situation. The paper goes on to look at the water situation since 2000. In line with the focus of the research project, this case study examines questions of agency on the part of the residents of Sakhisizwe municipality and locates these within the broader literature on social scarcity and protests. The situation in the Sakhisizwe municipality seems to challenge the view that links the scarcity of water and protests.

4.7.2 CALA URBAN: VIEWS FROM THE MUNICIPALITY

4.7.2.1 WATER SOURCES

The main source of water for the town of Cala was Tsomo River. A second important water source was the mountainous catchment area close to Ngcobo. The water supply scheme alternately combined the use of both sources. The scheme was such that pumps were normally used to abstract water from Tsomo River into the bulk supply pipeline that conveyed water upslope to a water storage dam and water treatment works. Treated water was then stored in a reservoir, to be reticulated within the town. During times of heavy rainfall, the water treatment plant was fed with water harvested in the mountainous area. Runoff collected in a ‘catchment pit’ constructed in the mountains. As the pit filled up,

water flowed by gravity into the storage dam, to be process by the treatment plant and stored in a reservoir before reticulation to Cala users[28]. However, when levels of water in the catchment pit became too low, the treatment plant would be fed with water pumped from Tsomo River. There were challenges associated with Cala's water supply scheme.

4.7.2.2 CHALLENGES

Firstly, water pumps were old and frequently broke down, thus requiring constant repair. The local municipality lacked technical capacity to operate the pumps and had to wait for service providers from Queenstown or East London to come and help when pumps broke down. There were no standby pump engines. These contributed to the inconsistency of water supplies to Cala water users. A view was that Chris Hani District Municipality, which employs locally-based technical staff responsible for water services, should ensure that there are adequately skilled workers to implement water services delivery.

Secondly, the scheme had become inadequate for the needs of the town. The practice of harvesting rain water from the mountains had apparently been going on for a long time. An assessment in 2008 identified that the municipality was not collecting optimum levels of water from the mountains. The technical manager responsible for water services considered that the original design of the scheme had become obsolete and needed revision.

Towards review and recapitalization of infrastructure, a major constraint for the local municipality was that water services development related decision-making, planning and implementation were competencies of Chris Hani District Municipality, which is the WSA. Sakhisizwe Municipality, as a Category B municipality and WSP, was effectively restricted to providing water to communities and collecting revenue on behalf of the district. The local municipality therefore could not make decisions or plans regarding major water services development.

Part of the challenge was that water revenue collection by the local municipality was relatively very low because of the high unemployment rate and high proportion (90 to 95%) of indigent people in Sakhisizwe. The local municipality therefore provided water supply services under duress because it operated without adequate cost recovery. This problem was compounded by population growth.

The population of Cala had "almost doubled or tripled" since the scheme was first established. There had been no measures to upgrade the scheme accordingly resulting in water scarcity, both in quantitative and qualitative terms. Quantitatively, the town's water supply was intermittent. This was due to antecedent water scarcity and strategies adopted by the municipality to cope with such scarcity. Water supplies were cut off every evening at 1900 hours. This was to allow sufficient water to be pumped from the treatment plant into the reservoir for reticulation and use the following morning, when there is peak demand. Valves in the supply pipelines are opened between 0440 and 0500 every morning. While it

[28] Interview conducted with Messrs Xola Mntonitshwa, the technical manager of Sakhisizwe municipality

might expected that this strategy should enable a constant supply of water, the reality is that it only alleviates peak demand water shortage but does not does not resolve the problem of water scarcity. Because of high demand, water in the reservoir quickly gets exhausted and supplies have to be cut off again for three (3) to four (4) four hours during the day to allow recovery of the reservoir storage. Thereafter, supply valves are opened again to cater to a second peak in demand in the late afternoon. According to the technical manager responsible for local water services, there is an urgent need for Chris Hani District Municipality to increase the capacity of the scheme to a level where water supplies to Cala became constant. Impacts of poor water services on quality of life had created "a lot of strain" within the Cala community. People had repeatedly raised complaints with technical services officials, the mayor and municipal manager, to no avail.

While the practice of cutting off and opening up valves had resulted in widespread public dissatisfaction with Cala's water services delivery, and while much of the dissatisfaction was focused upon insufficient quantities of water, concerns were raised about unintended consequences regarding quality of water. The latter problem, however, was due to dereliction of responsibility by some of the technical staff employed in water services. According to key respondents from the municipality, it seemed as if some of the workers did not care about ensuring requisite water quality. Water was often found to be dirty in the morning and later, at around 1100 hours, it changed for the better as the day progressed. This indicated that workers left the water treatment plant too early, before ensuring that water was sufficiently purified.

Water quality problems were also linked to contamination from old sewerage infrastructure. In the lower-lying southern parts of the town, close to the hospital and about five hundred metres (500 m) from Tsomo River, there was an old swamp 'hons' sewerage system that ran naturally. This system was no longer used. The problem, however, was that discharge from remaining septic tanks made the system overflow into the river. Since Tsomo River was the main source of water for the town, concerns had been raised by officials and ordinary water users about a possible cholera outbreak in Cala.

Although Sakhisizwe provided services to all residents, water scarcity seemed to affect residents of informal settlements more severely than those of formal settlements. Water services provision in informal settlements, such as Phakamisani and all the new extensions 13, 14a and 14b, was according RDP standards. Effectively, this meant that water services development planning provided for communal water supplies or 'standpipes' and not individual in-house or yard connections. There was therefore no individual reticulation, and people had to share limited supplies from standpipes. Hardships associated with such sharing, when contrasted with better services in formal settlements, seemed to intensify perceptions of relative deprivation.

4.7.3 CALA RURAL: VIEWS FROM THE MUNICIPALITY

4.7.3.1 WATER SOURCES AND CHALLENGES

Regarding rural communities surrounding Cala, water tended to be abundant during the rainy season. Wet season water sources included boreholes, mountain springs, small dams scattered around commons and small rivers and streams that flowed through villages.

During the dry season or droughts, surface runoff ceased water became scarce. Despite that people living in Cala's rural areas have experienced seasonal water scarcity over a long time it was only in 2009 that the national government declared these areas 'drought stricken'. Implications of such declaration were, theoretically at least, that assistance would be given in the form of provision of emergency water supplies. Interviews with key respondents from the local municipality suggested that there were problems of coordination that might have hindered efforts to mitigate disaster and reduce vulnerability. At the time of the study, it was reported that to date there had been no emergency assistance from national government. Instead, national government had asked the district municipality to dispatch trucks to supply Cala's affected rural population with water. It was not clear why this had not happened. Nonetheless, respondents considered that the local municipality also had a responsibility to ensure that the limited amount of water available within the town of Cala was shared with residents in rural areas. According to respondents, interventions by Sakhisizwe Local Municipality exerted a financial and economic strain on the municipality and could therefore not be sustained. There was a need for national government to follow declaration of disaster areas with requisite allocations of funding.

Views of local municipal respondents were possibly valid. However, it also seemed that while decision makers opened up conduits for emergency assistance to go towards addressing the plight of Cala's rural people, functionaries in different spheres of water governance failed to transcend boundaries of their specific mandates. Rhetoric about shared responsibility seemed to be underpinned by perspectives that viewed water governance as compartmentalized according to spheres of government rather than integrated in ways that put people's interests first.

4.7.4 ELLIOT: VIEWS FROM DIFFERENT STAKEHOLDERS

4.7.4.1 WATER SOURCES AND CHALLENGES

Water challenges in Elliot were described as slightly different from those of Cala Rural Area. Elliot's water supply scheme was a lot better than Cala's. Jurisdiction of the former did not include numerous rural communities, but rather included predominantly black 'townships', predominantly white 'suburbs' and newly established informal settlements. The main problem in Elliot related to the 'new and old establishment'. The old "location" (township), Vergenoeg (suburb) and town centre all had reticulation at greater than RDP standards. Effectively, water users in these areas obtained water from access points within their houses and/or homesteads. There were no communal standpipes in Elliot except in Phola Park, which is a new establishment. Residents of Phola Park obtained water from communal standpipes. For commercial farms surrounding Elliot ("*emasimini*"), which were largely private property, boreholes were the main water source. Such boreholes were constructed through private investments and were therefore privately-owned. Because of this, the local municipality could not intervene when such boreholes dried up. Farm workers were particularly vulnerable to dry season water scarcity, since they lacked resources to obtain water from alternative sources. By contrast, land reform beneficiaries received assistance from various government and NGOs, and were therefore not as badly affected as farm workers on established commercial farms. Key respondents alluded to a new legislation that is said to require municipalities to put private farms into consideration when planning for

water services. According to respondents, the bigger problem on farms was not water scarcity but poor sanitation. This was because farms were not connected to the main water supply pipeline and therefore used mobile toilets and pit latrines, whereas their main source of water was boreholes. There was therefore a danger of groundwater contamination by seeping sewage.

Although Elliot's water challenges were different from those of Cala, the town had a similar lack of human resources capacity. Technical skills among water plant operators were relatively low. Elliot also had similarly old infrastructure that needed to be revamped. Despite the growth of the town's population, the reticulation system still consisted of small pipes that had become corroded. This affected water quality as taps sometimes issued rust-coloured water.

4.7.5 CALA RESERVE: RURAL PEOPLE'S PERSPECTIVES

On the 25 February 2010, a meeting involving about fifteen (15) villagers composed of men, women and the youth in the Cala Reserve administrative area was organised by one of the researchers, Professor Lungisile Ntsebeza, accompanied by members of CALUSA, a local land-based NGO. Villagers were requested to draw a map of their area, citing what they considered to be important resources in their area. An issue that came up for discussion after the map was drawn was water. Villagers commented about the natural availability of water in Cala Reserve on the one hand, and problems of access to water as a result of municipal planning, on the other.

Regarding the availability of land, participants pointed out that there was water 'galore' in Cala Reserve. There were two significant rivers close to the area, the Tsomo and Cala Rivers. Apart from these two rivers, there were at least five springs, three of which were strong and never dried up even in winter and during drought. Umvuzo spring was apparently the strongest and elderly people in their 70s commented that they never saw the spring dry. From their perspective, these springs were not utilized at all. They contended that there should be no problems of water if these resources were properly and wisely used.

In practice Sakhisizwe Municipality contracted a company based in Queenstown to install a bore-hole along the Tsomo River and distribute water to Cala Reserve, parts of eMnxe and Lower Cala administrative areas. Households in most of these areas received water in taps within 200 m from their households, thus meeting the RDP specification. There were households, though, who had to walk more than 200 m to get to the nearest tap, but these were few.

What about the safety of the water and the reliability of supply? Together with some members of staff of CALUSA, researchers and meeting participants went to inspect the site of the borehole. There they met one of the men who maintain the borehole. The pump was a modern facility that drew water from the river and chlorine was used to purify the water. The technician, Mr Musa Dlamini, told the group that he was fully qualified with a diploma from Wits and had experience in purifying water. The group was convinced that villagers were receiving clean water from the borehole.

However, the problem seemed to be related to reliability of the supply. According to the technician, there was only one working engine which now and again broke down. When this happened, no water was supplied to villages. Another problem raised by the technician was theft of the engine or parts and vandalism. The latter confirmed what municipal officials and staff in the Department of Water Affairs in Cala had said. The theft occurred even though the engine was barricaded and locked, suggesting an inside job and weak administrative and management systems.

During the mapping exercise, villagers also confirmed the unreliability of water supply. They complained that the water supply was not predictable. In such situations, they would revert to the river and springs, sources that posed serious health hazards.

The above account was not unique to Cala Reserve, but was illustrative of water scarcity experiences in other parts of the districts, including the town of Cala. Residents of Cala often complained about how unreliable the supply of water was. They had become accustomed to water restrictions. By contrast, Elliot did not experience such problems of unreliable water supply. A recommendation by this study is that more in-depth research needs to be done to provide greater clarity for planning purposes.

4.7.6 WATER SCARCITY FROM AN ACTIVIST VIEWPOINT

The following interview provides useful insights into dynamics between water scarcity, people's expectations for water services delivery and social protests. The interview is presented verbatim in order to avoid distortions that commonly result from researchers' translations and interpretations, no matter how faithfully such information processing is done.

INTERVIEW WITH SIPHIWO LIWANI IN HIS OFFICE, CALUSA,[29] CALA ON 6 JANUARY 2010 AT 14H35[30]

Prof: What is the state of water in your part of the world?

Si: Water is a critical issue to be looked at closely by the municipality and government. There is a serious scarcity of water. Water topped the list of problems in Xhalanga at a meeting of Siyazakha.[31]

Prof: What attempts is the municipality taking given that it is their responsibility to supply clean water to its communities?

Si: It is not enough. There is the case of Ngwangwazi at Sifonondile. They have a borehole with a machine. They have access to water twice a week, and only for home consumption. At Upper Ndwana the engine is not functioning. Trucks deliver water, but there is

[29] This is a locally based NGO that works with mainly rural communities who are in search of land through the government's land reform programme.
[30] Interview conducted by Prof. Lungisile Ntsebeza.
[31] Siyazakha is a social movement that was established in 2007 involving people who wanted land for production purposes through the land reform programme of government.

discrimination as to who gets water. ANC members get preference. In Cala Reserve, water is exhausted during dry seasons. Water is not purified. People here go back to old methods, including boreholes which were abandoned when the new well was constructed. (**Compare this with the discussion with some members of the community in Cala Reserve during the mapping exercise on the 25th of February).** Right now and in December 2009 we collected water in the rural areas from springs. In other places it is water that was provided by the Health Care Trust when they were involved in spring protection. In Manzimdaka, they have a reservoir.

Prof: You say the issue of water has raised serious concerns?

Si: The issue of water was also high on the agenda of the Xhalanga Crisis Committee. They took up the issue of the quality of water. As indicated, the issue of water came up as a hot issue in Siyazakha. They approached the Department of Agriculture, whose focus is on water irrigation on a small scale. They were told that the Department has a limited budget. DWAF never honoured the invitations of Siyazakha. At one stage we invaded (*sobagqogqa*) them. We tried about three times. Their manager is Mr Masabalala. This was a build up to a march. On 14 October 2009 there was a delegation of members of Siyazakha to Chris Hani District Municipality in Queenstown. We went to the Technical Department which focuses on water in the whole District municipality. They commissioned a survey/study on Sakhisizwe, amongst others. Their target is to address water and sanitation by 2014 as part of their backlog programme. They referred us to the Sakhisizwe municipality. Ntsikelelo Saleni, the IDP manager of Sakhisizwe promised to make the report available. He has not done so. **I have been trying in vain to get this report from the Sakhisizwe municipality. Mr Mntontshi told me he was not aware of the study/report.**

Prof: How big was your delegation to Queenstown?

Si: It was made up of 16 people, including two staff members of CALUSA. The rest were members of Siyazakha. Siyazakha members are from Sakhisizwe and Emalahleni municipalities. At the same time as Siyazakha and Calusa were discussing issues of land and water, other TCOE regions had similar discussions. In meetings of the various TCOE regions, water, land and general issues of service delivery were discussed. A resolution was taken that the issues be taken up at local and district level as a build up to the provincial level.

A provincial march starting in King William's Town (Victoria Grounds) to the Bisho legislature eventually took place. Before this there were meetings involving the various regions preparing a list of demands. These were forwarded to the Office of the Premier.

There were attempts to pre-empt the march. Ntosh was phoned by Mr May wanting to know what the Department of Agriculture could do to help Siyazakha. At more or less the same time, Mrs Fani received a call from the regional manager of Chris Hani about a similar enquiry. I think these were attempts to pre-empt the march.

Prof: What did Ntosh tell Mr May?

Si: She explained what Siyazakha was about.

A memorandum was prepared and at the march was presented to MEC Sogoni, who accepted it on behalf of the Premier. Sogoni showed commitment to work with people on the ground to unpack the issues raised in the memorandum. He committed himself to holding a meeting in December 2009.

Prof: What happened?

Si: The meeting never took place. He organised a follow-up meeting which Ntosh and Mr Ntamo attended.

Prof: What were the demands?

Si: There were complaints about the slow pace of the land reform programme; limited post-transfer support; lack of support from the Department of Agriculture; lack of service delivery, for example, water, sanitation, infrastructure.

Prof: Who participated in the march to Bisho?

Si: A number of organisations such as Tralso, BRC, TCOE affiliates in the Eastern Cape province, the Unemployed Movement based in Grahamstown. There were roughly 1000 people.

Prof: Was this the first time civil society took up issues with the municipality, other than on issues around the IDP? Were there links with the service delivery protests we read so much about?

Si: Yes, TCOE affiliates and the People's Movements kept on asking how to deal with their demands. The country wide protests were influential. The challenge, though, is how to sustain the protests. TCOE affiliates are supposed to assess the march, but they need to involve the other organisations that supported the march.

NB: Siphiwe later shared his reflections about the march:

- No follow-up on their part
- There were visible signs of party political loyalties, with some trying to high-jack and/or derail the march as ANC, something that had the potential of being divisive.
- The march was organised by the TCOE regions and the People's Movements. A provincial task team was set up with all organisations in the region represented. Other non-TCOE organisations were later invited.
- Water was not the only issue. However, the issue that triggered the march was water and the land question.

While the above interview provided useful insights into the dynamics around water scarcity, people's expectations for water services delivery and social protests, more interviews needed to be made in order to deepen understandings of issues.

4.8 SUMMARY AND DISCUSSION

Empirical research findings from purposively selected rural and urban local contexts confirm and strengthen literature review findings that social water scarcity is closely linked to livelihoods. Respondents often alluded to discrepancies between gendered water use requirements and institutional responses (and/or lack thereof). Expectations for water services delivery were linked to livelihood strategies and aspirations, while perceptions of water scarcity were associated with vulnerability to various risks.

However, there are variations, according to context, in perceptions of what constitutes acceptable water service levels. Linkages between water scarcity and societal expectations and/or aspirations for water services are therefore case specific, with relatively arid rural communities and households tending to be more willing to accept basic 'RDP' levels of water service delivery than their urban-based counterparts.

For example, in drier rural areas, such as Muyexe village in the Giyani area of Limpopo Province, awareness that access to water is below the expected minimum standards of water services delivery and below requirements for livelihood aspirations tends to be tempered by a realism that water use necessarily has to be streamlined to water availability

and that government efforts to supply water need to be matched by local people's strategies for water demand management (WDM), water conservation (WC) and augmentation. By contrast, while rural areas with perceived unexploited water resources, such as Mbuzini communal area in Mpumalanga Province and Cala Rural area in the Eastern Cape, show evidence of coping and adaptive strategies, there less acceptance of persisting insufficient institutional responses to water scarcity and water use issues.

In urban informal settlements, such as those of Sannieshof in the North West Province, perception was generally that water scarcity and water use problems were largely due to institutional ineptitude, which left communities and households particularly vulnerable to risks associated with water contamination and pollution. Local responses to water insecurity, however, were mostly split along racial, socio-economic and political cleavages. By contrast, within urban informal settlements in Khayelitsha township of Cape Town, formalization and marginalization issues featured strongly in the linkage between water scarcity and societal expectations and/or aspirations for water services. A rift had developed between recently formalized property owners and neighbourhood informal dwellers, whereby the former no longer tolerated hitherto shared informal access (including "illegal" connections) to infrastructure within their property. The excluded were well-aware of constraints to water access imposed by servitudes that applied to the land they occupied, but nonetheless were aggrieved by perceptions of relative deprivation and marginalization. Such grievances were strongly linked to expectations and aspirations by mostly newly-settled migrants from the Eastern Cape.

Empirical research also reveals that a major problem with the linkage of water scarcity and use at micro-level and water resources planning at meso-/macro-level relates to unresolved institutional issues. Although the Integrated Development Planning (IDP) framework is intended to ensure effective integration and coordination between various sectors and spheres of governance, this study found that in some cases water needs expressed and prioritized by communities were not similarly prioritized in terms of implementation funding. There were also discrepancies between population and water use data at meso-/macro- planning levels and ground-truthed data at micro-levels. In some case study sites, such as Sannieshof and Cala, respondents cited lack of institutional financial, technical and skilled human resource capacity as key constraints to addressing water scarcity and use issues. In Sannieshof and Mbuzini, issues of corruption, the ANC's cadre deployment policy and local cultures of political allegiance rather than 'downward accountability' emerged as major constraints. Implications therefore appeared to be that planning strategies and interventions were likely to continue missing service delivery targets unless outstanding institutional issues were resolved.

The foregoing case studies indicate therefore that good governance by Water Services Planning institutions is critical to the building of trust and pursuit of a common future goal, which is water security, in its broader sense. In practice, however, it might not be easy to rally together socio-economically differentiated micro-communities and households behind a common goal. Overarching institutional frameworks, such as the National Constitution, serve as common points of reference over meanings of what security and stability entails and therefore define the 'social contract' between government and citizenry. However, in many local community and household contexts the co-existence of plural institutional frameworks means that struggles over meaning often play out within the socio-political

space. It is possible therefore that within such terrain, relations between local people and water services planning institutions at municipal, regional and national levels of government might be determined by unresolved differences over meanings as well as the extent to which planning is perceived to optimally addresses people's requirements for water security and livelihood sustainability.

From the literature review (Chapters Two and Three of this report) and from empirical research (this Chapter) this report surmises that, ultimately, future uncertainties are inevitably a commonly-shared concern, irrespective of people's differences. Such recognition could therefore be an important rallying point for starting dialogue about 'Integrated Future Scenario-based Water Services Planning' and striving towards strengthening resilience of local households, communities, economies and ecosystems and, thereby, the stability of social organization.

CHAPTER 5: RECOMMENDATIONS FOR A FUTURE RESEARCH AGENDA

5.1 INTRODUCTION

The study initially set out to address a requirement by the WRC for research to develop thorough understandings of the 'social' aspects of water scarcity and water use. From such understandings, WRC requirements were that the study should contribute to the development of mechanisms to ensure that approaches to future scenario-based planning for water services are optimally linked to societal requirements and expectations. Specific aims of the study were to:

1. Develop a thorough understanding of the dynamics between water scarcity and socio-political stability;
2. Develop a thorough understanding of the linkages between water scarcity and societal expectations for water services;
3. Develop future scenarios around water scarcity in relation to the politics, economics and sociology of service delivery and development (highlighting micro community and household level aspects);
4. Link the scenarios to water services planning at municipal, provincial, national and regional level; and
5. Formulate a research agenda on specific issues that would improve understanding and preparedness.

This chapter address Aim 5 above. The research agenda outlined herein largely draws from research findings and outputs relating to Aims 1 to 4 above.

The study began with hypothetical view that institutional responses that are designed to proactively plan for changing resource demand-and-supply scenarios and predicated upon good governance principles, sound data and clear understandings of people's multiple water uses and requirements for water services are more effective at ensuring water and livelihood security than those that are not. Research findings confirmed, in principle, this hypothesis. Furthermore, application of the Sustainable Livelihoods Framework (SLF) by the research revealed more clearly the mechanisms and pathways by which water scarcity and water use are socially constructed, articulated and contested. A number of key issues were identified by the research. This Chapter outlines some of the key issues and makes recommendations for a future Research Agenda.

5.2 DISCUSSION ON SELECTED KEY ISSUES

This section presents a brief discussion and recommendations on some of the key issues identified for further research. Four (4) of the nine (9) issues are discussed. An outline of recommendations on all identified key issues is presented in the proposed future Research Agenda next section (see next section, Section 6.3 of this report).

KEY ISSUE 1 COMMON UNDERSTANDINGS OF 'SOCIAL WATER SCARCITY'

The working definition by this report is that social scarcity of water refers to a social construct of 'resource management', which is determined by political, economic and social power dynamics underpinning the institutions that provide structure to social relations, security of access to bases of social power and productive wealth, and stability to the social organization of human societies. Since secure access to water is an integral part of people's multi-faceted livelihoods, manifestations of social water scarcity become strongly manifest at the micro-levels of social organization namely, communities and households at the local level.

People at these micro-levels often perceive social water scarcity to be inadequacy of the quality and quantity of available water to meet their multiple-use requirements, which affects their capabilities to secure and enhance existing livelihood asset 'portfolios' against vulnerability to risks and hazards within their given contexts. As such, narratives over social water scarcity often allude to people's unmet expectations for water services, on the one hand, and 'wasteful' water use, on the other hand. By contrast, narratives over social water security are closely linked to narratives over livelihood sustainability.

Local people are often also aware of the power dynamics underlying discourses over meanings and structure of institutions governing social relations in organized society and therefore see social water scarcity as largely an end-product of dominance by the more powerful political, economic and social interests, which define and dominate discourses over meaning, the structure of resource allocation and relations between themselves and water services institutions and institutional actors.

Where such meanings, institutions and relations are perceived to be sub-optimal, local communities and households will exercise their agency to adopt a range of livelihood strategies to safeguard themselves against vulnerability to risks. They mobilize their individual and collective livelihood assets, such as financial resources, human labour, social networks and socio-political platforms, to cope with water insecurity and/or to engage with institutions on the need for change. Outcomes of these coping and engagement strategies depend on, on one hand, capabilities entitlements and claim-making power of affected communities and households. On the other hand, such outcomes also depend on the governance practices and capabilities of institutions.

Although this study's working definition provides a useful vantage point for thinking about meanings of social dimensions of water scarcity and water use, it is still a work-in-progress. Further research is required to develop the concept of social water scarcity.

KEY ISSUE 2 NEED TO OPTIMIZE GOVERNANCE OF WATER SERVICES PLANNING

Institutions were found to play key roles in determining permutations of social scarcity of water and water use. Literature suggests that institutions, as "rules, regulations and conventions" (North, 1990) that "provide stability and meaning to social behavior" (Scott, 1995), determine the endowments, entitlements and capabilities of local communities and households, as well as vulnerability contexts and livelihood outcomes. Conversely, social organization of communities and households influences institutional contexts and

arrangements, irrespective of downward accountability (or lack thereof) of institutional actors (Van Koppen et al., 2006).

Attributes of 'Optimal' Institutions

The study defined 'optimal' water services institutions as those that possess a combination of good governance attributes and, thereby, contribute to the resilience and stability of social organization. Such attributes include 'legitimacy', 'accountability', 'robustness', 'effectiveness' and 'preparedness'.

- Legitimacy, in resource management, derives more strongly from the extent to which water services institutions pursue the interests of local constituencies than from mere accession into governance structures by democratically-elected representatives.
- Accountability, from the perspective of 'good governance', refers both to upward and downward accountability.
- Robustness refers to institutional capacity to adapt to changing contexts by timeously adopting innovative mechanisms to strengthen the alignment between water services demand and supply.
- Effectiveness of institutions is closely linked to robustness, but focuses more on the outcomes of institutional responses than on the pre-emptive and ongoing adaptations.
- Preparedness refers to the pre-emptive possession and use of predictive and mitigatory measures to deal with risks, shocks and uncertainty.

Although overarching frameworks, such as the National Constitution, provide a common reference point for determining preconditions for stability and security, in many local contexts, the co-existence of plural formal and informal institutions with multiple jurisdictions and operational scales meant that accountability by water services planning straddled the fault-lines and power relations of diverse stakeholder interests. Water services planning practice tended to be more upwardly-orientated than downwardly accountable and, consequently micro-level water security interests were subsumed to or unaddressed by meso-/macro-level planning objectives.

Permutations of such disjuncture included tensions around issues of privatization of water services, whereby planning saw decentralization as a means towards greater institutional efficiency while civic society organizations and social movements representing poor people saw privatization as leading to higher costs of water services and therefore greater inequality in water security.

Examples also related to the variance between multiple-use requirements by local communities and households the single-use design of formal public water schemes. Such disjuncture seemed to be at the core of 'social water scarcity'. The case of Mbuzini demonstrates this (see Section 4.4, Chapter 4 of this Report). Expectations by women of Thambokhulu village that an envisaged bulk water supply scheme would provide water for their multi-use needs, including irrigation of food gardens, were at variance with water services planning objectives.

Robustness of water services planning was often weak, particularly with regard to the

burgeoning of informal urban settlements. Cases of Sannieshof, Khayelitsha and Cala clearly demonstrated this (see Chapter 4 of this report).

Effectiveness of water services planning in other contexts, such as Muyexe Village of Giyani, fell far short of people's expectations for water services. Although Muyexe had been identified as a 'presidential pilot' for the government's Comprehensive Rural Development Programme (CRDP), and although various efforts had been made to ensure water security, many households remained without secure access to water (see Chapter 4).

The few examples cited above give glimpses of governance requirements in water services planning. The examples also indicate a need for further action research to develop clear guidelines for requisite institutional mechanisms. Such research would build upon work done by AWARD on the SWELL Methodology, as well as existing Municipal Guidelines for Multiple-Use Water Services.

KEY ISSUE 3 FURTHER RESEARCH ON WATER-RELATED SOCIAL PROTESTS

Although the study highlighted a number of key findings on water-related social protests, there is a need for further research to deepen understandings of the protest phenomenon. Such understandings will contribute to enhancing preparedness by water services planning and related institutions.

KEY ISSUE 4 DECISION SUPPORT TOOLS TO ENHANCE PREPAREDNESS: MODELLING OF THRESHOLDS OF RISK ACCEPTANCE AND RISK UNACCEPTANCE

The Methodological Framework (see Key Issue 3 above) proceeded to give a rough conceptual outline of core principles for a Decision Support tool that could be used to improve preparedness. The envisaged tool would seek to predict, pre-empt, prevent and mitigate asset loss, particularly at micro-levels. The suggested approach is summarized below.

From application of methods such as WRIAM and reliable data, such as provided by Quality of Life and General Household Surveys (QLGHS) and municipal Indigent Registers, would be used to construct vulnerability profiles of households and communities. From these, Risk Factor Indices would be calculated and Indicators for different magnitudes of asset loss would be developed and calibrated. Thresholds of Risk Acceptance and Risk Unacceptability would then be statistically computed. For practical applications, further research would need to identify the requisite information and communication capacities, and institutional interfaces for rapid information dissemination and response, among other needs.

5.3 FUTURE RESEARCH AGENDA: RECOMMENDATIONS

Table 10 presents an outline of recommendations for a future Research Agenda. The Agenda includes all nine (9) key issues identified. Planning Horizon broadly includes Short Term, Medium Term and Medium-to-Long Term. For each key issue, research objectives, rationale and resource requirements are outlined.

Table 10 FUTURE RESEARCH AGENDA

PLANNING HORIZON	FUTURE RESEARCH REQUIREMENT	OBJECTIVE	RATIONALE	RESEARCH RESOURCE NEEDS
SHORT TERM	**KEY ISSUE 1** COMMON UNDERSTANDINGS OF 'SOCIAL WATER SCARCITY'	To further develop understandings of 'social water scarcity'	Working definition by this study is still a work-in-progress. There still need for clearer understandings	Research funding
	KEY ISSUE 2 NEED TO OPTIMIZE EXISTING GOVERNANCE FRAMEWORK – TOWARDS ALIGNMENT WITH 'INTEGRATED SCENARIO-BASED WATER SERVICES PLANNING'	Develop Framework for Optimal Water Services Governance – with clear TOR, capacity requirements, institutional interfaces, platforms for engagement & early warning signals for problems e.g. water issues & relationships	Disjuncture between social water security needs at local community and household level and Water Services planning at municipal, regional and national level. Integrated Scenario-Based Water Services Planning requires good governance and 'optimal' Institutions.	Funding for Action Research
	KEY ISSUE 3 METHODOLOGICAL FRAMEWORK FOR 'INTEGRATED SCENARIO-BASED WATER SERVICES PLANNING' Water Services Issues Assessment Method, incorporating 'SLF-WSIAM-Scenarios'.	To refine the instruments of this study's proposed Methodological Framework. To further develop a more comprehensive Framework that can be used for wider practical applications in Water Services Planning	Tools and instruments of proposed Methodological Framework need to be refined. A more comprehensive framework is needed, with clear guidelines and approaches for practical applications,	Research Funding
	KEY ISSUE 4 DECISION SUPPORT TOOLS TO ENHANCE PREPAREDNESS: MODELLING OF THRESHOLDS OF RISK ACCEPTANCE AND RISK UNACCEPTANCE	To proactively plan for changing resource demand-and-supply scenarios. To predict, pre-empt, avoid	Lack of adequate predictive capacity and preparedness contributes to uncertainty and 'water crisis' scenarios.	Research Funding Knowledge support for social researchers on development and

		and mitigate vulnerability to risks, hazards and uncertainty.	Social protests often unanticipated. 'Hidden' scarcity in rural areas often goes unseen.	application of DSS tools. (to enable social researchers to make meaningful input into tool development)
MEDIUM TERM	**KEY ISSUE 5** FRAMEWORK TO GUIDE EXTRAPOLATION OF INTEGRATED SCENARIO-BASED WATER SERVICES PLANNING APPROACH TO A WIDER RANGE OF SCARCITY CONTEXTS NATIONALLY	To determine optimal guidelines for effective and efficient national scale application.	Many Guidelines and Toolboxes developed for other purposes in the past have often proved too difficult and unwieldy, and therefore outputs of such research have tended to end up on the 'shelf'. Guidelines to optimize national roll-out lead to cost-effective use of state resources.	Research funding
	KEY ISSUE 6 BASELINE STUDIES ON EXISTING INSTITUTIONAL CAPACITY	To establish benchmarks To identify capacity needs	Governance practices of by Water Services planning seem to need strengthening. Clear understanding of needs helps to target interventions. Benchmarks provide a base for monitoring achievement.	
	KEY ISSUE 7 DEVELOPMENT OF TRAINING RESOURCES FOR INSTITUTIONAL CAPACITY BUILDING	To build HR capacity on identified needs	Proposed Integrated Scenario-Based Water Services Planning, as a new approach. Shifts in planning practice require support and optimal capacities	Funding for development of training resources.

MEDIUM-TO-LONG TERM	**KEY ISSUE 8** DEVELOPMENT OF A COMPREHENSIVE ROLL-OUT STRATEGY FOR INTEGRATED SCENARIO-BASED WATER SERVICES PLANNING (for implementation by DWA & municipalities)	To develop a more comprehensive Methodological Framework with clear guidelines for practical application. To and evaluate practical applications of methods and tools	Clear practical and practicable framework is required.	Research Funding
	KEY ISSUE 9 MONITORING AND EVALUATION OF EFFECTIVENESS OF IMPLEMENTATION OF INTEGRATED SCENARIO-BASED WATER SERVICES PLANNING	To develop indicators to assess effectiveness of implementation. To evaluative impacts on a representative sample of socio-economically-differentiated communities households in prioritized contexts (including rural & urban formal & informal areas). To give attention to Attention to targeted vulnerable groups, e.g. poor households, women, youth and other groups.	Local responses to water scarcity are diverse. Social protest are a more visible form, while much of social scarcity takes the form of 'hidden transcripts', off-stage of the publicized protests. Need therefore to avoid entrenching further marginalization of 'silent' groups. Need to support also the coping strategies. Monitoring & evaluation give insights on effectiveness of implementation and interventions	Research funding

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APPENDIX 1 EXPLORATORY METHODOLOGICAL FRAMEWORK AND APPROACH

I. INTEGRATED FUTURE SCENARIO-BASED APPROACH TO WATER SERVICES PLANNING: METHODOLOGICAL FRAMEWORK

A. INTRODUCTION

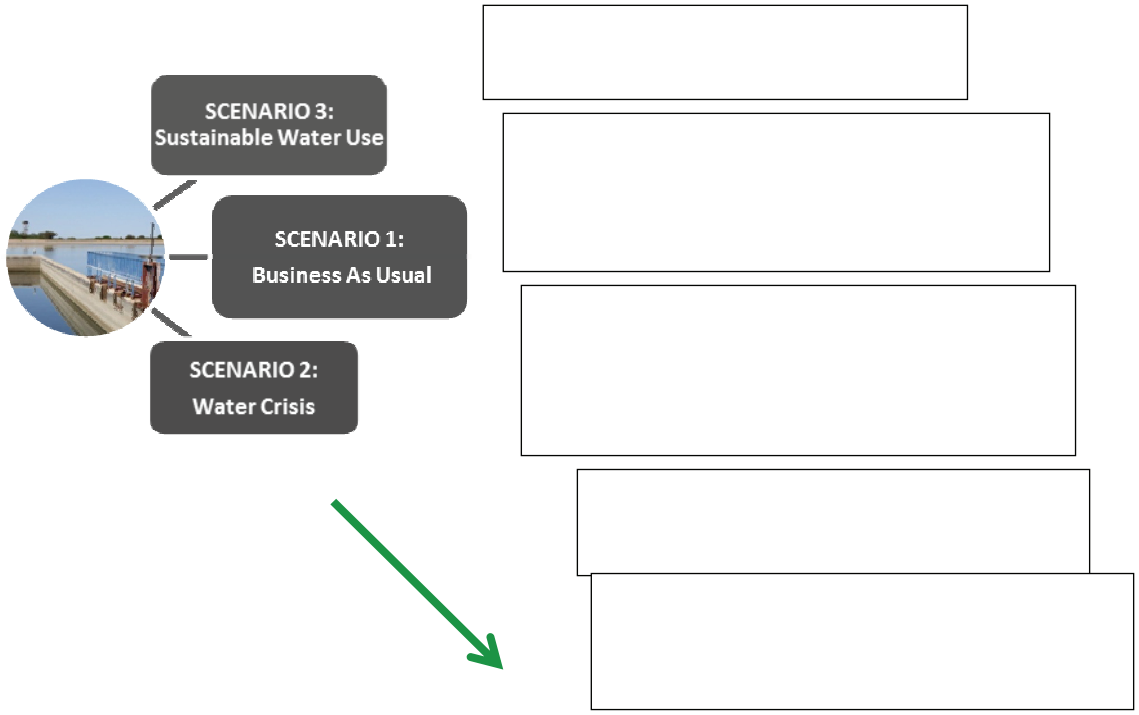
Appendix 1 (this section) outlines a Methodological Framework that was explored by the study towards optimizing the effectiveness of water services planning in ensuring water and livelihoods security at micro-community and household levels. A key objective of framework development was to find a possible scientific approach to linking nuanced insights on social water scarcity and water use issues at micro-community and household levels, on the one hand, to future scenario-based water services planning at municipal, regional and national levels.

The section begins by presenting an overview of the Methodological Framework. This is followed by an outline of a scenario-building approach that links micro-level social water scarcity and water use issues to macro-/meso-scale water services planning. The section then proceeds to present an outline of methods for collecting data pertaining to social water scarcity and water use issues at micro-community and household levels. Finally, the utility of the Methodological Framework is demonstrated on a hypothetical setting that is based on this study's empirical findings from Sannieshof. It is worth noting that the express objective of this test is to gauge the internal logical consistency of the proposed Methodological Framework and to lay a foundation further research. Findings of the hypothetical test are therefore not intended to provide any definitive statements on prevailing real-world conditions in Sannieshof. Henceforth, the remarks made in the conclusion are limited to the usefulness of the Methodological Framework as a basis for future research.

B. OVERVIEW OF METHODOLOGICAL FRAMEWORK

Figure 15 presents an overview of this study's proposed Methodological Framework towards optimizing the effectiveness of water services planning in ensuring water and livelihoods security at micro-community and household levels.

A. **MESO/MACRO-LEVELS OF PLANNING**



B. **MICRO-LEVELS OF WATER SCARCITY AND USE**

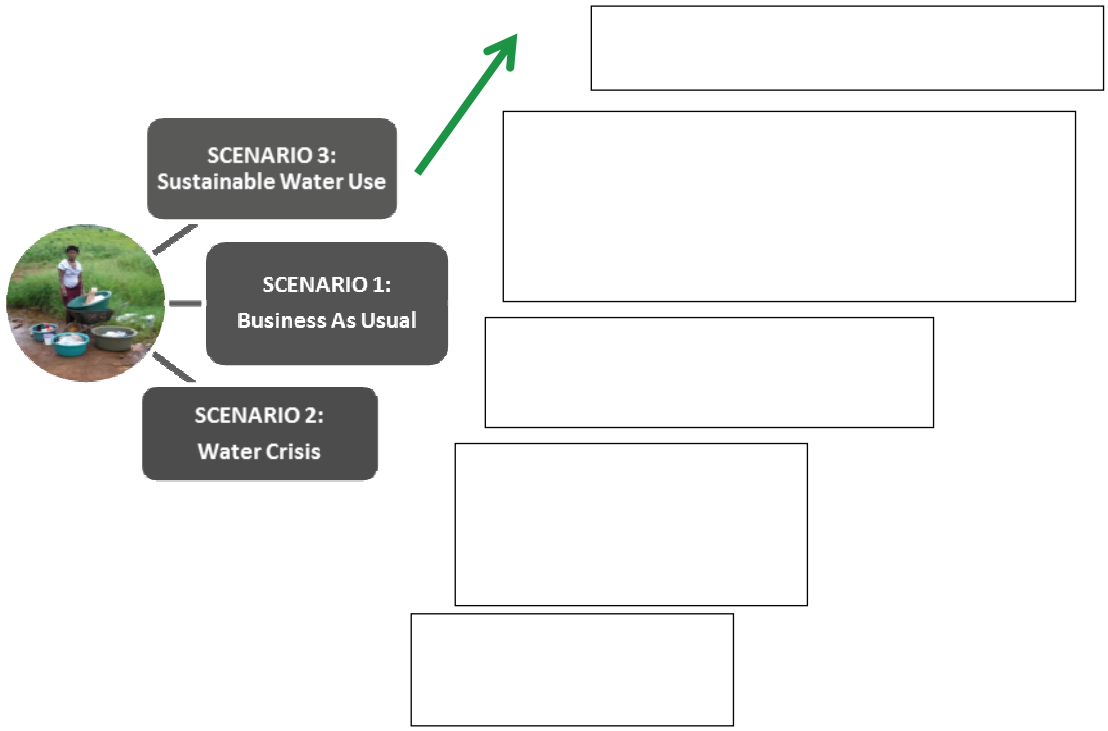


Figure 15 **OVERVIEW OF METHODOLOGICAL FRAMEWORK**

Key elements of the framework are:

Stratified (or layered) scenario framework consisting of (A) Meso/macro-levels (i.e. municipal, regional and national levels) of planning and (B) micro-levels (i.e. local community and household levels) of water scarcity and water use.

Three corresponding scenarios that play out at Planning Level (A) and Water Scarcity and Use Level (B).

- Scenario 1: Current 'Business as Usual' (BAU) approach to planning
- Scenario 2: Downward future trajectory from BAU to 'Water Crisis' (CRI)
- Scenario 3: Upward future trajectory from BAU to 'Sustainable Water Use' (SUS).

Levels A and B influence, respond to, resonate with, are discordant to and/or independent of each other.

At Level A, this means that planning decisions, options and responses either influence or are influenced by water scarcity and water use issues at local community and household levels. For example, planning may proactively adopt water reconciliation options to ensure water security at Level B. Conversely, planning may respond or react to a water crisis situation at Level B.

At Level B, this means that communities and households in water scarce contexts may influence or be influenced by planning decisions, options and responses (or lack thereof) at Level A. For example, communities may use stakeholder platforms to influence planning decisions or responses. Similarly, communities might adopt protest action as a mechanism to force planning to respond to their perceived deprivation of water services. Conversely, communities may disengage from planning processes and adopt independent action to mobilize water resources and ensure water and livelihood security.

Towards clearer understandings of the link between micro-community and household water scarcity and water use (Level B) and macro-/meso-level planning (Level A), three scenarios necessarily have to be read in unison, as overlaid and inter-woven motifs. Similarly, operationalization of micro-level and meso-macro-level linkages requires that understandings of Level B (micro-community and household level) attributes should be complemented at Level A (meso/macro-levels of planning) by corresponding data collection and analytical methods to enhance understandings of micro-level water scarcity and water use issues (Figure 16).

Results of data analysis should then be used to formulate planning options, decisions and responses that are geared towards preparedness and risk-avoidance, at planning levels, and water and livelihood security, at micro-community and household levels (Figure 16, Step 5).

The effectiveness of water services planning will depend upon the scenario approach adopted. In addition to aforementioned requirements, requisite factors include (i) a high degree of resonance in top-down and bottom-up understandings and (ii) adoption of sustainable water use scenario approaches (i.e. Scenario 3 type).

Other requirements include (iii) predication of water services planning upon the principles of good governance, (iv) reliable data and adequate financial, human, physical, natural and social infrastructure for implementation of robust and effective scenario-based planning.

II. FUTURE SCENARIO-BUILDING APPROACH: OUTLINE

A. INTRODUCTION

This section presents an outline of the scenario building approach used in this study's Methodological Framework. In its broadest sense, the term 'scenario' has many meanings (Schoemaker, 1993). A 'scenario' has been defined as "a coherent, internally consistent, and plausible description of a possible future state of the world" (Carter et al., 1994 in Rosegrant et al., 2002). It is not a forecast but a "snapshot" of how the future could unfold (Rosegrant et al., 2002). Multiple scenarios are often used in corporate planning to characterize the range within which the future is likely to evolve (Huss, 1988 in Schoemaker, 1993). The value of scenario building and analysis in planning is that it enables managers to identify basic trends and uncertainties and thereby "construct a series of scenarios that will help compensate for the usual errors in decision making – overconfidence and tunnel vision" (Schoemaker, 1995: 25).

Various methods have been used in the analysis of future scenarios. These include 'sensitivity analysis', which is based on changes in one underlying variable within a single formal model (Rosegrant et al., 2002). They also include holistic qualitative scenarios that create a narrative from a logical plot that governs the way things will unfold and then use other models and quantitative tools, such as accounting frameworks and mathematical simulation models, to assess the quantitative aspects of such scenarios (Gallopin & Rijsberman, 2001 in Rosegrant, 2002). This report proposes that a multiple scenario approach might be more appropriate than sensitivity analyses, contingency approaches and computer simulations for purposes of planning to address social water scarcity.

The rationale is that the context of social water scarcity in South Africa is characterized by a complexity of drivers and trends, which introduce uncertainty to water services development and resource management planning. At the same time, there is a pressing need to broaden water security and ensure universal access to water, particularly for historically disadvantaged people living in water scarce localities such as informal urban settlements and marginalized rural areas. In light of such complexity and need for reform, emphasis by contingency planning and sensitivity analysis on one uncertainty or variable (such as population growth) while keeping all other variables constant seems to be of limited utility and inadequate for

long term planning requirements. By contrast, multiple scenario approaches change change several variables simultaneously without keeping others constant, try to capture the new states that will emerge after major shocks or deviations in key variables, attempt to interpret output from complex simulation models and often include elements that are not or cannot be formally modelled, such as new regulations, value shifts and innovations (Schoemaker, 1995:27).

The methodological approach proposed for scenario building and analysis for this study derives from a synthesis of various sources. These primarily include works of Paul Schoemaker (1993; 1995), national scenario building processes, such as the Dinokeng Scenarios (Dinokeng, 2009) and constructs that specifically examine future water scarcity scenarios (Rosegrant et al., 2002; The Barilla Group et al., 2009) and those that deal with ecosystem service in general (Scholes & Biggs, 2004). The overarching framework will be Integrated Water Resources Management (IWRM).

B. BACKGROUND

This study's bottom-up approach to Methodological Framework development complements simultaneous studies by the Department of Water Affairs (DWA) to develop future scenario-based planning approaches, from a meso/macro-level perspective. The DWA All Towns Reconciliation Study, which covers all the towns in the country, as well as a large number of rural villages and Metropolitan Areas Reconciliation Studies were initiated by the National Water Resources Planning Directorate with the objective to provide 'first order' strategies for reconciling future water demands with water supplies within each given universe, in order to limit vulnerability and ensure resilience. A second objective was to use results of Reconciliation Studies as a basis for regular review of future water demand scenarios, and the available options and actions required to meet such demands.

As decision support frameworks for future scenario-based water resources planning therefore, DWA Reconciliation Studies represent a shift away from 'business as usual' and 'crisis management' approaches towards 'sustainable management' approaches (according to Rosegrant et al., 2000)[32]. The latter have the flexibility to accommodate discrepancies between envisaged future scenarios and actual eventualities, thereby conferring greater potential to minimize the vulnerability of societies, economies and ecosystems

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[32] See Deliverable 3 of this study (WRC K5 1940//3).
[33] See Deliverable 3 of this study (WRC K5 1940//3).

The All Towns Reconciliation Study, in particular, selected, grouped and prioritized according to the following criteria:

- Economic growth point (according to the National Spatial Development Plan)
- Poverty node
- Easy to develop a strategy (by inspection and expert knowledge)
- Political pressures (in addition to the above)
- Problem areas (existing stress)
- Logical grouping of towns

This study used the same criteria in its selection of case studies (see Chapter 4).

The scenarios-building approach that was used to formulate first order reconciliation strategies broadly resonated with WEAP and similar Decision Support (DSS) Models. Each strategy was based on an assessment of the current water balance situation and expected future water requirements in each given universe. From this baseline, the strategy mapped out a scenario-based course of actions to effect adequate future reconciliation of water requirements and water availability. These included demand- and supply-side interventions and options, with population growth as a key socio-economic variable. Supply-side options included measures to augment existing water sources, such as supplementary surface water schemes, groundwater abstraction, desalinization of brackish or marine water, trading of water use authorizations. Demand-side options included Water Demand Management (WDM) and Water Conservation (WC) measures, such as reduction of infrastructure-related water loss, re-use of treated effluent, hydraulic pressure management, installation of water meters, improved monitoring and accounting of water use

In their consideration of scenarios and options, reconciliation strategies took into account various factors, such as characteristics of current and projected population growth and water consumption (at 'high' and 'low' rates), existing infrastructure, time and capital cost requirements for implementing an intervention, net effect of the water balance, availability of funding and managerial expertise and indications on who should be responsible for different aspects of strategy implementation, monitoring and adjustment.

The first set of scenarios mapped out future demand-supply scenarios in the absence of reconciliation options (i.e. 'business as usual' approach), which would eventually lead to crises as both low and high rates of population growth and water consumption outstrip available supplies. The second set of scenarios mapped out future demand-supply scenarios in the presence of selected demand- and/or supply-side reconciliation options. Where a combination of both types of options was included, emerging scenarios differed from the first set of scenarios in that such options tended to lead to increased water availability, except where there was existing deficit and supply-side options were severely constrained, such as in the case of Mbuzini in Mpumalanga Province. Where reconciliation options enabled a net increase in water availability, this prolonged the time taken to reach the water deficit threshold, at both low and high population growth rates

The Reconciliation Sties' scenarios varied slightly from those developed this study. Despite differences, there was sufficient overlap from which to gain useful insights. A critical difference was that while scenarios constructed by the Reconciliation Studies were consisted of a single-layer, which was the meso/macro level of planning, this study's scenario construct consists of two overlaid strata namely, the micro-community and household level and the meso/macro levels of planning.

The value of this study is therefore in that it provides a dual and inter-linked bottom-up and top-down perspective, which gives a more comprehensive view of any given water planning and use universe. There are also complementary strengths. Reconciliation Studies have more rigour in demand- and supply-side methods and data. By contrast, this study is more rigorous in its treatment of water-and-livelihoods, water security, social water scarcity and water use, as well as relationships between livelihoods and institutions (including planning institutions).

C. TOWARDS AN INTEGRATED APPROACH TO FUTURE SCENARIO-BASED WATER SERVICES PLANNING

In the manner of Rosegrant et al. (2002), Scenario 1 of this study's Methodological Framework depicts the current 'Business as Usual' (BAU) approach to planning; Scenario 2 shows a downward trajectory from BAU towards 'Water Crisis' (CRI); and Scenario 3 portrays an upward trajectory from BAU towards 'Sustainable Water Use' (SUS) (Figures 16 and 17). Towards clearer understandings of the link between micro-community and household water scarcity and water use, on the one hand, AND macro- and meso-level planning, on the other hand, these three scenarios necessarily have to be read in unison, as overlaid motifs or "flip-sides of the same coin".

SCENARIO 1: BUSINESS AS USUAL

At the Upper (Macro-/Meso-) Level, the Business As Usual (BAU) Scenario is whereby current planning practice is not sufficiently responsive to basic and livelihood needs for water at micro-community and household level. Hence planners, for example, design infrastructure for singular use while in practice such infrastructure serves multiple-use purposes. Planning might also not be sufficiently gender-sensitive, such that infrastructure (for example some manually-operated water pumps) is not amenable to use by women and girls, who play principal roles in collecting and conveying water. Planning is also not sufficiently proactive in adopting Augmentation Measures, such as investing in surface water storage infrastructure, groundwater abstraction and/or 'new water' (e.g. desalinization and re-use technology). Similarly, there is insufficient pursuit of Efficiency Measures, which include various methods of water demand management (WDM) and water conservation (WC). Although some augmentation and efficiency interventions are implemented, these do not necessarily reconcile water demand-and-supply at micro-community and household level. Rather, planning tends to be intuitive, opportunistic (e.g. depending on the coincidence of political will, availability of funding and suitable dam sites) and/or compelled by other forces, such as unanticipated rapid urbanization, social protests or civil disobedience. Planning is not based on any clear understandings of the relationship between livelihoods and water scarcity and

use at the micro-level. In the shorter, through trial-and-error, BAU water resourcesplanners might achieve a semblance of “management”.

However, in the long run, with population growth, the BAU approach offers no guarantees of success in achieving sustainability goals of IWRM.

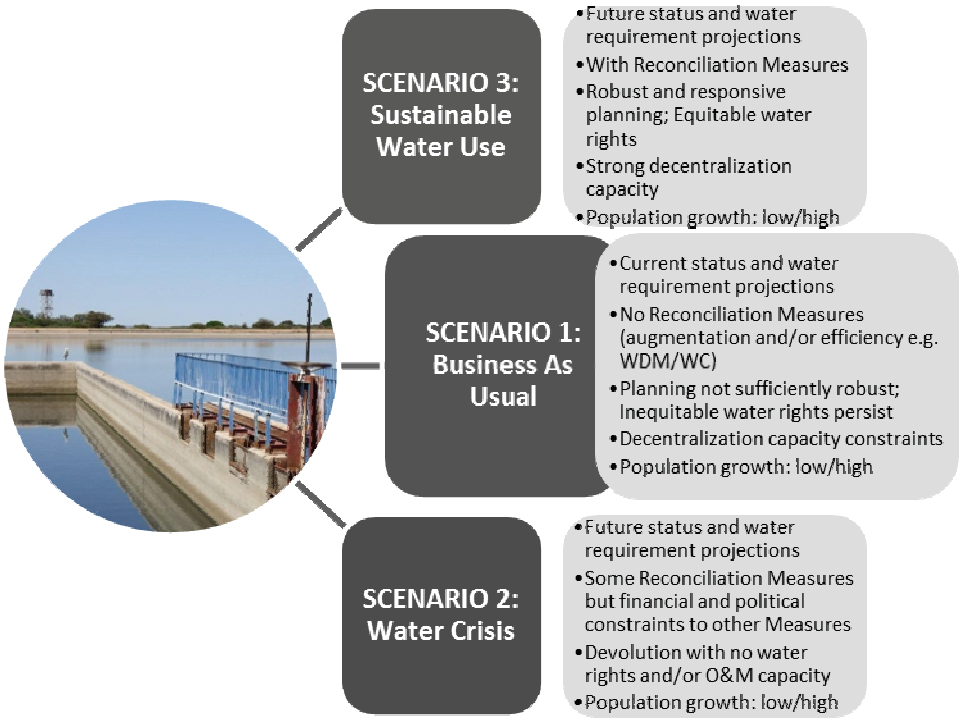


Figure 16 Future scenarios: meso- and macro-level planning

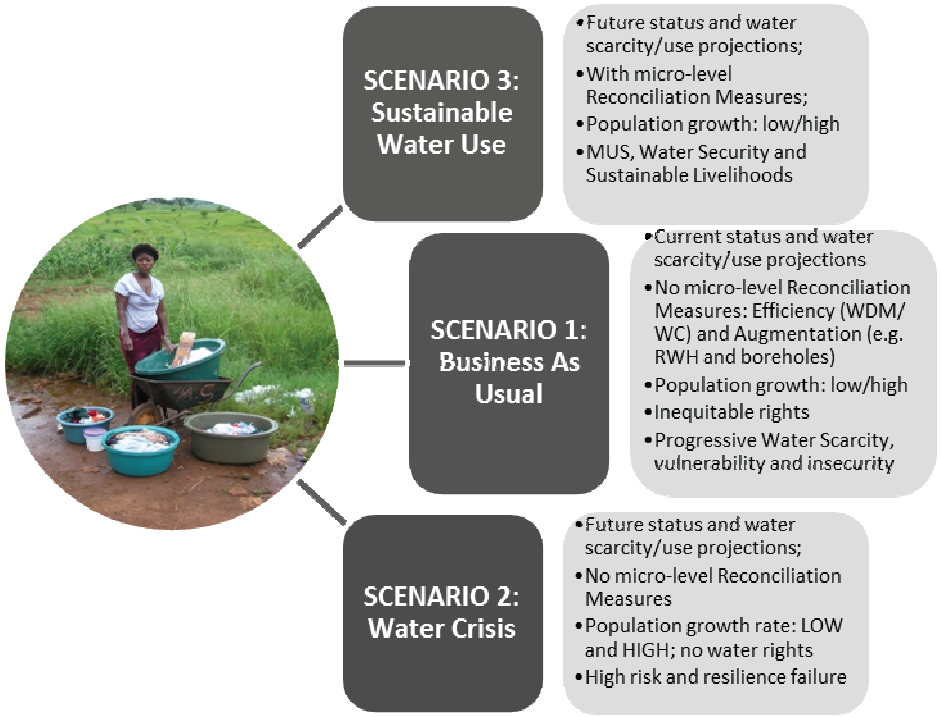


Figure 17 Future scenarios: micro-community and household level

At the Lower (Micro-) Level of the BAU Scenario, people within micro-level communities and households currently live with on-going effects of day-to-day and/or seasonal water scarcity. Out of necessity, their coping strategies often include reliance on alternative water sources, such as raw water from rivers and springs and procurement of water from informal vendors, often at a higher cost than public supplies. In instances where public infrastructure exists, such as bulk supply pipelines and irrigation canals, but does not service people's basic and/or multiple livelihood requirements for water, coping strategies might extend to cannibalization of state-funded infrastructure through self-help means like informal connections, which are often criminalized. By contrast, adaptation strategies might include rainwater harvesting, water re-use and drip irrigation as means to augment or conserve communal or household water supply. Without linkage to macro- and meso-level planning interventions from above, however, micro-level coping and adaptation strategies might not necessarily reconcile discrepancies between water demand-and-supply within communities and households. Such strategies might also not be reconciled to externally-planned water supply-and-demand management regimes. Indeed some habitual water use practices, such as wasteful use, Multiple-Use Water Services (MUS) infrastructure designed for single-purpose and water pollution often run counter to planning objectives. Other livelihood practices within local quaternary catchments can actually contribute to the destruction of the very ecosystems and hydraulic infrastructure that planners need to articulate government obligations to ensure water security, in the broader sense of the term.

In such contexts, population growth and historical inequalities in the allocation of resources often combine to exert pressure on the natural resource base. Together with careless land-use practices, population pressure results in the degradation of wetlands, croplands, rangelands and forests. Land degradation causes further reductions in available surface and groundwater within catchments. For example, accelerated soil erosion causes dam siltation, which reduces the life-span of existing water storage dams. The costs of rehabilitating or recapitalizing such infrastructure are high. A second example relates to land use effects of reducing ground cover and/or compacting soils, which increase run-off, lower percolation and thereby reduce replenishment of groundwater. In the context of such degradative land use practices, if planners' water augmentation options are based on assumptions of groundwater availability and consistent dam capacity, government expenditure on boreholes and dam infrastructure might not yield matching returns in water supply. The integration of water planning and water use levels is therefore critical to resolving misalignments between planning practice and water user requirements and actions. Without such linkage, BAU Scenarios render planning interventions unsustainable and water user communities and households vulnerable to water insecurity and unsustainable livelihoods (Figure 1 in Chapter 2 of this report).

Vulnerability under BAU Scenarios is not experienced uniformly but according the socio-economic differentiation of communities, households and individual members of households. Affluent communities and households often have the financial means to obtain safer alternative sources of water. They can privately invest in boreholes, purchase commercially bottled water and/or procure private water services. Less affluent rural communities and households might make collective or individual investments in communal hydraulic infrastructure, such as wells and small impoundments. Other communities might collectively legitimate informal (or "illegal") connections to state-funded infrastructure. The poorest of households, however, remain the most vulnerable to risks associated with informal service provision, particularly the relatively high costs of supplies by vendors and hazards of using of raw water. The highest costs within such households, however, tend to be borne by women and girls, who shoulder the heavier burden of conveying water and using it for household domestic requirements.

For this gender group, such costs often include a narrowing of livelihood opportunities as women and girls spend more time sourcing water for basic needs than acquiring assets for strategic access to productive wealth, such as education and paid formal and informal employment. The full cost implication of BAU planning for these women and girls is best appreciated in view of their reproductive roles, wherein the negative livelihood impacts of water insecurity cascade to subsequent generations of resource-poor households, and the vicious cycle of poverty becomes perpetuated. On a day-to-day basis, unprotected water sources potentially endanger women's and girl's health and lives, due to risks like crocodile and hippo attacks, accidents caused through competing with domestic animals for access to water, drowning and contraction of water-borne diseases such as cholera and bilharzia. Therefore, apart from options to ensure reconciliation of water supply-and-demand, a key challenge for institutions under the BAU Scenarion is to diligenlty ensure that alignment between micro-level water use and macro-/meso-level water planning results in water security for the poor, and women and girls in particular.

SCENARIO 2: CRISIS MANAGEMENT

The Crisis Management (CRI) Scenario represents a down-ward future trajectory of the BAU Scenario (Scenario 1). Weaknesses in the linkage between macro-/meso-planning and micro-use levels lead to a progressive failure of institutional arrangements and ultimately a major water crisis. While consequences of failure to reconcile water demand-and-supply result in water governance crises at municipal, provincial, national and transboundary levels, the most poignant effects are felt at micro-community and household level, particularly by the poorest and most vulnerable communities and households.

With progressive lack of or insufficient realization of human rights to water, people's expectations remain unmet and, over time, aspirations seem unattainable. Water insecurity is compounded by mismatches between population growth and planning responses, whereby service delivery targets continue to lag behind growing population demand for water.

How micro-level communities, households and individuals react to institutional failure depends on the margin of perceived risk, perceptions of relative deprivation, degree of social and socio-political organization, relationship with government institutions, and socio-economic and socio-cultural characteristics of affected populations, among other factors. Such factors determine the points at which affected populations cross thresholds for acceptability or unacceptability of risk (Figure 18) and the strategies they adopt to avert risk and vulnerability.

SCENARIO 3: SUSTAINABLE WATER USE

The Sustainable Water Use (SUS) Scenario represents an up-ward future trajectory of the BAU Scenario (Scenario 1) or, belatedly, a remediation attempt in a post-CRI Scenario. At the Upper Level (i.e. Macro-/Meso- planning), the SUS Scenario is whereby future water resource planning strategically adopts more robust approaches to balancing water supply-and-demand. Objectives of such approaches are to ensure equitable access to water, multi-use water services, water use efficiency through WDM and WC measures and augmentation of available water. Comprehensive options analysis is done to ensure that reconciliation measures ultimately achieve sustainable outcomes for society, economies and the natural environment. Planning demonstrates particular sensitivity to the interests of impoverished communities and households, which in principle should be prioritized. The net effect of planning approaches and interventions is that, as population grows, water deficits are largely averted. However, such aversion is longer-lived under lower than higher population growth rates.

At the Lower Level (Micro-Community and Household water scarcity and water use) of the SUS Scenario, equitable access to basic needs water enhances quality of life (QOL) through reduced hardship (particularly for women and girls), improved health, sanitation, dignity and well-being. Multi-use water services support people's livelihood strategies, particularly in informal economies, where the majority of the rural and urban poor eke their livelihoods, often with limited state-support. Endogenous (i.e. locally innovated) water use efficiency and augmentation measures combine with similar exogenous (i.e. derived from or influenced by externally-based agents) measures to ensure optimal use of available water resources. In the longer term, as population grows both within micro-level communities and households and in their meso- and macro-level contexts, optimal supply and use of water ensures that deficit-related crises are largely averted. The duration of such aversion depends on population growth rates, with lower growth rate contributing more to prolonging water security.

Generally, the SUS Scenario ensures that the margin of risk is maintained far below the upper limit of 'minimal acceptable risk' (Figure 18). At micro-community and household level, the frequency and magnitude of 'risk events' is low and, therefore, anomalous to a largely secure water regime.

Through appropriate institutional interfaces that effectively link micro-level water scarcity and use and macro-/meso-level planning, water users and planners work cooperatively to address local needs and constraints, including those emanating from unexpected natural hazards, such as floods and droughts. Because planners and water users "walk together" towards achieving water security, sustainable outcomes are possible both for livelihoods and for planning objectives and interventions.

D. TOWARDS RISK AVOIDANCE AND PREPAREDNESS: CONCEPTUAL FRAMEWORK

Figure 18 roughly sketches out some rudimentary elements of a possible predictive water services planning approach. With further research to develop statistically sound predictive instruments, the proposed approach could be a useful tool for ensuring that planning moves away from the current sub-optimal Business as Usual (BAU) approaches, avoids possible future progression towards crisis management (CRI) and embraces, in tangible ways, mechanisms towards risk avoidance, preparedness and ultimately water security and sustainable water use (SUS). behaviour by micro-level water users faced with water-related crises. The model identifies two thresholds, namely the Lower and the Upper Thresholds. Up to the Lower Threshold, there is a Zone of 'minimal acceptable risk', which is often associated with the day-to-day or seasonal hazards of vulnerability to water scarcity under the BAU Scenario. Beyond the Upper Threshold is a Zone of "unacceptable risk", in which the margins of risk due to water scarcity and water use problems reach significantly high proportions and recovery becomes severely compromised or impossible. In between the two zones is a Zone of Reducible Risk, in which there remains open a window of opportunity for institutional behavioural change.

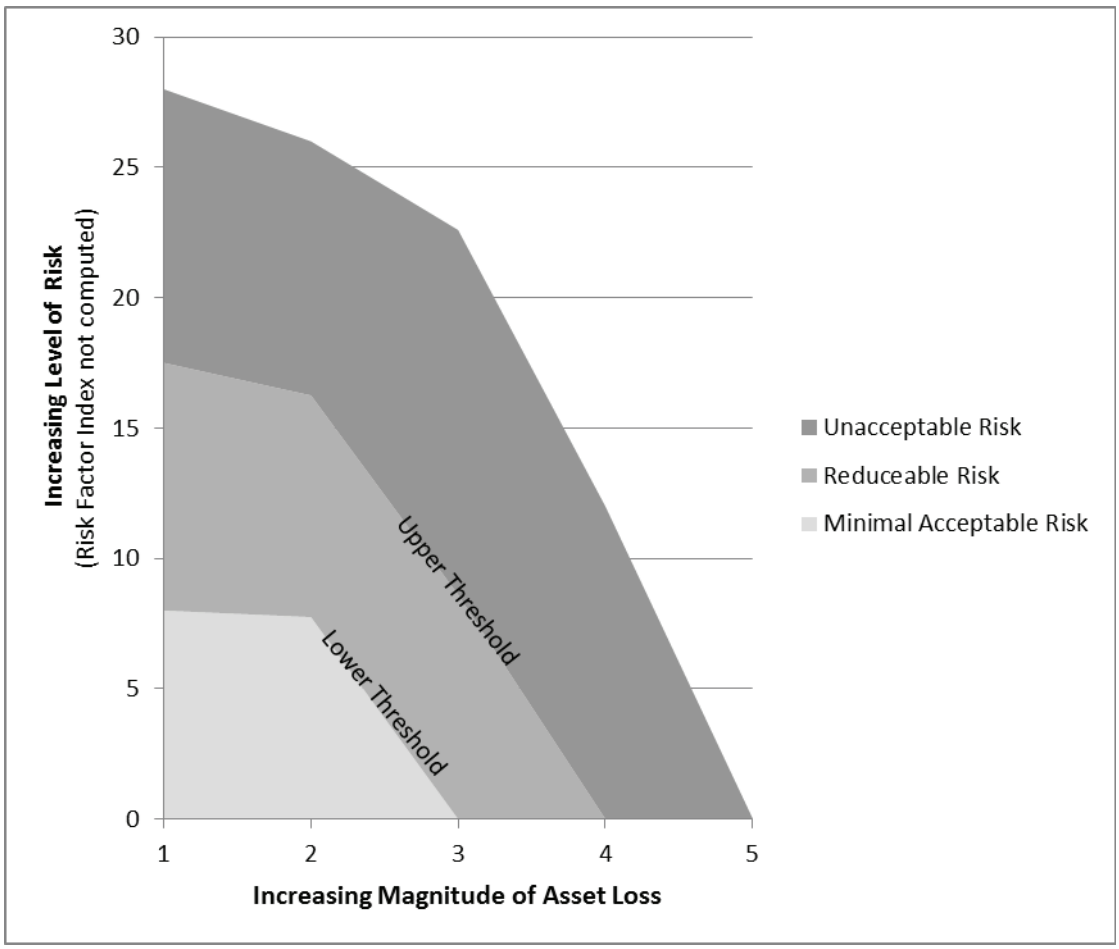


Figure 18 TOWARDS CRITERIA FOR RISK ACCEPTANCE AND RISK UNACCEPTANCE: EXPLORATORY CONCEPT

The Lower Threshold indicates the transition at which the magnitude and costs of 'minimal acceptable risk' become too high to be ignored, tolerated and/or accepted by micro-level communities and households. Increases in the loss of lives, health, income and other assets give rise to perceptions that such risk constitutes a crisis, which might be valid. However, if impacts are reducible and reversible within the short term, then such risk and crisis are of a Lower Order, and is distinct from the catastrophic and long-enduring impacts of a Higher Order risk and crisis. The Upper Threshold indicates the transition at which continued Lower Order risk shifts from being a reducible risk and crisis to being a Higher Order disaster. Crossing of thresholds might be a gradual process towards tipping point or might occur suddenly due to trigger factors, or might result from interplay of both the gradual process and trigger factors.

A singular water scarcity-related problem that progresses from a Lower Order to a Higher Order risk is likely to be accompanied by shifts in coping and adaptive strategies as people grapple with the shock of unprecedented stress associated with the crisis. When the Lower Threshold is approached, people shift away from their 'usual' acceptance of relatively lower levels of perceived risk towards strategies to ensure greater water and livelihood security.

These might include engagement via established institutional arrangements, such as elected or traditional leadership and various governance structures. Such strategies might also include increases in collective or individual self-help mechanisms, such as informal infrastructure (including local legitimation of illegal connections, construction of communal wells and investments in individual boreholes). In certain instances, strategies might also include social protests, but this depends on the complex interplay of a number of factors, including perceived relative deprivation, socio-political organization, marginalization of informality, opportunistic behaviour, contagion, conflation and other less overt factors.

At the Lower Threshold, the success of coping and adaptive strategies depends on the livelihood assets, capabilities and entitlements of communities and households. Since communities and households are socially-differentiated, it is reasonable to expect that those who are more affluent, capable and secure in accessing their rights have greater resilience and are better able to cope with or adapt to a Lower Order risk and crisis. By contrast, resource-poor communities and households, who lack the requisite capabilities and entitlements, are the ones more likely to founder at the Lower Threshold due to resilience failure. For that reason, social safety nets and social networks might be critical to the survival of the poorest households during Lower Order crises. Indeed, 'crisis' for such households might be part of normal daily existence, which means therefore that there might be a much lower, often invisible, threshold for these households, which co-exists with 'minimal acceptable risk' and beneath what commonly constitutes crisis in public perception.

Without adequate institutional responses during the 'reducible risk' phase, the Lower Order crisis might further escalate to a Higher Order crisis. As communities and households cross the Upper Threshold, socio-economic differentiation becomes less of a determinant of resilience, and impacts of water insecurity engulf whole populations with disastrous or catastrophic effect. There is widespread resilience failure, and a liquidation of many lives and livelihoods. At such point, local people's refusal to accept risk might play out in either despair, survivalist strategies or strongly politicized ways that range from violent and non-violent social protests and civil disobedience to high level conflict and political instability. While the constitutionality of such action might be open to scrutiny, failure by government to meet international obligations to ensure realization of the human right to water might rally international stakeholders (e.g. the UN, SADC and various human rights organizations) behind interests of affected micro-level communities and households.

What seems clear is that further progression along the Crisis Management Scenario can potentially lead to disaster of catastrophic margins. This is when absolute resilience failure is reached, or when losses become insurmountable even in the long term. In such circumstances, the catastrophic margins of risk are unacceptable, not only to the "small" group of local communities and households, but also to institutions dispersed at all levels and in various sectors of the international water governance framework. At such point, micro-level strategies to deal with Higher Order crisis might converge with support from external institutions. This could take the form of 'relief aid' from state agencies, donor and humanitarian organizations.

Convergence could also take the form of agitation for 'rights', whereby human rights and similarly orientated NGOs actively support local people in their struggles to attain water security. At an extreme level, such convergence could lead to a widening of views that question the legitimacy of the state. Given that legitimacy derives only from the extent to which organizations and elected representatives sustain the functions of articulating and pursuing interests of their constituencies" (Stewart, 1998), it is likely that at the Upper Threshold, such questions could emanate from both within and outside established constituencies.

On the other hand, there might be, even at such point, sufficient political will to institute urgent change in planning practice. While such reform might lead to sustainable outcomes, an earlier (i.e. pre-Higher and Lower Order crises) decision to pursue goals of Sustainable Water Use would seem to entail fewer losses and less suffering and turmoil, and in effect therefore greater water and livelihood security. For that reason, Scenario 3 types of future planning have the greater capacity to achieve goals of IWRM.

E. SCENARIO-BUILDING APPROACH

For each of the two levels (i.e. Upper Level water resources planning and management and Lower Level water use and management), scenario-building begins by selecting variables or "building blocks" from a range of key drivers that have direct bearing on water and livelihoods. Such drivers include economic; demographic; climatic and hydrological; technological, managerial and infrastructural; and policy drivers (Table 11). For modelling purposes, some variables are held constant in order to reduce complexity, while others such as Population Growth and Technology, Management and Infrastructure remain the moving variables. Population Growth (high and low rate) is a consistent building-block for all three scenarios at both levels. On the other hand, reconciliation options for water supply augmentation and efficient water use, which include Technology, Management and Infrastructure variables, differ according to operational level.

Deliberate effort is made to ensure that the construction of Reconciliation Options at the Upper Level broadly reflects some elements of meso/macro-level perspective adopted by DWA Reconciliation Studies. Reconciliation Options at the Lower level are derived from primary and secondary research in this and related studies. For ease of comparative analysis of scenarios at the two levels, mean population growth rates used by the DWA Reconciliation studies are taken to reflect similar trends in corresponding micro-level water universes.

Table 11 SELECTION OF SCENARIO VARIABLES

Driver	Examples of variables	Treatment of Variables
Economic factors	GDP growth; household incomes	Held constant
Demographic factors	Population growth	Variable
	Consumption patterns; livelihoods; water use practices	Held constant
Climate and hydrology	Precipitation, run-off, groundwater recharge and evapotranspiration	Held constant
Technology, management, infrastructure	Catchment management efficiency, water storage dams; water reticulation infrastructure operation and maintenance; surface and groundwater abstraction, use, re-use and re-charge	Variable
Policy	Water allocation priorities among sectors (e.g. domestic, agriculture, environment, industry and mining); water prices	Held constant

III. TOWARDS CLEAR UNDERSTANDINGS OF MICRO-LEVEL WATER SCARCITY AND USE ISSUES: OVERVIEW OF FRAMEWORKS, METHODS AND TOOLS

A. INTRODUCTION

The study started from a premise that institutional responses that are designed to proactively plan for changing resource demand-and-supply scenarios and predicated upon good governance principles, sound data and clear understandings of people's multiple water uses and requirements for water services are more effective at ensuring water and livelihood security than those that are not. Key questions for Methodological Framework development therefore are:

- What constitutes 'optimal' linkages between water services planning institutions at meso/macro level and people in water scarce contexts who require water for multiple uses?
- What are the requisite practical approaches, mechanisms and tools for optimizing linkages between water services planning at municipal, regional and local levels, on the one hand, and local communities and households living in water insecure contexts, on the other hand?

This chapter gives an overview of selected conceptual frameworks, methods that were found useful in the development of this study's methodological framework. Such constructs include:

- Sustainable Livelihoods Framework (including elements of MUS and SWELL)
- Water Resource Issues Assessment Method (WRIAM);

This study's Conceptual Framework towards Risk Avoidance and Preparedness (Figure 19)

B. SUSTAINABLE LIVELIHOODS FRAMEWORK

The Sustainable Livelihoods Framework (SLF) (see Figure 1 in Chapter 2) is a critical instrument in Methodological Framework proposed by this study. The SLF is particularly useful for deepening understandings of people's multiple water needs, uses, expectations and aspirations. Of particular relevance is the fact that the SLF enables better understandings of relationships between **people and institutions**, and the effects of such linkages on livelihood asset endowment, entitlement and capability in local communities and households.

Where such relationships are sub-optimal, water services planning might predispose people towards vulnerability to risks and shocks, possibly leading to resilience failure, deeper poverty and/or dissolution of households and communities. For example, water insecure HIV and AIDS infected and affected households, which are a particularly vulnerable group, have been observed to progress more rapidly towards such decline and dissolution than those with secure access to water for multiple uses (Makonese, 2007).

Where relationships between people and institutions are optimal and robust, water security can contribute to enhancing both the tangible assets (e.g. health, productivity, incomes and property) and intangible assets (e.g. well-being and dignity). Such gains can be used to increase existing assets, thereby strengthening coping strategies, resilience and thereby sustainability.

Where institutions do not relate optimally to household and community needs and expectations, studies show that people will often exercise their agency and devise strategies to safeguard themselves against vulnerability and risk and to ensure water and livelihood security. Such strategies might include individual and/or collective coping strategies, such as own investments in water infrastructure. Alternatively, people might adopt more confrontational strategies to deal with dissatisfaction, deprivation and perceived lack of downward accountability by institutional actors. Depending on each given set of circumstances, coping strategies might succeed or fail to generate desired livelihood outcomes. A water security approach, however, seeks to develop and strengthen optimal relationships between people and water services institutions. The SLF helps to enhance understandings on how these linkages can be improved.

C. WATER RESOURCE ISSUES ASSESSMENT METHOD (WRIAM)

The Water Resources Issues Assessment Method (WRIAM)[34] is derived and adapted from an Environmental Impact Assessment (EIA) method called Rapid Impact Assessment Matrix (RIAM). An underlying principle of WRIAM is to establish a balance between water availability and social, economic and environmental requirements relating to water, with the goal of minimizing 'vulnerability' and 'risk'. The methodology (Figure 20), which is still being developed, forms the part of approaches that are broadly termed 'Issue Based Water Resources Management' (Nauri, 2010).

WRIAM enables the assessment of specific 'water resource issues' pertaining to a well-defined micro-level site. Such issues are easily lost in the multiplicity of issues and the volume of data accruing at higher scales of water resources planning (DHI, n.d.). Water resource issues are defined as basic problems that directly affect water users, such as insufficient availability of water, pathogenic contamination, eutrophication and pesticides. Water resources issues tend to be fraught with subjective perceptions, expectations and aspirations, which presents a challenge to predictive water planning.

[34] WRIAM has been developed by DHI in Denmark and is still being refined. This outline of the WRIAM methodology draws from ongoing work by DHI.

A key strength of WRIAM is that the method has been conceived to allow the attribution of reasonably qualified quantitative values to more or less subjective judgements, thus offering, simultaneously, an evaluation of a given impact and a registerable figure that can be used later either for re-evaluation or for comparison with other impacts (Ibid.). WRIAM therefore enables the prioritization of issues in catchments (or other water planning universes) as part of a structured situational analysis. Furthermore, WRIAM incorporates elements of Vulnerability Assessment, Risk Analysis and Comprehensive Options Analysis. Such analytical frameworks and methods are essential to developing useful practical mechanisms to enhance preparedness and risk avoidance.

IV. OUTLINE OF WRIAM

A. CONTEXT ANALYSIS

Context Analysis examines the broader institutional context and institutional arrangements at regional, national, provincial and municipal levels[35]. Context Analysis can form part of preliminary efforts to gain clearer understandings of the broader setting for micro-level water scarcity and water use issues and scenarios.

B. PARTICIPATORY SITUATIONAL ANALYSIS

Participatory Situational Analysis focuses on the micro-community and household units of analysis. Identified key stakeholders and water resource management experts, particularly planners in water services institutions, take part in the:

- Construction of a generalized socio-economic profile of the community;
- Compilation of baseline information on livelihoods;
- Compilation of existing knowledge on water resource issues within specific micro-community and household contexts;
- Identification of problems and challenges (i.e. issues) relating to water resources and their management framework in a national context;
- Ranking of problems for prioritization in an IWRM and/or Water Services action plan or strategy; and
- Identifying constraints and opportunities, including international agreements with neighbouring countries and requirements for external financial assistance.

Baseline information on livelihoods could include an inventory of community and household 'assets' (see Figure 1 in Chapter 2). These refer to physical assets (e.g. housing and water infrastructure), natural assets (e.g. land tenure and access to water), human assets (e.g. skills and labour), financial assets (e.g. income, savings, social support grants), and social assets (e.g. social networks, socio-political networks, membership of associations).

[35] Regional water schemes are included in this group.

For example, Quality of Life and General Household Surveys (QLGHS) are particularly useful in the rapid generation of required data, although a degree of ground-truthing remains requisite. By contrast, national census statistics might not sufficiently capture the context-specific nuances at micro-community and household levels.

Analysis of existing water resources issues might involve describing and ranking surface and groundwater quality and quantity problems and water related risks, and identifying hot spots, such as degraded ecosystems. Analysis of the management framework might include a description (and not ranking) of problems relating to the national water policy, national water strategy, water-related legislation, regulatory texts, appropriateness of institutional and organizational frameworks for IWRM, human resource capacity, and adequacy of financial resources, frameworks and instruments.

The range of identified issues seems to be largely dependent on case-specific conditions. Some contexts are likely to have a greater complexity of water resource problems than others. For example, WRIAM application in Burkina Faso identified one hundred and seven (107) potential water resource issues or 'problems'. To simplify the possible complexity of issues, WRIAM groups problematic water issues into four categories (Table 12), namely:

I) **Impact on the resource** which are the cases when human activities – either decreases the quantity of the resource significantly or degrades the water quality in relation to the different requirements stated by the uses.

II) **Demand or availability of the resource** which are essential problems when the availability or the quality of the resource does not correspond to the needs for exploitation of the resource.

III) **Mobilisation of the resource** i.e. possibilities of establishing productive drillings, finding adequate sites adequate to build dams, etc.

IV) **Risks and harmful effect of the resource**. This last group of problems includes the negative effects imposed on the human community because of the presence of water, for example, floods and the role of water in relation to water-borne diseases and epidemics.

C. PARTICIPATORY EVALUATION OF ISSUES

Identified water issues are evaluated. The evaluation method is based on a standard definition of the 'important' assessment criteria, as well as on the semi-quantitative values assigned to each criterion through the computation formulae outlined below. The aim of issues evaluation is to give a precise and independent quotation to each condition relevant to water resources. The method operates with five (5) criteria in the first phase of the analysis. Two (2) criteria fall under Group A and three (3) fall under Group B. These 5 criteria represent the most important fundamental assessment conditions and comply with the principles stated above. The important assessment criteria fall into two groups (see Box 2 for criteria definition and scores):

(A) Criteria that are of importance to the condition, and which can individually change the score obtained considerably; and

(B) Criteria that are of value to the given situation, but individually have a little effect on the score obtained.

For Group A, the overall quotation system is based on multiplying the scores allocated each criterion. The principle of the multiplication is very important since it assures that the weight of each criterion intervenes directly, whereas a summation of the notes could give identical results for groups of different notes. There are two criteria in group A (A1 and A2).

For Group B, the quotation system involves adding the scores allotted to each criterion. This guarantees that an individual score cannot influence the overall result much. On the other hand, the summation assures that the collective importance of all values in Group B is taken into account. Group B has three criteria (B1, B2 and B3).

For each water resource issue, the following calculation is done:

(a1) x (a2) = aT
(b1) + (b2) + (b3) = bT
aT x bT = ES

Where:

(a1) and (a2) represent individual criteria scores for group A;
(b1), (b2) and (b3) represent individual criteria scores for group B;
aT is the result of multiplication of all A scores;
bT is the result of summation of all B scores; and
ES is the overall score of importance for the condition considered (see Table 12).

Group A water resource issues using only a one-way scale (i.e. from 0-4 and 0-3 for A1 and A2, respectively) (see Box 5).

The zero is a value avoided in group B. The rationale is that any individual score of zero among criteria b1, b2 and b3 will give a final ES score of zero, which effectively renders the identified water resource issue a non-issue, and this is against the required goal of WRIAM. For this reason, values of the criteria in group B range are 1, 2 or 3, where 1 represents a neutral situation.

Table 12 WRIAM Categories of Problematic Water Issues

I. Problems of impact

Problems related to human activities which, either decrease the quantity of the resource significantly, or deteriorate the water quality compared to the various requirements of the uses.

These problems are divided into impacts on surface water / ground water and quantity / quality. They include:

All assessments (concerning deterioration of the resource)

Upstream installations (which decrease water availability downstream e.g. stoppings and derivations of rivers)

Dependent water deficits or losses:

Climatic evolution (precipitation data from e.g. the last 30 years)

Temporal and spatial variation in pluviometry (dry years / wet years and geographical variations)

Increased evaporation (construction of stoppings/dams with a surface / volume ratio leading to increased loss)

Sedimentation (due to the effects on the surface / volume ratio of the dams)

Disturbances of infiltration or flows:

Change of infiltration (i.e. recharge of the aquifers) or in the surface water flows, because of the activities related to the occupation of the grounds, by example: deforestation, modifications of the grounds, installation of large perimeters, urbanization, etc.

All direct pollution sources

Eutrophication (Excessive algae production caused by nutrient outlet – indirect effects from pollution and/or erosion)

II. Problems of demand

Problems occurring when the availability or quality of the resource does not correspond with the requirements for exploitation of the water resource. These type of problems are divided in demand of surface water / ground water and quantity / quality and include:

The demand from all sectors

III. Problems with mobilization of the resource

This type of problems concerns difficulties with mobilization of the resource, even if the resource exist in relative abundance:

Possibilities for establishment of productive bore holes

Mobilization potential (possibilities of finding adequate sites to build dams)

The capture/collecting technology

The total demand compared to the mobilizable resource (with the available technology)

IV. Problems related to risks and harmful effects of water.

This type of problems includes the negative effects on the human community due to the precense of water:

Water borne diseases and epidemics (installations which favour hydrous diseases)

Degradation of infrastructures (flood, intense rising/rain)

Soil erosion (flood, intense rising/rain)

Loss of agriculture's (floods)

Accidents (e.g. drowning, etc.) because of reservoirs

Appreciation of the overall score (OS) of importance for the condition considered

0 : No importance / Not applicable
1 : Importance / slight negative impact
2 : Importance / negative impact
3 : Importance / moderate negative impact
4 : Importance / significant negative impact
5 : Importance / major negative impact

Appreciation of the score of documentation level (DS) for the condition considered

0 : No information / documentation
1 : Slight actual information / documentation
2 : Existing information / documentation, but insufficient
3 : Good information / documentation

Appreciation of the score of evolutionary (ES) character of the problem considered

0 : No evolutionary character
1 : Light evolutionary character
2 : Moderate evolutionary character
3 : Strong evolutionary character

Table 13 Types of Problems and the WRIAM Ranking System

Box 5 Assessment criteria for the WRIAM method

The criteria should be defined for the two groups A and B, and should be based on fundamental conditions that may be affected by change introduced by the activities considered. It is theoretically possible to define a number of criteria, but those should always satisfy two principles:

The universality and importance of the criterion;

The nature of the criterion, which determines whether it should be treated as a group A or B condition.

Group A criteria

Importance of condition (criterion A1)

A measure of the importance of the condition, which is assessed against the spatial boundaries or human interests it will affect:

a1 = 4: Important to national/international interests

a1 = 3: Important to regional/national interests

a1 = 2: Important to areas immediately outside local condition

a1 = 1: Important only to local condition

a1 = 0: No importance

Magnitude of change / effect (criterion A2)

Magnitude is defined as a measure of the scale of benefit / dis-benefit of an impact or a condition:

a2 = 0: No change / status quo

a2 = 1: Negative change to status quo

a2 = 2: Significant negative dis-benefit or change

a2 = 3: Major dis-benefit or change

Group B criteria

Permanence (criterion B1)

This criterion defines whether a condition is temporary or permanent:

b1 = 1: No change / not applicable

b1 = 2: Temporary

b1 = 3: Permanent

Reversibility (criterion B2)

This criterion defines whether the condition can be changed and is a measure of the control over the effect of the condition:

b2 = 1: No change / not applicable

b2 = 2: Reversible

b2 = 3: Irreversible

Cumulative character (criterion B3)

This criterion is a measure whether the effect will have a single direct impact or whether there will be a cumulative effect over time, or a synergistic effect with other conditions:

b3 = 1: No change / not applicable

b3 = 2: Non-cumulative / single

b3 = 3: Cumulative / synergistic

Source: DHI, n.d.

Table 14 Appreciation of the overall score (ES) obtained

Score (ES)	Range value (RV)	Description
0	0	No importance / Not applicable
	1	Importance / slight negative impact
1 to 9	2	Importance / negative impact
	3	Importance / moderate negative impact
10 to 18	4	
	5	Importance / significant negative impact
19 to 35		
		Importance / major negative impacts
36 to 71		
72 to 108		

Appreciation of the documentation level

Documentation Score (DS)	Description
0	No information / documentation
1	Slight actual information / documentation
2	Existing information / documentation, but insufficient
3	Good documentation / information

Appreciation of the evolutionary character of the problem

Evolutionary Score (ES)	Description
0	No evolutionary character
1	Light evolutionary character
2	Moderate evolutionary character
3	Strong evolutionary character

Table 15 shows an illustration of how a WRIAM score sheet can be completed. The illustration is based on results from testing the methodological framework on this study's empirical findings on Sannieshof (Chapter 4). The rapid appraisal method and logistical constraints limited a more rigorous application of WRIAM.

Table15 Illustration of WRIAM Score Sheet

Type	Object 1	Object 2	Nature	Cause	Overall ES	Doc. ES	Evo. ES
Impact	Quality	Surface water	Pathogenic contamination	Excreta	4	1	2
Impact	Quality	Surface water	Organic pollution	Excreta	3	1	2
Impact	Quality	Surface water	Organic pollution	Urban waste	0	1	2
Impact	Quality	Surface water	Organic pollution	Livestock	1	1	2
Impact	Quality	Surface water	Organic pollution	Outlets from food industries	0	3	1
Impact	Quality	Surface water	Organic pollution	Aquaculture	0	3	1
Impact	Quality	Surface water	Eutrophication	Agricultural cropping	1	1	2
Impact	Quality	Surface water	Eutrophication	Excreta	1	1	2
Impact	Quality	Surface water	Eutrophication	Outlets from food industries	0	3	1
Impact	Quality	Surface water	Eutrophication	Aquaculture	0	3	1
Impact	Quality	Surface water	Eutrophication	Erosion	0	1	2

D. CONSTRAINT ANALYSIS

After water issues have been identified and ranked the final step in WRIAM is to conduct Constraint Analysis, as outlined below:

Step 1 Grouping of Issues

The analytical method groups constraints into five (5) categories pertaining to issues of technical, institutional, economic, sociological and legal nature (Figure 19). For each water resource issue, Constraint Analysis evaluates and identifies the existing technical level, responsible institutions, existing legal framework, sociological structure and the economic situation.

Step 2 Evaluation in terms of Management Levels

Each of the listed constraints is evaluated with respect to relevant management level, which could be international, regional, national, provincial, local and/or a combination of these levels.

Step 3 Identification of responsible Institutions

Existing public and private institutions involved with the types of listed constraints are identified. These might include water services authorities, water utilities, irrigation boards, industries, mines, laboratories, village water committees, and others.

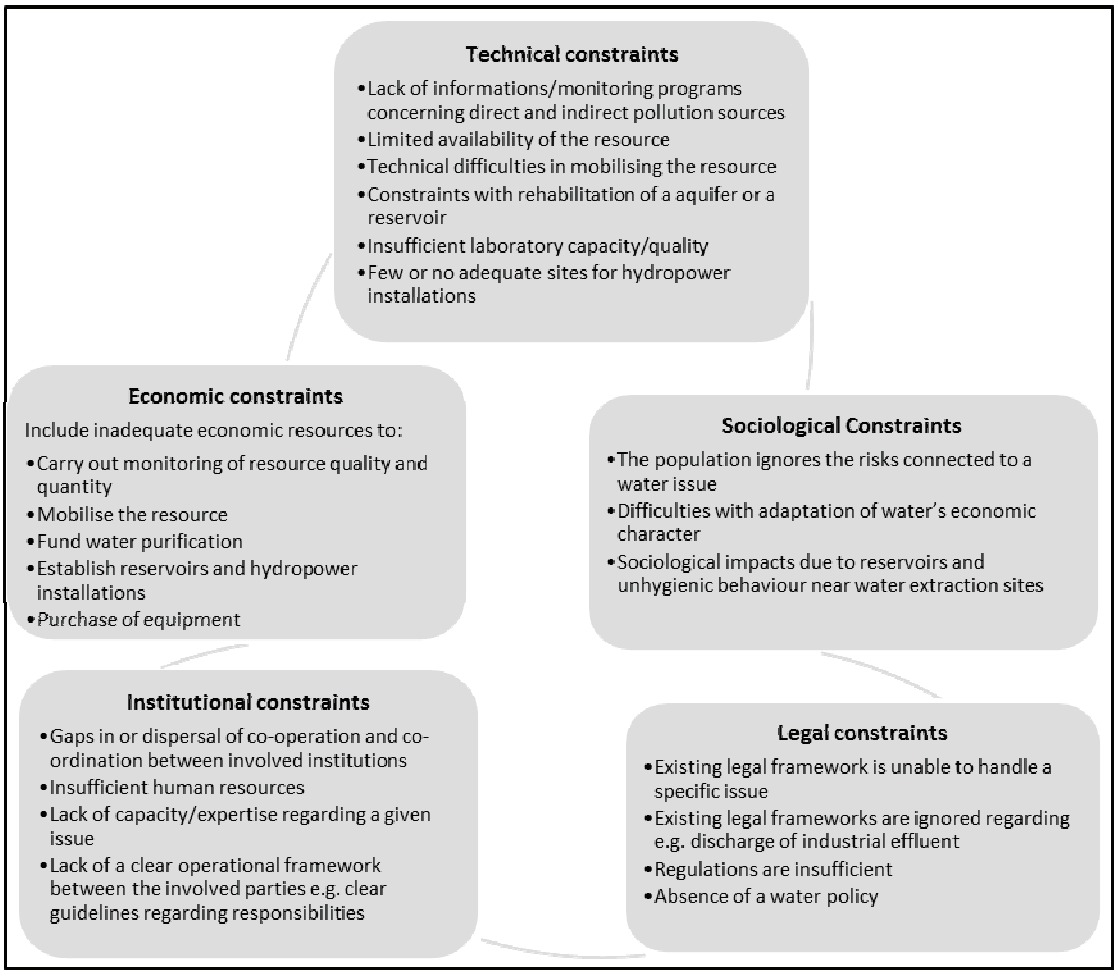


Figure 19 WRIAM Constraint Analysis: Examples of types of constraints

E. IDENTIFICATION AND QUANTIFICATION OF RISKS AND HAZARDS THAT CAN AFFECT A LIVELIHOOD SYSTEM[36]

Within this study's methodological framework Vulnerability Analysis, at micro-community and household level, addresses five (5) basic objectives, namely:

- Identification and quantification of risks and hazards that can affect a livelihood system;
- Estimation of the susceptibility to damage, loss and suffering in the context of differing risks and hazards;

[36] See Section 2.1 for definition of a 'livelihood system'.

- Definition of measures to be included in scenario-based plans to address prevailing water resource issues, ad hoc and seasonal emergencies, and future water requirements and supplies;
- Identifies requisite institutional options and actions for developing future scenario-based water resources plans; and
- Evaluate the effectiveness of interventions.

Following identification of risks and hazards to livelihood systems, Vulnerability Analysis quantifies the vulnerability of components of given systems. Such components could include physical assets, such as water reticulation infrastructure and public-funded infrastructure for individual or communal water point sources (i.e. “stand pipes”). Livelihood System components can also include natural assets, such as unprotected raw water sources such as springs and rivers. Vulnerability of such systems can result in shocks and risks to livelihood systems that test the resilience of affected livelihoods. Vulnerability is expressed as the ‘conditional probability of occurrence of a certain level of damage, loss or suffering (Ej), given that risk or hazard (Hi) occurs’. The probability is denoted as: P(Ej /Hi). Four levels of damage, loss and suffering often used to describe Ej. These are:

E1 No damage, loss and/or suffering
E2 Slight damage, loss and/or suffering
E3 Reparable damage, loss and/or suffering
E4 Severe damage, total loss and/or extreme suffering

F. ESTIMATION OF THE SUSCEPTIBILITY TO DAMAGE, LOSS AND SUFFERING IN THE CONTEXT OF DIFFERING RISKS AND HAZARDS

In common practice, Vulnerability Analysis quantifies vulnerability. Due to logistical constraints, which mainly relate to lack of resources to build research capacity in for Statistical Analysis of risks. Consequently, although the study makes qualitative reference to the Risk Factor Index and its application to determining Thresholds of Risk Acceptance and Risk Unacceptance, (Figure 18 in Section IID of Appendix 1), no attempt is made to postulate quantitative calibrations and relationships between this index and the Magnitude of Asset Loss.

G. COMPREHENSIVE OPTIONS ANALYSIS (FOR WATER SERVICES PLANNING)

Results of the preceding steps of WRIAM are synthesized to form the first part of a Comprehensive Options Analysis (COA) for water services planning. According to WRIAM, the analysis of policy options can be structured as follows:

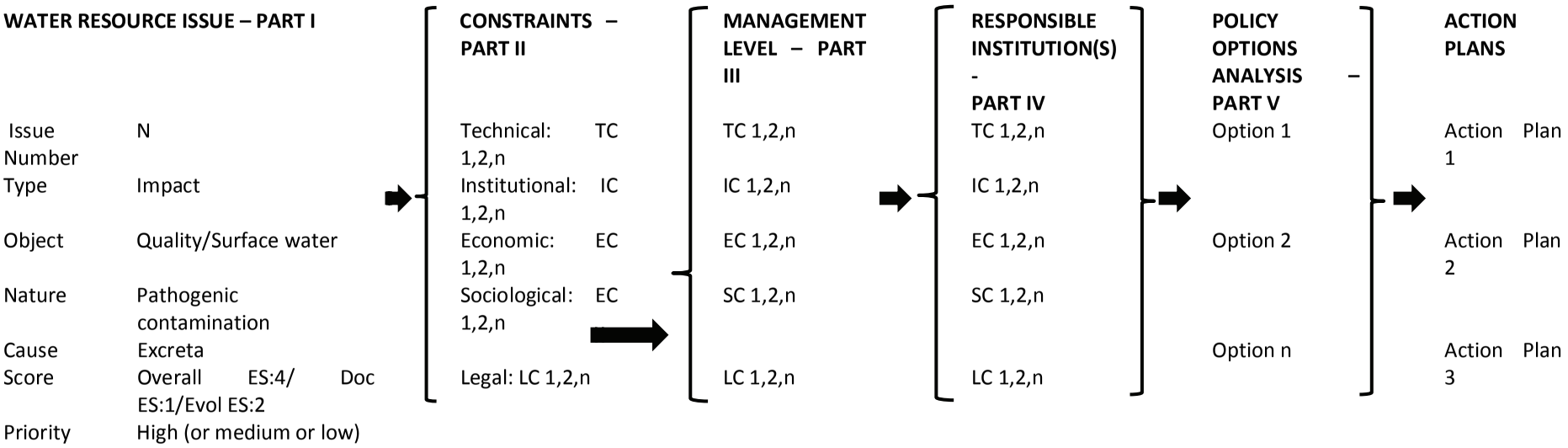
- Observation and Description
- Analysis
- Options Identification
- Recommendations
- Action Plans

Part I describes key facts about a given water resource issue. Towards identifying possible planning options, Part II identifies major constraints, interests, costs and benefits. Part III identifies the most optimal interventions. Part IV gives clear and concise recommendations to decision makers and planners, and such advice becomes the basis for policy choices. Part V maps out detailed action plans on how to design and implement interventions to address highly prioritized water resource issues.

Identified planning options can then used as a basis for stakeholder engagement and decision-making on preferred options. Alternatively, identified options can be used to develop indicators, instruments, mechanisms and action plans towards preparedness, risk avoidance and effectiveness of water services planning.

V. OVERVIEW OF CONCEPT

Figure 22 presents a schematic overview of data collection methodologies applicable to the meso/macro levels of water services planning and micro-levels of water use. Effectively, future research would need to integrate data on livelihoods and multiple water use at local levels with data on water demand and supply at national, regional and municipal levels. Both groups of data would be examined for water services and related water resource issues, preferably through participatory approaches to issues and needs analysis. On the basis of a dualistic top=down and bottom-up perspective, water services planning would proceed to construct future scenarios and analyse options for reconciling planning and use. The rationale for such a proposition is that the achievement of water security requires optimal linkages between water planning and use, which are based on sound governance, common understandings and shared responsibility.



Legend:

- TC – Technical Constraints
- IC – Institutional Constraints
- EC – Economic Constraints
- SC – Sociological Constraints
- LC – Legal Constraints

(Adapted from DHI, n.d.)

Figure 20 OVERVIEW OF THE WRIAM PROCESS

FIGURE 21 INTEGRATED APPROACH TO SCENARIO-BASED WATER SERVICES PLANNING: METHODOLOGICAL FRAMEWORK SYNTHSIS