PERCEPTIONS OF WATER SCARCITY: THE CASE OF GENADENDAL AND OUTSTATIONS

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DECLARATION

I declare that *Perceptions of Water Scarcity: The case of Genadendal and Outstations* is my own work, that it has not been submitted for any degree or examination in any other university, and that all sources I have used or quoted have been indicated and acknowledged by means of complete references.

Full Name: Simone Beatrice Noemdoe Date: September 2006

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ABSTRACT

The water resources management regime has shifted from one focusing almost exclusively on augmenting supply to one where ensuring access, equity and sustainability are an integral part of process. A growing demand for water and the fact that the amount of fresh water is constant raises the impression of water scarcity will occur. Indications are that the notion of access to water for basic needs as well as access to productive water underpins perceptions of scarcity. This thesis interrogate perceptions of scarcity in a small rural community in order to understand the role water can play in developing sustainable livelihoods. Data was collected using semi-structured interviews with key internal and external stakeholders in agriculture, local and provincial government and Department of Water Affairs and Forestry (DWAF). Additional data sources were consultancy reports as well as policy and strategic planning documents. Data were analyzed using the grounded theory approach. The results show that notwithstanding sufficient water being available, the community still experiences infrastructural induced scarcity, institutional induced scarcity and political induced scarcity. Whereas the different forms of scarcity usually occurs sequentially (albeit not linearly), in the case of Greater Genadendal they are all present simultaneously leading to a very complex situation.

KEYWORDS

1. Catchment
2. Genadendal
3. Integrated Water Resources Management (IWRM)
4. Manufactured scarcity
5. Participation
6. Perceptions
7. Real scarcity
8. Sustainable Development
9. Sustainable Livelihoods
10. Water scarcity

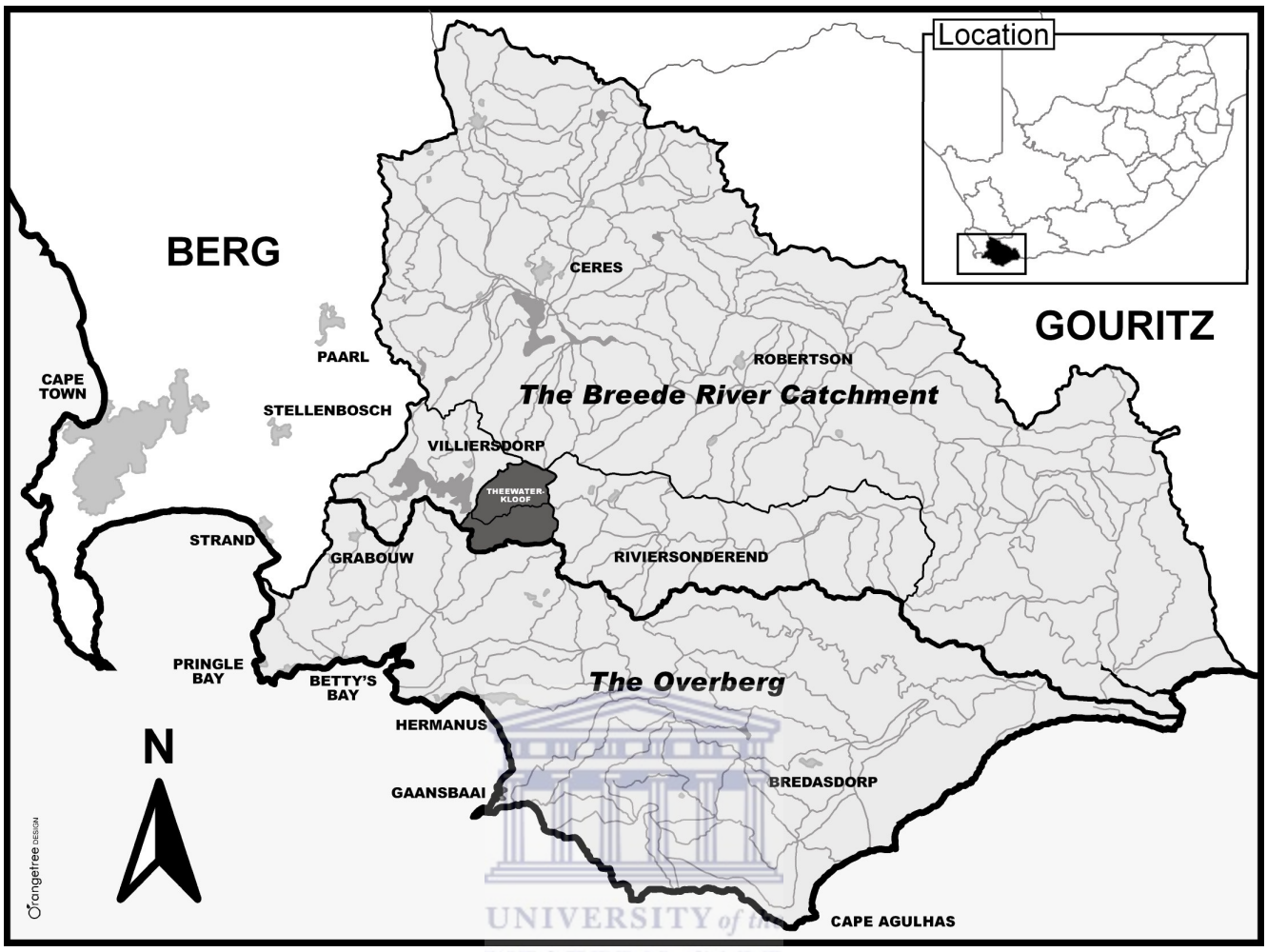

Figure 1: Genadendal location map (Source: Department of Water Affairs and Forestry)

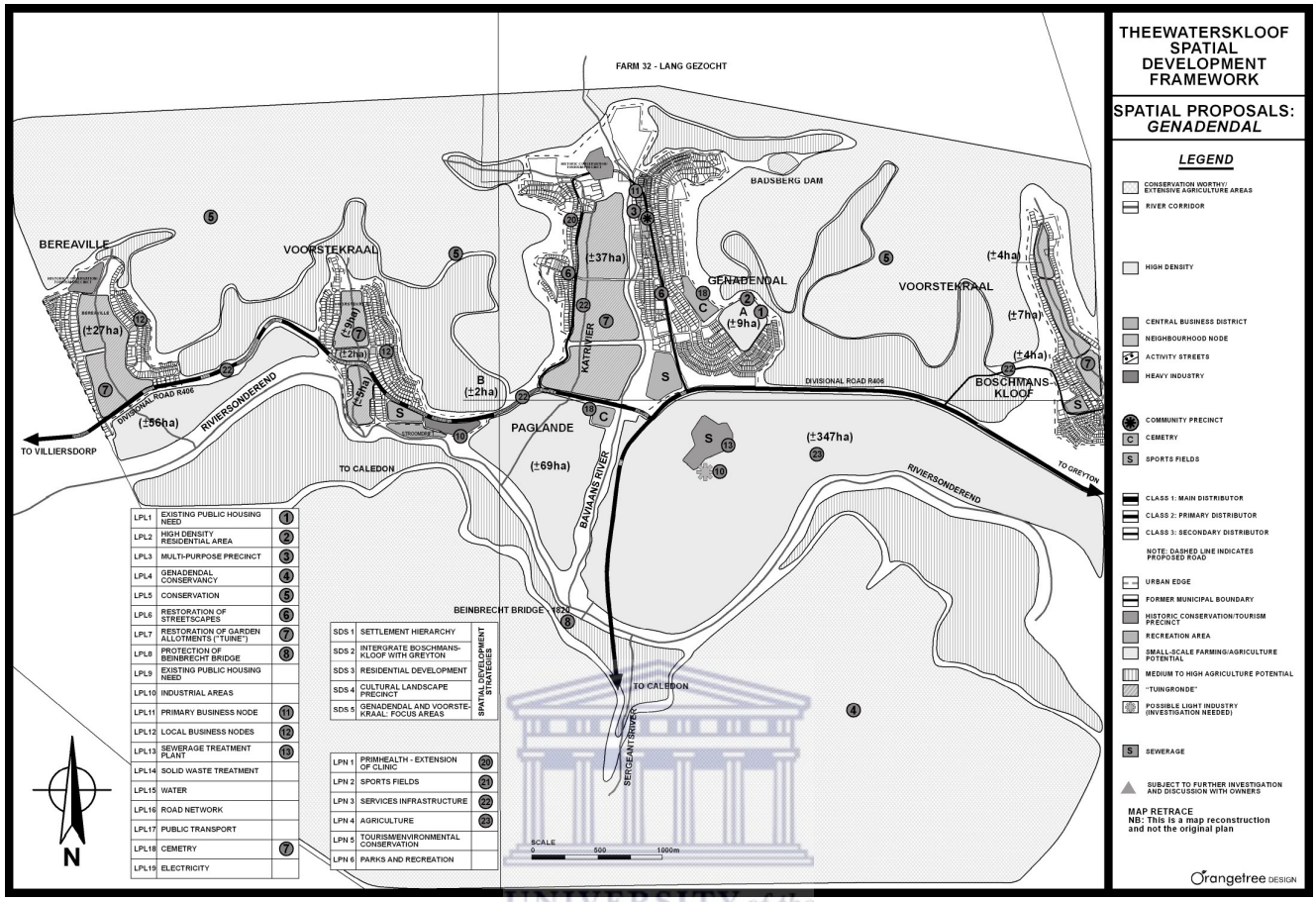

Figure 2: Genadendal Spatial Development Framework (Source: Department of Water Affairs and Forestry)

ACKNOWLEDGEMENTS

Worse than giving birth
Seemed the pain I felt
The memories, which will be held
About this work completed
With much respect it should be treated

Without,
All your love and support
Patience and threats
Tears and pleas
Sometimes what felt
The longest moments without ease

Reggie and Dawn,
First in line
Bearing the brunt of all the stress
When words were scarce
And time even less
Your love and support
Made things fine

Lewis and Larry
Your “baby” it became
Throughout the long hours
Of labour pains
I now see the gains

Sophia (late Mammie) and Christie
I carried with me,
Tough lessons
“Persevere, work hard”
“You will succeed, nothing is easy, don’t give up!”
Your legacy

Carron, Melissa and Morajee
My siblings
The best cheerleading three

Friends and colleagues
What can I say?
You saw me slave
Day to day

Last but not least
With your inputs
I was very pleased
Greater Genadendal, my community of choice
Through your thought and voice,
Together with Departments
Agriculture, Water and Land Affairs
Local Government and the odd consultant
This, thesis as product resultant

Therefore allow me to do it this way
With these words
A heartfelt THANK YOU!
I say

CHAPTER 1: INTRODUCTION

1.1 Background to the Study

Water is a common denominator of the ecosystem and the human system

(Falkenmark, 2002)

"Freshwater occurs as a complex system possessing a number of dimensions. Surface water, groundwater, water quantity and quality are all linked in a continuous cycle - the hydrological cycle - of rainfall, runoff from the land, infiltration into the ground, and evaporation from the surface back into the atmosphere each component may influence the other components and each must therefore be managed with regard to its inter-relationships with the others." (DWAF, 2004). Rockström (2003) differentiates between blue water (surface and groundwater) and green water (the water used by plants). Allan (2003) also considers soil moisture a key component of water resources. Such renderings of water differ markedly from historical approaches to water management – these focused primarily on diverting or storing surface water resources (Allan, 2003).

South Africa's National Water Policy (DWAF, 1997) describes the purpose of water resources management in South Africa as ensuring "some (access) for all (equity) forever (sustainability)." This deliberate tying together of the concepts of access, equity and sustainability as goals in water resources management links water management to issues of sustainable livelihood. For the purposes of this thesis, sustainable livelihood is defined as follows: "A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base" (Scoons, 1998). Although access to water was initially defined within the context of water for basic human needs, it is now understood to also include access to water for productive purposes. The linking of Integrated Water Resources Management (IWRM) with sustainable development creates a

framework “within which to interrogate people’s relationship with water” (Jonker, 2002).

1.2 Rationale

In the South African context, water rights are elevated through Act 108 of 1996 to a Constitutional level (Republic of South Africa (RSA), 1996). Water is valued as an economic good, and is entrenched as a social good through Act 36 of 1998, the National Water Act (Republic of South Africa, 1998) and the Water Services Act (Act 108 of 1997) (Republic of South Africa, 1997). Water user rights are regulated to such a level that any land-use activity impacting on the quantity, quality and availability of water is licensed (except for meeting basic needs and limited livestock watering).

This is well articulated in the following IWRM strategies as first developed under United Nations Conference on Environment and Development (UNCED) (Bruntland Report, 1987), and later adapted to the South African context and articulated in the National Water Resources Strategy (DWAF, 2004):

- A long-term viable economic future for (catchment) dependants (both national and trans-national).
- Equitable access to water resources for catchment dependants.
- The application of principles for demand management and appropriate pricing policies to encourage efficient usage of water between agricultural, industrial and urban supply sectors.
- In the short-term, the prevention of further environmental degradation and, in the longer term, restoration of degraded resources.
- The safeguarding of local cultural heritage and the local ecology as they relate to water management, maintenance and encouragement of the potential for water related tourism, as well as linkages between tourism and conservation. (DWAF, 2004)

South Africa celebrated its first decade of democracy in 2004. Victories in the water sector included increasing the number of people with access to potable domestic water supply by 10 million, and rewriting the national water legislation and policies in full consultation with all stakeholders in a very comprehensive public participation process (DWAF, 2004).

Given the stated situation, current water sector reforms, policy and legislation rest on the firm foundation of the Constitution (Act 108 of 1996) (Republic of South Africa, 1996). For example, Chapter 2 of the Bill of Rights (Section 24) states: “Everyone has the right to (a) An environment that is not harmful to their health or wellbeing; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”.

Section 27 (1) elaborates on health care, food, water and social security: “Everyone has the right to have access to … sufficient food and water” (RSA, 1996). The link with broader understandings of IWRM is clear. However, realizing these aims is hampered in part by the history of unequal access to water and use under Apartheid. To overcome this legacy the Constitution further states: “[The] state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realization of each of these rights” (Section 27(2) (RSA, 1996).

That everyone has the right to access and the use of adequate water resources is codified in a number of policy documents, among them the White Paper on a National Water Policy for South Africa such as in Section 2.1.8, (DWAF 1997), the National Water Services Act 108 of 1997 (RSA, 1997) and the National Water Act 36 of 1998 (RSA, 1998). According to the National Water Resources Strategy

(DWAF, 2004), there is full scope and vision for the integrated management of water at a local level anywhere in South Africa. The Department of Water Affairs and Forestry as the lead agent, recognizes however that to fulfil its constitutional mandate a considerable amount of time and resources should be available (DWAF, 2004).

Current water resources management and practices are influenced and developed at multiple levels. The South African government, in consultation with civil society institutions, the corporate sector and through extensive public participation, embraced a transformational approach in building a renewed society. Exploring opportunities for all those living in South Africa, new approaches and systems of water resources management are influenced by the broader realities of a society fraught by extreme poverty on the one hand and excessive wealth on the other. The latter, some will argue, has been attained by the exploitation of the natural resource base and the exploitation of human capital (Ruiters and Macdonald, 2005).

Notwithstanding the radical transformation and transparent nature of the South African water transformation process, certain communities still feel disadvantaged as far as access to water is concerned. One such affected community is the inhabitants of the farm Remainder of Genadendal (39).

The communities living on the farm Remainder of Genadendal faces a disjuncture between the availability and accessibility of freshwater resources for domestic, agricultural and other local economic development opportunities. The farm Remainder of Genadendal (39) comprises of the main village, Genadendal ("Valley of Grace"), outposts Voorstekraal, Bereaville and Boschmanskloof which are divided into agricultural, industrial as well as conservation areas. In this study, the entire area will be referred to as Greater Genadendal (GG).

The Department of Water Affairs and Forestry (DWAF) is of the opinion that adequate water is available to meet all the water requirements of this community, whereas members of the Genadendal community believe that water is scarce. Over the years the skewed development patterns observed in this valley have been attributed to a lack of access to water resources and water scarcity. MBB Consulting Engineers (1998), states that Genadendal is underdeveloped with regard to agriculture although it offers significant agricultural development opportunities. Greater Genadendal's Strategic Plan (BKS, 2000) attributes the continued lack of agricultural development potential to the fact that there is not enough water available. GG is reliant on water from its own sources (localised rivers), releases from the Theewaterskloof Dam located upstream from the village and the Riviersonderend River.

1.3 Research aim

The aim of this research is to explore the perceptions of key external and internal stakeholders with regard to water resources (availability, access, right to, scarcity) in GG, and to investigate how these perceptions impact on current water use.

1.4 Research objectives

- To investigate the basis for contrasting perceptions of water resources – in particular, that water resources are abundant (external stakeholders) and that water resources are scarce (internal stakeholders) in Genadendal.
- To investigate how the understanding of water scarcity amongst key internal and external stakeholders influences the different livelihood options explored in GG.
- To tease out the implications for water resources management in GG that get beyond the impasse of conflicting perceptions.

1.5 Organization of the thesis and conclusion

The thesis is organized as follows:

Chapter 1 (Introduction) provides an overview of the thesis. It sets out the aims and objectives of the investigation.

Chapter 2 (Literature Review) explores the history of Sustainable Development and Sustainable Livelihoods as the backdrop to the implementation of Integrated Water Resources Management (IWRM). A brief overview of IWRM as an emergent globally accepted discourse for the sustainable management of water is followed by an in-depth review of the concept 'water scarcity' and its impact on development.

Chapter 3 discusses the research methodology and its rationale.

Chapter 4 describes the study area and key issues in detail. It also critically examines several consultancy reports conducted into the nature of the problem of water scarcity in GG. This chapter then forms the baseline from which subsequent chapters will investigate why viable interventions in sustainable water resources management in GG are not forthcoming.

Chapter 5 presents the results and an in-depth discussion of the key stakeholder interviews. It focuses on their various perceptions regarding water resources, the relationship between water and land, the adequacy of current water resources management regimes, the nature, cause and remedy for seasonal scarcity, and the questions of ownership and entitlement to water resources.

Chapter 6 discusses the key findings, and places it in the wider context of IWRM and sustainable development. Indications are that consistent with findings elsewhere water scarcity is a social construct. Despite sufficient water availability

people might experience water scarcity due to various social and institutional factors in play.

As presented in chapter one, the result of South Africa's water law reform process provides a meaningful starting point for investigating the "Perceptions of water scarcity: the case of Genadendal and Outstations".

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Jonker (2004) suggests that for any water management activity to be classified as integrated water resources management, the activity has to have the following characteristics:

(i) be located within the largest possible hydrological unit; management should at the very least consider upstream-downstream interactions

(ii) take the complete water cycle into consideration; even those diversions brought into the cycle by human activity (sewage and storm water)

(iii) focus on sustainable development

Understanding the prevailing "Perceptions of Water Scarcity: the case of Genadendal and the Outstations", as well as deriving viable policy options for sustainable water resources management for sustainable livelihoods, would be incomplete without reviewing the following literature.

- Sustainable development and Sustainable Livelihoods as a backdrop to the implementation of Integrated Water Resources Management.
- IWRM as an emergent globally accepted discourse for the sustainable management of water.
- The concept of 'water scarcity' and its impact on development.

2.2 Sustainable Development

Sustainable development became a cornerstone in the global development lexicon over the last three decades (Aguirre, 2002). Popular in the public, private and non-governmental domains, there is almost as much written about how sustainable development evolved as to how it can contribute to the global development process (http://www.eldis.org/; http://www.livelihoods.org/).

Sustainable development as a concept gained significant attention because of work by the United Nations' World Commission for Environment and Development also know as the Brundtland Commission. The Commission's primary task was investigating the relationship between the environment and development (IUCN, 2002). During this time, environmentalists were already engaged in highlighting the world's negative environmental state of affairs. Poor economic growth indicators and increasing populations were all seen as threats to the environment (Markandya, 2001).

The report 'Our Common Future' (WCED, 1987) was the result of wide consultation and lengthy deliberations, and was filled with numerous key recommendations. It was this report that captured the definition of sustainable development: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Publication of "Our Common Future" resulted in the concept Sustainable Development gaining popularity and becoming the foundation of international discussion of development processes. Two events are considered to be most critical. The first is the United Nations Conference for Environment and Development, held in Rio de Janeiro, Brazil in 1992. Also known as the Earth Summit, it was the start of the focus on Sustainable Development in the context of the triple bottom line, i.e. ecological, economic and social development. Participants signed off on Agenda 21. This document contains specific recommendations and action plans to further sustainable development. In addition, the conference delivered the Framework Convention on Climate Change (FCCC); the Convention on Biodiversity Preservation (CBD); the Convention to Combat Desertification (CCD) and the Statement on Forest Principles (Speth, 2003; Swatuk, 2003). The process in Rio also resulted in the establishment of the Commission on Sustainable Development (CSD) and the Global Environmental Facility (GEF). Other key development milestones attained

were the recognition of ordinary people in development processes, as well as the recognition of the role of civil society institutions, the non-governmental sector and the corporate sector in the creation of a new development paradigm.

The second event, in 2002, was the World Summit for Sustainable Development (WSSD), held in Johannesburg, South Africa. This was an opportunity to review the progression of 'Sustainable Development' and monitor the outcomes proposed under Agenda 21. Speth (2003) raised the point that in the run-up to WSSD, the global dialogue processes revealed a sad picture of minimal progress from the Earth Summit in Rio de Janeiro. State organs and civil society seemed to be more focused on what could be attained with the available resources at the WSSD. Platforms were used to publicise achievements and showcase work, rather than accentuating the policy development or dialogue processes. This summit produced a fifty-page action plan (Speth 2003) that entrenched the Millennium Development Goals (MDG's) - an action plan for deliverables to be met by 2015 (see http://www.undp.org/mdg/; http://www.undp.org/poverty/). MDG targets are focused across five key areas: water and sanitation; energy; health; agriculture; and biodiversity and is popularly known as WEHAB. The CSD is continuing to meet and drive processes - at a global level - that track national and regional progress on the MDG's. Water and sanitation delivery was the first area to be implemented and the process is being monitored by institutions such the World Water and Sanitation Council, the Global Water Partnership and the Global Water Forum (Swatuk, 2003).

Development, however, is not a static process operating in an abstract manner. It can be categorized into a number of paradigms. The most prominent, Woodhouse (2000) argues are: "A Neo-liberal development view (p 158), a People-centred development view (p 160) and an Interventionist or Global environmental management view" (p 160).

He defines the Neo-liberal view of development as natural capital providing services such as water, land, soil and biodiversity that should be protected and given a chance to replenish itself. Alternatively, less will be available for future use. To him this signals the difference between income and capital; income being the sum consumed over time without having less in the end.

The global environmental management view is expressed in terms of the opening texts of Agenda 21 as quoted by Woodhouse (2000): "We are confronted with a perpetuation of disparities between and within nations, a worsening of poverty, hunger, ill health and illiteracy, and the continuing deterioration of the ecosystems on which we depend for our well-being. However, integration of the environment and development will lead to the fulfilment of basic needs, improved living standards for all, better protected and managed ecosystems, and a safer, more prosperous future. No nation can achieve this on its own, but together we can – in a global partnership for sustainable development" (p 161).

Drawing from an inter-regional consultation on People's Participation in Environmentally Sustainable Development held in Manila in 1989, Woodhouse (2000) further states, with regard the People-centred development view, that: "The concept of sustainability is best understood in terms of the sustainability and non-sustainability of a community. Authentic development enhances the sustainability of the community. It must be understood as a process of economic, political and social change that need not necessarily involve growth. Sustainable human communities can only be achieved through a people-centred development".

D'Souza (2002), however, questions the debates and processes where 'sustainable development' seemed to be hailed as yet another development panacea. She argues that 'sustainable development' as an idea only exists because 'development,' which came before it, failed. Like 'development', 'sustainable development' is about speechifying. To her both concepts are

primarily concerned with the 'North' helping the 'South', technological advances, growth, and relieving poverty. She argues that it is all about the United Nations driving a particular brand of development under the control of the global superpowers such as the United States of America and United Kingdom. Her critique is that instead of supporting the grassroots development interventions from within the developing nations, their brand of development is focused on using the natural resources like land, water, biodiversity and people as sources of cheap labour as well as harnessing institutional capacity to grow the interests of the capitalist corporations from the North.

Sathiendrakumar (1996) conversely does not question 'sustainable development' as a development framework. He feels that the "traditional economic thinking, in pursuit of economic growth, has led to the wanton exploitation of the environment". It is his contention that the prevailing environmental crisis is primarily a management crisis. His paper revisits the now popular 'Our Common Future' definition and brings it into the realm of economic thinking. He argues that economists have a problem with the concept of "needs" since this discipline is more focused on meeting "unlimited wants with limited means". He cites two examples of how economists have redefined 'sustainable development'. Pearce and Warford (1993) see sustainable development as "development that secures increases in the welfare of current generations, provided that future welfare does not decrease". Pearce and Turner's (1990) applying the definition of sustainable development as development which "involves maximizing the net benefits of economic development subject to maintaining the services and quality of natural resources". The definitions proposed by Pearce and Turner (1990) or Pearce and Warford (1993) imply that renewables can only be used at a rate equal to or less than its natural rate of regeneration. The use of non-renewables can efficiently be used on condition that alternatives become available supported by capital and labour and the chances of new advances in technology (p 152).

As a concept, the argument by Sathiendrakumar can be accepted, but the process to Rio, and from Rio to Johannesburg still leaves society baffled by major development challenges. Solutions have to be found to balance the need to prosper versus the need to survive, hence the birth of another concept, 'sustainable livelihoods'. This is not necessarily a new concept but a revisiting of traditional, grassroots development strategies or development approaches.

Sustainable Livelihoods (SL) is broadly defined as: "A livelihood comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base." (Ashley & Carney 1999)

In terms of the objective of 'sustainable livelihoods' much of the literature on the Sustainable Livelihoods Approach (SLA) as a development strategy stems from work done by Chambers and Conway in the early 1990's (Solesbury, 2003). The definitions of 'Sustainable Livelihoods Frameworks or Approaches' are still largely driven by overseas aid agencies through funding projects in mainly developing countries. Coupled with this, there seems to be a concentrated effort by the United Nations through the work of the United Nations Development Programme (UNDP) to support its implementation through investment in capacity building, lobbying and research in this field (Solesbury, 2003).

Water is a recurring theme in the Sustainable Development and Sustainable Livelihoods debate. It is recognized as one of the essential tools for development.

2.3 Integrated Water Resources Management

During the evolution of concepts Sustainable Development and Sustainable Livelihoods, a corresponding discourse was taking place in the water sector. A number of high-level meetings were hosted by the United Nations in partnership

with nations such as Argentina (Mar del Plata, 1977); Ireland (Dublin, 1992); Netherlands (Hague, 2000); Germany (Bonn, 2001); and Japan (Kyoto, 2003). The dialogue process was focused on raising consciousness with regard to the exigency of changing water management practices in the face of increasing scarcity influenced by different factors. A shift to implementing integrated water management was strongly advocated. It also provided the opportunity to build wisdom to manage water and it generally acknowledged the value of water in improving peoples' quality of lives (Rahaman and Varis, 2005).

Allan (2003) argues that water resources management has passed through five paradigms over the last 200 years. It was initially broadly defined as pre-modern; industrial modern; late-modern green; economic; and finally political approaches. He contends that it is only since about the year 2000 that the political nature of water resources management has been acknowledged (Allan, 2003). Allan calls the fifth water management paradigm Integrated Water Resources Management (IWRM). According to Allan, IWRM embodies all previous paradigms, including recognition of the political nature of decisions regarding the allocation and usage of water. IWRM is defined as a holistic framework that provides wide-ranging and interpretive principles to guide the management of water resources. It recognizes that water must be considered in all of its forms if it is to be managed sustainably to the benefit of all users now and in future.

IWRM is about moving forward in terms of creating a better water use and management situation. Taking a proverbial "look in the mirror" Lundqvist (2000) tracks the evolution of IWRM as a water resources management framework. It is his argument that there is great synergy between the Dublin Principles and the water sector goals as proposed in Chapter 18 of Agenda 21. To Lundqvist (2000), the Dublin Principles emanating from the International Conference on Water and Environment held in Dublin, Ireland, in 1992, most clearly articulate the relevance of IWRM if any development should be truly sustainable.

Principle 1 asserts the finite nature of our freshwater resources and raises its profile in terms of its vulnerability as well as its indispensable role in maintaining life for the environment and for development. It also emphasizes that it is critical to manage water and recognizes the fact that water sustains life. Effective management of water resources demands inclusive strategies that focus on ecosystem protection and using water for social and economic development. This principle is focused on the relationship between land, surface- and sub-surface water management across catchment areas as viable management units.

Principle 2 concerns the participation of all the users of the resource in its management and development. It proposes elevating the consciousness of all water users through participatory means, thus ensuring that all water management decisions should incorporate people at the lowest level. Emphasis is placed on including all users when developing water projects.

Principle 3 highlights the role of women in water resources management. It urges all institutions charged with the responsibility of managing the resource to acknowledge women's roles and to create an enabling environment for women to gain access and participate at all levels of the management of the resource.

Principle 4 emphasizes the economic value for water as well as the competition that exists between the different users. It restates the urgency to redress the historical failure of recognising the economic value of water, and proposes its valuation as an instrument with which to attain resource efficiency, equity, protection and conservation.

Having guiding principles for the integrated management of water resources does not guarantee that the general state of water resources management affairs will improve. Jønch-Clausen and Fugl (2001) argue that IWRM has "never been unambiguously defined, nor has the question of how it can be implemented been fully addressed". They contend that it is currently not a very progressive situation with at least three issues challenging it: IWRM has become part of the water

management jargon; the concept tampers with peoples' understanding of the issues in water resources management; and it hampers the ability to converge diverse opinions in water resources management.

Writing from a Global Water Partnership (GWP) Technical Advisor perspective Jønch-Clausen and Fugl (2001) propose the following definition: "[IWRM] is a process that promotes the coordinated development management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (GWP TAC, 2000).

Jønch-Clausen and Fugl (2001) reflected on this definition and proposed some adjustments. They are of the opinion that the "M in IWRM should read development and management, and that IWRM is a process and not an explicit goal in itself or rather a means to an end or a process of balancing and making trade-offs between different goals in an informed way" (p503).

Similar to the triple bottom-line approach of sustainable development, GWP's definition of IWRM also considers social, economic and environmental goals. To Jønch-Clausen and Fugl (2001) this definition thus emphasizes IWRM as a coordination process and creates an opportunity to integrate rather than entrench fragmentation to "holistic cross-sectoral water management". Despite raising all these points as to what constitutes IWRM, Jønch-Clausen and Fugl (2001) conclude by stating that the process for agreement on a collective dialogue and space for interacting on IWRM should be considered as ongoing. The conclusion of this argument is interesting, since in their view, they refer to IWRM as "principles, concepts, ideas and recommendations" in terms of water resources management and development.

Savenije and Van der Zaag (2000) use the classical temple as an analogy in discussing the challenges of "sharing international water resources" (roof). Three

distinct pillars are “politics, technical co-operation and institutions” (walls) and “integrated water resources management” (foundation). Focusing the discussion mainly on their “foundation”, their article could reflect a level of comfort with the prevailing views on IWRM that is a review of the Dublin principles; the prescripts of Chapter 18 in Agenda 21; and the definition of IWRM as propagated by GWP. It is their argument that IWRM has not developed instantly, but it grew over time.

They propose the following to be taken into consideration in the management of international water resources:

- Integrating demand and supply management that should include strategies to manage less available water;
- Reducing the losses as well as focusing on increasing the water yield whilst decreasing water demand;
- Creating an enabling environment through vertical and horizontal capacity building initiatives ensuring public participation; and
- Exploiting interdependencies between riparian states to the benefit of the whole basin (Savenije and Van der Zaag (2000) pp 31 – 40).

Much of the debate and discussion on IWRM has been focused on the dire status of the world’s water resources. Rahaman and Varis (2005) also reviewed the IWRM dialogue processes and their work supports IWRM implementation. Their review of water resources management revealed that researchers in the water sector could go back hundreds of years and find examples of the precursors of IWRM. Spain was already organizing water management at the river basin level, drawing in all the stakeholders in the process during 1926, long before the existence of Dublin Principles. Regional water management strategies were already implemented in the Tennessee Valley (United States of America) during the 1940’s.

They do however recognize that there are some pertinent gaps and highlight several areas of concern:

- Acknowledgement of the IWRM dialogue as a crucial part of the process, but they expressed concern for the lack of its implementation;
- Water privatization cannot just be implemented, all angles should be considered with due recognition of the prevailing ideological challenges;
- Driving economic efficiency through using the water as an economic good principle could result in un-sustainability;
- Development of common policies inclusive of legal instruments is crucial for trans-boundary water resources management;
- River restoration is not very prominent in the IWRM principles;
- Absent from IWRM, in their opinion, is an articulated understanding of the role of aquaculture and fisheries, and taking its needs into consideration;
- Integration of the lessons learnt in IWRM, since it seem to be that the prevailing IWRM mechanisms do not take the historical experiences of detailed planning into consideration; and
- Lack of acknowledgement of the spiritual and cultural role of water in the IWRM mechanism is an "unfortunate situation" in their opinion.

Some authors consider the process to attaining a common dialogue for water resources management just as important as the actual activity of managing the resource. It seems to be their contention that the debate should be shaped by all stakeholders, hence a common buy-in into the Dublin Principles for IWRM (Allan, 2003; Rahaman and Varis, 2005; Lundqvist, 2000). Others use the process and consensus around the utility value of IWRM to advocate a certain course of action in water resources management (Jønch-Clausen and Fugl 2001; Savenije and Van der Zaag, 2000).

Indications are that IWRM as an organizing concept for the management of water has been in use prior to the meeting of specialists at Dublin. The significance of the Dublin Conference, however, is that the debate produced a set of principles, that did not previously exist within which to crystallize the management of the world's vulnerable fresh water resources.

2.4 Water Scarcity

Water scarcity is defined in a number of ways. For example, Falkenmark developed a water stress measure that related population to blue water availability. This was represented empirically in terms of people per flow unit. One flow unit constituted 1 million cubic metres of water. As populations neared 600 people per flow unit, Falkenmark argued, societies would experience water problems associated with pollution and dry spells. Between 600-1000 people per flow unit, societies suffered water stress. As societies approached 2000 people per flow unit, they would experience absolute water scarcity (Pallett, 1997) Expressed differently, it may be said that where available water dipped below 1700 cubic metres per capita (i.e. below the World Health Organization minimum of 50 litres/person/day), societies would experience water stress. Below 1000 cubic metres per capita they would experience chronic water scarcity; and below 500 cubic metres per capita, they would be living 'beyond the water barrier' (Falkenmark and Rockstrom, 2004).

In the southern African case, such statistics indicate that by 2020, Botswana, Malawi, Namibia, South Africa and Zimbabwe will all suffer absolute water scarcity with Botswana, Malawi and Namibia all living beyond the water barrier (Pallett, 1997). According to available statistics, South Africa is approaching 1000 people per flow unit, or less than 1000 cubic metres of water per capita.

The South African National Water Resources Strategy (NWRS) states that "South Africa's water resources are, in global terms, scarce and extremely limited in extent" (DWAF, 2004, p17).

This understanding of scarcity can be critiqued from a number of perspectives. For example, Pallett (1997) argues that Falkenmark's measure is very crude, neither distinguishing between total run-off and available run-off, nor accounting for groundwater or water stored in lakes and dams. Swatuk (2002) citing Rockstrom (2001), argues that since most food crops are rain-fed, measuring the

ratio between population and blue water overstates human dependence on surface water for survival. Moreover, Swatuk (2002) argues that given that 70 per cent of all water used in the region goes to irrigators whose contribution to national/regional GNP is very small, it suggests that 'scarcity' results in part is a result of political decisions. Authors such as Allan (2003) introduce the concept of 'virtual water' – i.e. the amount of water that may be found in traded goods and services – to, among other things, suggest that even where there is absolute water scarcity, the consequences are not necessarily inevitable. Indeed, in the case of Israel, Allan (2003) argues that the country has been living beyond its water barrier for many years, compensating for its lack of water by importing it in the form of food and other goods.

Winpenny (1995), in a discussion document prepared for the Food and Agricultural Organization, argues that "in popular usage, water scarcity is a state of affair where there is not enough water to gratify normal requirements". He contends that this "commonsense definition is of little use to policy makers and planners". To him there are "degrees of scarcity – absolute, life threatening, seasonal, temporary, cyclical etc". He further argued that "scarcity may have its roots in water shortage, but it may also be a social construct, a product of affluence, expectations and customary behaviour". To him water scarcity situations can have different origins and it can be dealt with by countries that would face such situations. Winpenny feels that "scarcity is not necessarily inevitable or immutable" (http://www.fao.org/ag/agl/aglw/webpub/scarcity.htmp).

Recent efforts to move southern African states toward demand management practices also suggest that scarcity is in part socially constructed: reflecting historical patterns of infrastructure development, institutional management practices, and popular perceptions about the 'god given' nature of water (Swatuk, 2002; Gumbo et al, 2004). Thus, managing demand can create *more water* without tampering with the hydrological cycle. However, as demonstrated by

Swatuk (2005), changing historical practice is largely a political issue. In the South African case, results have been haphazard at best (Gumbo et al, 2004).

A different way of defining scarcity is the historical preoccupation with the role of water in industrial development. For example the 1997 UN Study *Comprehensive Assessment of the World's Freshwater Resources* introduced the idea of 'technical water stress', i.e. the percentage of total blue water withdrawal relative to available resources. Where more than 40 per cent of a state's water resources had been developed, they were said to be entering a condition of high water stress. Where less than 10 per cent of the resource was developed, there was said to be low water stress. According to this measure, South Africa is said to be suffering from high water stress.

Recently, Falkenmark and Rockstrom (2004: chaps. 5 and 6) have attempted to arrive at a more nuanced understanding of water scarcity that combines various forms of water (blue, green), development patterns, and biomes (arid, semi-arid, sub-humid, humid). When these various factors are taken into account, the sorts of stress societies' face may be quite different: arid regions suffer green water scarcity; in other regions where blue water is scarce, the cause may be due to technical stress (over-exploitation) or social stress (increasing population). A state's capacity to deal with these problems is reflected in 'coping capability problems', *e.g.* lack of financial or human resources or an unwillingness to reallocate water toward more sustainable and equitable patterns of use (Falkenmark and Rockstrom, 2004, p95). The authors further differentiate between climatological and human-induced scarcity profiles described in the table below as scarcity modes A, B, C and D, where A relates to natural aridity, B to high seasonal variability and regular occurrence of drought, C due to human induced land degradation, and D due to human-induced water crowding.

Table 1: Water Scarcity Classification (Source: Falkenmark and Rockstrom, 2004: 106)

Water Mode	Scarcity	Type	Water Scarcity manifestations	Additional features
A	Aridity	Green	Short growing season determined by annual rainfall and potential evaporation	Sensitivity linked to crop choice
B	Drought	Green and Blue	Recurrent inter-annual meteorological droughts	Linked to El Nino phenomenon
C	Land degradation	Green	High vulnerability resulting in extensive land degradation	May lead to man-made drought – i.e. soil moisture deficit – without experiencing Type B drought
D	Water crowding	Blue	Very limited blue water surplus results in blue water scarcity, which is exacerbated by population growth	Blue water scarcity in the savanna zone < 100 mm/yr of runoff surplus

Batisse (2000) writes about the challenges facing the world and reflects upon the specific problem of water for food production to meet the needs of all people. He argues that domestic supply can be met with the available water. However, this might not be the case in meeting the demand in other sectors. In the case of agriculture, he says that by using modern scientific solutions, like biotechnology, sufficient food can be produced to meet the needs of the global populace "without major problems". He does however raise concerns about the emerging limitations of rain-fed agricultural expansion (green water) thus bringing about greater future dependence on irrigated crop production. Highlighting the competing demands of water, Batisse (2000) cautions that the projected expansion of irrigated agriculture will consume 2250km^3 of water by 2025. This volume of water will require an abstraction of 3200km^3 if irrigation losses are taken into account. Coupled with the increase of demand for domestic and industrial use, this volume of consumption is unsustainable. This would avert the impending crisis of an estimated 2,7 billion people who will access less than 1000m^3 per person per year. From Batisse's perspective 'sustainable irrigation' would mean finding

appropriate institutional, technological and social solutions to meet the expectation of “more crop per drop”.

Like, Batisse, Gleick (2000) also looks at an impending global water resources crisis. To him, indiscriminate economic development choices are having a severe impact on the ability of this generation to ensure a situation where future generations could meet their basic needs. He does however recognize that a greater number of water management institutions are revisiting their approaches and are investigating ways to use water more effectively, making better water demand management choices and redistributing water between different users in a bid to fill the potential gap between future demand and supply. He acknowledges that the connection between water and food production is getting more attention in the light of less water being available. This issue is also being investigated by amongst others, Swain (1998); Yang et al (2002); Pereira et al (2002).

Winpenny (1995) views water scarcity as a social construct. Ohlsson (2000), reflecting on the history of water resources management, postulates that first order scarcity (water shortages) is followed by second-order scarcity (the ability of society to overcome the water shortages). He argues that, as society changes, the solution for ensuring adequate water has to change. This ability of society to find new solutions to water scarcity is called adaptive capacity. Ohlsson sees the evolution of the approaches ensuring water security as “oscillating between a perceived natural resource scarcity of water, and the social resource scarcity of adaptive capacity” (p.215). Taking the notion of water scarcity out of the natural resource context and locating it in a social context, He concludes that the concept of adaptive capacity shifts water shortages from absolute scarcity to relative scarcity, from a natural construct to a social construct.

Mehta (2001) explores the social construction of water scarcity in the context of the “exploitation of the perceptions of scarcity” by the powers that be in fuelling

development investments in large-scale water infrastructure. She uses the case of the Sardar Sarovar Project in Kutch, a partially dry district in western India. Her study concluded that the fixation of a discourse about decreasing rainfall and increasing droughts creates an acceptance of the notion that water is scarce. This is true even where the social dialogue and popular beliefs of water scarcity is refuted by scientific indicators. Typifying this discursive scarcity as manufactured scarcity, Mehta (2001) contends that peoples' perceptions of water scarcity become a powerful tool in shaping the discourse about development which is not reflected at grassroots.

This discord between perception and reality requires that water scarcity be analyzed as a biophysical and as an anthropogenic problem. To her, water scarcity as a bio-physical phenomenon means there are real water scarcity or water shortages as a result of little or very little precipitation. Water scarcity as an anthropogenic phenomenon means that there is sufficient precipitation but people do not have access to water because of human action, hence the concept of manufactured scarcity.

The simultaneous existence of both states of water scarcity fuels a generalized perception of water scarcity. This perception in turn influences the pursuance of development in the communities where it prevails. Mehta contends thus that this paralysis provides the space for proponents of some preferred solution to enforce that solution as opposed to the development of solutions suited to local contexts (Mehta, 2001).

Hoekstra (1998), in his discussion on the nature of water scarcity, raises different debating points on the issue. To him, the term water scarcity implies a situation where users are in competition over water resources. Firstly, it is manifested in terms of the biophysical situation of supplying sufficient water of the right quality at the right time to meet the demand. Secondly, it concerns threats to the resource such as people's drive for economic development coupled with an

increasing birth rate. This, he contends, can be managed by controlling water consumption, setting tariffs and educating the users about the resources situation. Thirdly, he discusses the widely accepted concept of “water as an economic good” and says that if one should follow this edict the cost of water is an appropriate indicator of water scarcity (Hoekstra, 1998). Water scarcity can thus be perceived to present problems from both a supply and demand level.

2.4 Conclusion

Evident in the literature, therefore, is an increasingly nuanced understanding of water scarcity, combining a number of measures. One logical consequence of this understanding, in line with IWRM as an organizing concept, is that where water is scarce (for whatever reason), decisions regarding its allocation and use should be based on ‘allocative efficiency’. This means that water should go to the most efficient user. Allocating on the basis of efficiency holds risk for water availability for less efficient uses. In the South African context, this has been partly resolved by setting aside both an ecological reserve (i.e. the amount of water that is necessary for the continuing health of the river basin) and a basic human consumption reserve of 25 l/p/d translated to a household connection of 6kl / month (DWAF, 2001) In addition, there are attempts to re-orient current management practices from the top and center (politicians and water ‘experts’) to the bottom (the river basin and the user at water point). Driving this reform is a combination of global thinking on ‘best practice’ in the light of water scarcity, and local thinking determined in part by the global discourse, and in part by a widely-held desire to overcome the apartheid-era induced developmental deficit (DWAF, 2004). As will be seen in the case study presented in this thesis, however, attempts to move forward to sustainable management regimes are hampered by historic practices as well as perceptions about water resources management and use.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

Historically, Genadendal had a vibrant and affluent agriculturally-based economy (Balie, 1988). Today, agriculture (commercial as well as subsistence) has been identified as the development opportunity with most potential (BKS, 2000). Adequate water is needed to exploit this potential. There appears to be a perception that in GG water scarcity is a major contributor to the vulnerability of livelihoods. This research attempts to elucidate these perceptions among the 'alleged' influential and powerful community members. An assumption of this research is that if the influential and powerful cannot attain an upward developmental trajectory, the rest of the community will remain marginalized.

This thesis investigates contrasting perceptions regarding the adequacy of water resources in the GG area. External stakeholders (i.e. those with decision-making capacity in government departments outside of the study area such as DWAF) are adamant that while the area suffers seasonal water scarcity, there are a number of viable interventions that could easily resolve this problem. Internal stakeholders (those living within the resource base) hold more complex understandings regarding the reasons behind scarcity, and how abiding seasonal scarcity is in fact a measure of government disinterest in the lives of local residents.

Perceptions of scarcity therefore form the crucible within which key stakeholders come together to hammer out new guidelines for water resources management. However, the continuing inability to reconcile these different viewpoints ensures that Genadendal will continue to suffer periodic water shortages for the foreseeable future. This thesis therefore attempts to articulate these contrasting views in order to move beyond the impasse toward sustainable and equitable water resources development.

3.2 Measurement

3.2.1 Sampling

Purposive Sampling was used to select the respondents. Purposive or judgmental sampling entails the use of an expert to identify respondents who may have intrinsic knowledge or experiences to prove or disprove a particular hypothesis (Neuman, 2000).

A list of the stakeholders from the study area, and participants in the Catchment Management Forum was compiled. This was based on the purposive sampling methodology in conjunction with expert opinion sourced from the DWAF.

This instrument was chosen because it allowed for the selection of internal and external stakeholders who use and/or manage water-related processes in the study area.

The Internal Respondents (IR) lives and work in the community. External Respondents (ER) do not live in the community, but are mandated to work with the community specifically in land and water resources management.

3.2.2 Data gathering

The primary form of data gathering involved semi-structured interviews. The use of open-ended questions provided an opportunity to probe respondent views and gain clarity in terms of their interpretation of the issues.

Initial contact with potential respondents was made telephonically. Although some interviews could be arranged in this way, some respondents were not contactable due to the nature of their employment. Most of the IR identified is farming or self-employed entrepreneurs.

A local resident assisted in visiting respondents over one weekend. Stakeholders were now more comfortable and willing to talk to the researcher. After a brief explanation of the study objectives, most respondents were willing to participate in the process and agreed to be available for interviews at later dates.

Interviews were completed in the homes and offices of the IR and ER. Respondents could be interviewed in Afrikaans (mother tongue) or English. The majority of the IR preferred to be interviewed in Afrikaans. All the respondents consented to their interviews being recorded. The tapes and field notes were transcribed. Once transcribed, the Afrikaans interviews were translated to English and verified by the thesis supervisor.

The fieldwork was completed over a period of four months from May to August 2004. IR and ER interviews were undertaken concurrently. Multiple visits to the study area were required in order to complete a limited number of interviews. Some respondents did not keep their appointments, despite a number of attempts made to meet. Fourteen interviews were completed, seven with external respondents and seven with internal respondents.

Other data sources included consultant reports, strategic planning documents, legislation and policy documents. A number of consultant studies have been completed for the study area, and this rich database is accessible for review. These reports allowed for verification of the interview data. For example, information sourced from interviews regarding a dry year could be verified with streamflow data. Non-payment for water services could be cross-referenced with Municipal account information.

3.2.3 Document analysis

Data was captured in a matrix using a word processing package (MS Word). The names of the internal interviewees were captured in columns, and the questions

in rows. The responses of each interviewee were recorded in the block opposite the question as a first level of coding. Common issues raised by the interviewees were then extracted and categorized. The same procedure was followed for external interviewees. The categories of issues generated from the internal and external stakeholders were reconciled to produce a consolidated list of the categories of perceptions of all persons interviewed.

The research method produced a rich array of views from the various stakeholders. To find commonality in the context of the key hypothesis, the matrix provided a visual platform, as well as the opportunity to compare the views of different stakeholders regarding similar issues.

When different views were expressed in terms of technical information, this was verified using the documentation mentioned in section 3.2.2.

3.3 Shortcomings and sources of error

A major shortcoming of the data gathering process was that the number of respondents was less than initially identified. Fourteen (from an identified 25) interviews were completed. Most of the respondents who participated in the study held office bound positions in internal and external institutions. Due to time constraints, the time available to interview the locals was limited. This gap, however, could be partially bridged by accessing consultant reports, as well as the key findings of a recently undertaken quantitative socio-economic survey of the area (BKS, 2000).

3.4 Conclusion

Chapter Three described the research methodologies employed and provide a brief overview of the limitations of the study. The next chapter will provide an overview of the study area culminating in the results presented in Chapter Five.

CHAPTER 4: STUDY AREA

4.1 Introduction

Chapter Four provides an overview of the study area — including the water management area, geographical location, population, socio-economic and political context, with some focus on the current resources.

4.2 Study Area —Physical Characteristics

4.2.1 Breede/Overberg Water Management Area

The farm Remainder of Genadendal (39) is located in Quaternary Catchment H60E (DWAF, 2002) of the Breede/Overberg Water Management Area (WMA). One of four in the Western Cape Province, this WMA's neighbours is the Berg-, Olifants/Doorn- and Gouritz Water Management Areas, as well as the Indian and Atlantic Oceans converging at Cape Augulas (DWAF, 2003). Currently, 28% of all the available run-off in the Breede/Overberg WMA is transferred to the Berg River WMA (DWAF, 2005).

4.2.2 Research Site

The farm Remainder of Genadendal (39) is about 4772, 97 ha, and includes the main village Genadendal (966 plots), and the outstations Voorstekraal (175 plots), Bereaville (237 plots) and Boschmanskloof (161 plots). For the purpose of this study the main village, outstations and agricultural land is referred to as Greater Genadendal (GG).

4.2.3 Topography

GG is located almost 19°33' on the Eastern Longitude and 34°02' on the South Latitude (MBB, 1998), on the southern foothills of the Riviersonderend Mountain

range. The Riviersonderend River crosses this property from West to East. Mountains and hills make up the southern part of the farm. The Sergeants River Valley is situated almost in the middle of this land, from South to North, where it joins the Riviersonderend Valley.

GG was founded as the first Moravian Mission on the African Continent around 1737. In the late 18th century, this community was the second largest settlement; with Cape Town being the largest. The Khoi craftsmen who settled in this village manufactured some of the best products in the country. Achievements among these villagers in the Colony included the development of the first teacher training college in 1838; a nursery school; knife-making and the printing of the first Afrikaans book. It also boasted the best mill and tannery (Balie, 1988). Historically, the land belonged to the Moravian Church, but with time, due to growth, development and increased external social and political influences, management of the land was transferred to the state in the 1960's (MBB, 1988).

4.2.4 Geology

Bokkeveld-Serie shale and sandstone makes up most of the soils, whilst the development area to the north and south is made up of hard quartzites and the Table Mountain-Serie formations of the Swart- and Riviersonderend Mountains. Shale layers and Bokkeveld-Serie characterising the foothills has deteriorated to clay, common to the hills. "An anticline effect that occurred resulted in wet areas on the slopes due to the impervious clay layers" (MBB, 1988). Approximately 25 percent of the farm is sloped between 0 and 10 percent; roughly 16 percent of the land has a gradient of between 10 -25 percent. The rest of the farm consists of steep mountain cliffs.

4.2.5 Vegetation

Mountain fynbos is the dominant vegetation type found in the area. Species include the restoid constituent (Restionaceae), the ericoid or heath component (primarily Ericaceae) and proteoid component (Proteaceae) (DWAF, 1998). The fynbos is largely concentrated on the Riviersonderend Mountain ranges, and grows in the northern areas of Bereaville and Genadendal, as well as in a significant part of Voorstekraal. Boschmanskloof and the southern parts of Bereaville and Genadendal are covered by South Coast renosterveld, a small leafed scrubland.

4.2.6 Population and Employment

The total population in 2001 was 4,663 - 2,199 males and 2,464 females (Statsa, 2001). According to BKS Consulting Engineers (2000), 38% of the community is unemployed and 87% of 946 households interviewed had a combined income of R1 600.00 per month. Local jobs are on the farms, in the service sector as well as seasonal fruit picking and packing in neighbouring towns. Artisans find work with the local building contractors.

4.2.7 Land Tenure

The National Minister of Land Affairs is the custodian of Remainder of Genadendal (39) under provisions of Act 9 of 1987. Management of the area is the responsibility of the Theewaterskloof District Municipality (TWKDM). Current land allocations are still in accordance with the original sub-divisions developed by the Coloured Affairs Department in the 1960's (BKS, 2000). TWKDM and the local Agricultural Committee (AC) jointly manage this system. Most of the agricultural development is driven by the Genadendal Farmers Association (GFA) whose members are pursuant of commercial (±10 farmers) and subsistence (±

50 farmers) agriculture. A number of development potential studies were completed for the GG.

Table 2: Land Potential (Source, BKS 2000)

Land Potential	Total Area Available (ha)	Net Area Available (ha)
High	822	616
Medium-high	598	448
Medium	121	90
Medium-Low	294	220
Low	283	212
Total Investigated	**2108**	**1586**

4.2.8 Water Resources

According to the DWAF (2004), the following water (measured in kiloliters per annum (kl/a)) is available to the GG:

- 184 000kl/a, from local resources to Bosmanskloof for domestic, subsistence and urban agricultural needs. This exceeds the projected requirements of 38 000kl/a in 2030;
- 162 000kl/a, from local resources to Voorstekraal for domestic and subsistence and urban agriculture, exceeding the projected need of 47 070kl/a in 2030;
- 73 000kl/a, from local resources to Bereaville for domestic, subsistence and urban agricultural needs. This is more than the 42 000kl/a projected for 2030;
- It is estimated that 2 458 000kl/a water is available from local resources to Genadendal. This is almost four times to the projected needs of 596 775kl/a in 2030;
- Greater Genadendal also has an amount of 207 000kl/a available from other resources (Theewaterskloof Dam on the Riviersonderend River) for rural

agricultural purposes. This is equivalent to the irrigation of 34.5ha at 6kl/ha/day from 1 November to 30 April, annually. This allocation might be subject to restrictions during low-flow years. A further 100ha irrigation right has been purchased for rural agricultural purposes in this community by the Western Cape Department of Agriculture (DoA).

4.2.9 Agriculture

Once known as the food basket of the country, GG produced high value crops such as almonds, apples, potatoes, beans, cabbage, grain, onions, and numerous other crops. Farmers in the area also engaged in food processing activities, as well as exporting to the rest of the colony and country (Balie, 1988). Currently, a large percentage of its high value agricultural land is fallow and overgrown with invasive alien shrubs and trees.

Presently the farmers grow mainly seasonal vegetables like potatoes, beans, onions, sweet potato and butternut for subsistence, and both the domestic and outside markets. A number of farmers also diversify their income with dry-land and irrigated wild flower production, livestock farming, piggery and domestic fowl. Agricultural development is considered a potential cornerstone in the rejuvenation of this area. This is clearly stated in the Strategic Development Plans and the Spatial Development Framework for Genadendal as part of the Integrated Development Plan for the Theewaterskloof District Municipality (BKS 2000).

4.3 Conclusion

Chapter Four provided an overview of the biophysical context of the study area. The area is rich in biodiversity, agricultural potential and water resources. Yet, the development potential has not translated to a broader development framework being implemented to combat growing unemployment in the

agricultural sector or through tourism development. Could this observed agricultural under-development be understood within the context of access to water? Chapter Five explores this perception.

CHAPTER 5: RESULTS

5.1 Introduction

Chapters one to four provided information about the nature of this study, an overview of global theoretical concepts such as Sustainable Development (SD), Sustainable Livelihoods Approaches (SLA), Integrated Water Resources Management (IWRM) and extensive discussion on water scarcity.

In many of the instances where water scarcity has been perceived to exist, the human impact can be discerned. What are the perceptions in the study area? Chapter Five highlights the voices of some of the stakeholders living and working in this community. Of value, are their "Perceptions of Water Scarcity: the case of Genadendal and Outstations". Interviews were held with Internal Respondents (IR) and External Respondents (ER).

The chapter discusses the issues as they emerge under the following sub-headings: ownership of the resource looks at the perceptions on local and other resources. The focus then shifts to seasonal water shortages followed by the use of water in the context of domestic water supply, agriculture and the water payment.

5.2 Ownership of the Resource

Chapter Four provided insight into the water sources available on the farm Remainder of Genadendal (39), (GG) some of which are located within its boundary and others passing through from springs in the mountains outside its boundaries. There are different views on the origin and management of these diverse water sources.

5.2.1 Local and other Resources

Distinction is drawn between water from mountain springs and rivers traversing the village (local sources) and water from sources outside the immediate boundary of the study area (other sources). Some of the local water sources have been identified on land owned by the Moravian Church (farm Lang Gesoght). Other water sources are situated on land not owned by the Moravian Church.

Two respondents referred to both 'local' and 'other' sources during the course of the interviews. IR1, who lives in the village, drew a distinction between the different sources, said;

> [Our] quota of water rights is not sufficient. At the moment we only have a 35.4 ha irrigation right from the [Rivier] Sonderend River. We will be getting an additional 100ha or 60ha which was purchased by the [Western Cape] Department of Agriculture.

IR1 also provided this view on the other resources;

> The historical system in Genadendal was that each house is connected to a garden in which that household could plant to meet the household needs. That water comes directly from the mountain streams and not from the irrigation dams. Genadendal and the outposts each have a dam or two. The irrigation needs of the home gardens are met from the mountain source or the irrigation dams.

IR2 grew up and is still living in GG. Working for the TWKDM, he gave an interesting perspective on the current water supply situation;

> We [Genadendal / Theewaterskloof District Municipality (TWKDM)] get water from the mountain. It is all mountain streams, Bereaville, Voorstekraal, from Bereaville to Greyton all

> have mountain streams…and we are also in the process of an investigation to explore buying water from the Overberg Water Board.

Although the other interviewees do not explicitly refer to local and other sources, they also drew a distinction between the two. IR4 grew up in the village, is a livestock farmer and member of the Genadendal Farmers Association, said;

> [The] Water comes from the mountain that is the source… I also understand that the church owns the farm Lang Gezoght and the source of the water is on this farm...

When IR2 explained the Municipality's efforts to alleviate water scarcity during the summer months, the reference to the local source is explicit;

> We [TWDM] sunk the boreholes at Bereaville and Greyton and we found sufficient water. Bereaville's water is like a fountain in the ground and the borehole at Greyton [nearby town in same management area] delivers 30 litres of water per second an indication that it is a sizable water source that we found. It is only to augment the supply during the dry summer months. We are expecting a dry summer this year [2004].

The responses cited above provide the local perspectives in terms of their consideration and entitlement to the water resources. Respondents seem to draw a distinction between "their water" and "other water". From this view, it seems as if a high premium is placed on the water occurring on the GG, held in trust for the community, and Lang Gesoght, that is owned by the Moravian church (of which a large percentage of the community are members). These are seen as local resources. The other resource is the Theewaterskloof Dam outside the farm Remainder of Genadendal (39). The water from the reservoir is allocated to Genadendal for the purposes of agriculture. Respondents are of the opinion that

"their" water (local sources) is enough and that "other" water (summer allocation) is scarce.

In this community, water is considered a critical element for local development and the literature concurs that water is a development tool that cannot easily be substituted (Lundqvist, 2001). In the case of the study area, there are visible flowing streams as well as infrastructure such as retention walls and boreholes. The community demonstrates a strong sense of "ownership" of the water. This notion of "our water" is explored in the next section.

5.2.2 "Our Water"

In section 5.2.1 respondents highlight "our" water as being enough and water from the "other" sources as insufficient for their needs. Reflecting individual views and to some extent what is demonstrated can easily become an institutional perspective. Our water is about how the respondents feel about the resource. It is not really focused on the policy and legal frameworks governing ownership of the resource.

IR1 is a part-time farmer, and employed full-time by the GFA. This position gives him the opportunity to participate in almost all the discussions concerning water resources management and agricultural development of the study area. Expressing a strong sense of ownership of the water resources he said;

> The immediate plans are to use the water rights that have been purchased [by the] Department of Agriculture (DoA) [bought] it for the Farmers Association… To have the water rights that have been purchased registered.

Respondent IR1, on the other hand, considers the Municipality the custodian and responsible party for ensuring access to domestic water. This is his response to "why the domestic demand cannot be met by treating water from the allocated irrigation supply?"

> Ask the municipality. They have a dam in the mountain.

IR5 is a retired teacher, part-time farmer and committee member of the Genadendal Farmers Associations. It is clear who he thinks the water belongs to;

> The river of ours is a tributary [of the Riviersonderend River], but the land is all being used. I am telling you it is our water, now they [Government] say that the water belongs to the state. This is a problem for a lot of people.

IR7, a local subsistence gardener refers to the water from the local source in terms of the water available for his garden;

> In Korlandskloof there is [a] dam… I can show you that there is a lot of water here. If they [TWKDM] got the water from Theewaterskloof [dam] and if they [TWKDM] paid for the water then one could understand, but they get the water from the mountain, it is a free flow thing… This is special irrigation water, you know, it is there especially for the gardens.

The comment by IR2 also alludes to a strong sense of ownership of the resource;

> [Yes] The agriculture applies for its own water quota from [Department of] Water Affairs [and Forestry]. We do have irrigation gardens in Bereaville, Voorstekraal and Berea[ville]. This is for people who want to engage in subsistence gardening by planting sweet potatoes and this are where our water runs to when our dam is full it runs to a smaller dam and this is where the irrigation water is distributed to.

This issue expressed itself even further when raising the possibility of transferring some of the irrigation water to domestic supply. ER3 expressed the following views;

> [I] don't know how we are going to respond to that. The farmers did not even want to give the 40ha of water. I went to them and I asked them and I said: 'Look you can sell your 40ha of water to the Land Reform Project, keep that as a Trust Fund, because I don't want the money back. This is the government, but use the money then to start projects'. They did not want to do that. They don't want to give the water away to anybody, not even the municipality for drinking water. So they are saying it is our water as a Farmers Association not as a Genadendal community, and they get pretty worked up.

Ownership of the additional water right is currently claimed by the GFA, but it seems as if some of those farmers feel left out of the process;

> ...[There] has been a conflict, because there is also a group of organic producers and they were not part of the Farmers Association that spoke to the Minister or the Premier and they did not want to give them water either … even though it was to the benefit of creating jobs and expanding agriculture. (ER3)

What appears to emerge is that the people of GG lay claim to the exclusive ownership of the water (estimated 989,840 kl/a) originating from within the boundaries of the farm Remainder of Genadendal and the farm Lang Gesoght. Furthermore, some residents with aspirations to become commercial farmers also give the impression to take the agricultural allocation from the other resources (207 000 kl/a) to themselves.

Water resources available to GG, as reflected in section 4.2.8 of the thesis, seem to indicate that people here do not experience water scarcity. There seems to be sufficient water available from local and or other resources to cater for their needs. Currently none of the Genadendal farmers have off-channel storage

facilities to keep the daily unused quota for later application. All of this contributes to the notion of water being scarce.

5.3 Seasonal water shortages

There appears to be widespread agreement that GG suffers seasonal water shortages. Respondents raised concerns on the insufficient water availability for summer irrigation.

IR1 made special reference to the water right for irrigation based on the land that can be used for irrigation agriculture, signalling a particular view on water shortages;

> [Our] quota of water rights is not sufficient. At the moment we only have a 34.5ha irrigation right from the Sonderend River [Riviersonderend Water Scheme]. We will be getting an additional 100ha or 60ha which was purchased by the [Western Cape] Department of Agriculture.

There is also a perception of scarcity created by making less water available to GG than the area of land available for cultivation. The total water allocated to Genadendal is 135 ha whilst there is 1300 ha of irrigable land.

IR4 is a livestock farmer who lives on the banks of the Baviaans River who in turn spoke about the summer water stress endured by irrigation farmers working the outer commonage (flood plains), and subsistence gardeners planting the inner commonage;

> [You] will find [a] shortage of water, especially in summer, and a lot of water drains away.

IR1 in turn talked about the summer water shortages and concomitant restrictions;

> During this time of year [summer] the water is not as sufficient as it is during Winter then one can expect that the water will dry up, if much of the water that is consumed in summer is used for their gardens or more reservoirs should be built. We are also subject to water restrictions over the December to January period where we are not able to open our taps in the evening. For example you are not allowed to use water at night. There are certain times when you are not allowed to use water. It is probably to give the dams a chance to fill up.

Seasonal water scarcity is experienced in Bereaville when the mountain streams stop flowing in summer. To alleviate this scarcity, water was initially transported from Genadendal but lately obtained from boreholes.

> [No], the water is not scarce. We are reliant on mountain streams before the two boreholes were sunk. So, if it does not rain and there is no mountain water, then there is no water. We never experienced a real shortage. The only problem is Berea[ville] that has a small mountain stream and this stream dried up. Then we had to physically transport water from Voorstekraal and Genadendal, because they have enough water. Understand, it is not that there was a drought, but basically the water in the kloof [ravine] dried up. (IR2)

IR2 provided an insight into some of the other historical experiences with regard to the domestic water supply situation when the town experienced water shortages for a reason other than seasonality;

> [If] your water was off for a number of days, at Passover [when the number of people in the village can double or triple] the town used to run out of water and so on. We have not had the water off for longer than four hours…

Households plant vegetables such as green beans, sweet potato and onions for domestic purposes. Water for this activity comes from the overflow of the reservoir situated on the Baviaans River. During the dry season, there is no overflow and therefore no water is available to irrigate the home gardens.
Respondent ER2 had the following response about the water situation;

> [With] Groundwater, rainfall and run-off are sufficient based on the water required but there is a lack of storage capacity to meet the peak season demand.

The review of the water resources in Chapter 4, Section 4.3 indicates that by taking the current supply available to the people in the study area, the water is sufficient. Respondents' views seem to indicate that those seasonal water shortages are experienced.

5.4 Domestic water supply

The respondents' understanding of the water availability (in-stream, underground or in reservoirs) has been demonstrated in section 5.2. Section 5.3 illustrated that even though the perception that water is sufficient, seasonal water scarcity is experienced. Reference here is mainly in the context of agricultural shortages (for subsistence, urban and rural) and indications are that the area receives a sufficient supply in terms of domestic water.

GG is well served in terms of domestic water reticulation. The area boasts almost one hundred percent coverage (DWAF, 2005). However, households seem to recall experiencing a history of periodic shortages. The most recent episode of severe shortage was quoted as "two years ago" (2002, from the time of the interview in 2004). Respondents spoke about these interruptions in situations when the purification system breaks down or when maintenance work is done or leaks are fixed.

IR2 highlighted some of the difficulties the Theewaterskloof District Municipality is still grappling with;

> [I] hardly have any broken pipes in the town except if someone vandalises it or if a big truck goes over it or something like that. I cannot do it differently. The only thing I would really like to see is and that I will be able to achieve this year is the installation of the sand filtration system that will remove the organic matter such as the leaves and such things from the [water] network.

IR7, who has been living in the village for more than 30 years and is more involved with the tourism development initiatives, provided valuable insight in terms of the immediate concerns of the water management;

> [The] town gets its water from right up in the mountain, transporting it with a pipeline using gravitation, it pushes the water up to the reservoir… a dam and then it distributes it through the town… but in summer it is very low, but there is also a retention wall here at the back [refers to the river behind the historical church yard] with a pump, then they pump the water into the reservoir at night. My friend just told that a pipe is broken and the water is just draining away.

IR5 refers to the water in terms of the quality, thus highlighting critical concerns regarding the infrastructure;

> Our water here [Genadendal] is raw. Berea[ville's] water is the ugliest, when they run the water through a cloth it colours it almost blue because they do not have a chlorinator. They add the chlorine manually. It is a very expensive machine and we had a fight [with TWKDM] to have the machine operating. The water of Genadendal is also not being filtered.

The author found it interesting that this view is supported by ER4 who said;

> [At] the moment they get the water straight from the source. There is a small filtration tank with sand filters, but I don't think that it is working at the moment because it is in a poor condition so they are currently only chlorinating the water then it goes into the dam and then it goes into the reticulation system. The water quality could be a problem dependant on what is discharged into the stream that goes directly into the system.

ER1 is responsible for the management of the resource from an engineering perspective and operates under the mandate of the Theewaterskloof District Municipality;

> … [In] terms of service delivery certain needs were identified. Water shortage, that would be a shortage of sources and then we also look at the internal reticulation systems, sanitation and water.

Contradictory to this view, ER2 provided the following insight;

> [Groundwater], rainfall and run-off are sufficient based on the water required but there is a lack of storage capacity to meet the peak season demand [summer]".

During the 1960's there was a different engineering perspective. IR7 recalled;

> …[There] was not a reduction in the rainfall, but their [the Coloured Affairs Department] dams were built in such a way, wanting to make the pre-scientific canals scientific, and it does not work. We do not have a water shortage in Genadendal. South Africa is a unique country in terms of droughts, but Genadendal does not have a water shortage.

Regardless of the fact that water is seen as being sufficient, there seems to be infrastructural induced scarcity of domestic water supply.

5.5 Agriculture

Agricultural development is considered a major opportunity for the transformation and development of the GG (BKS, 2000). GG is divided into about 37 farming units demarcated in and around the residential areas as well as the outlying areas; these are classified according to agricultural potential from high value irrigation land, dry-land farming and grazing units. All land is accessed with either an inter-generational land grant(s) or Permission to Occupy (PTO) lease. Under the current lease system, families still have to renew their grants every five to 10 years. Over the years there has been some land consolidation in GG, albeit a system of informal granting of "permission to use" between different families. Certain farmers are thus commanding larger pieces of land than their initial grants or PTO's.

Households opting for agriculture engage in typical mixed-farm activities, although not all the activities are necessarily within the same geographical confines. They would be planting vegetables on the commonage, keep chickens in the back yard and pigs in pens on the edge of the gardens. Irrigation patterns are therefore influenced by the type of land as well as the geographical location of allotted portions in relation to the water sources (figure 4).

5.5.1 Recreational and Subsistence gardening

Recreational gardeners use the land around their houses to plant vegetable mix such as green beans, cabbage, beets, sweet potatoes, onions and potatoes as well as flowers. These gardens are watered from the same sources feeding the main domestic supply reservoir with the smaller schemes providing water to the

outstations. This situation could lead to potential conflict as the following quotation suggests;

> I must however tell you that we are going to have [water] problems now since we have two types of home gardens. Some households have a garden in their yard and also a garden attached to their house in a communal manner mainly across the road from their house. It is the farmers with the garden across the road from their house who are irrigating with water from the river. Then you will find someone with a flower garden and a vegetable patch on their house plot. (IR1)

The land management plan for the GG has been developed in such a way that a large percentage of the productive land can access irrigation water, but there are certain households who have access to plots that do not have an irrigation right allocated. In the village, this is called the “dry gardens” and it is mainly used for dry-land planting.

IR3 planted a dry-land garden next to the family homestead in Bereaville. They are close to the bank of the Riviersonderend River;

> We do not get ... irrigation water. Look, here it operates like this… you get water for your garden. We are one of the gardens that are not entitled to this water… the gardens below the main road. You see this is the main road, this is the dry gardens, they call it dry gardens, the previous council and the municipality refers to it as the dry gardens.

Currently this household is dependant on the up-stream garden’s run-off. IR3 views the situation as follows;

> Look, for example like now, the water, you can see for yourself, in the middle of the garden [she points] is a channel, the people above us, who let the their surplus water run down, we use that

> water, the surplus … water. The new municipality would have to take a decision on the water at some point. I am not sure if there is a possibility, but we are a few gardens below the road. The majority of the gardens are above the road.

As a possibility of diversifying her income, IR3 is interested in commercial rose production. When prompted on her water needs for this venture she said;

> [Well], I would be using the water allocated for domestic use.

IR1 reiterated the issue of the irrigation access for the house gardens.

> [The] historical system in Genadendal was that each house is connected to a garden in which that household could plant to meet the household needs. That water comes directly from the mountain streams [feeds the local domestic sources] and not from the irrigation dams. Genadendal and the outposts each have a dam or two. The irrigation needs of the home gardens are met from the mountain source or the irrigation dams.

ER2, Department of Water Affairs and Forestry response to alleviating seasonal shortages:

> [Groundwater] Study- funded by the DWAF and the Theewaterskloof District Municipality – investigating the possibility of developing three to four large boreholes and sufficient storage capacity to meet the peak season demand of both Genadendal and the outstations.

5.5.2 Agriculture on the inner commonage

Farming takes place on the inner commonage of the main village and outstations. Households are able to access plots varying in size from a half to two hectares

through PTO leases. Irrigation water to this land is a combination of water from Sewefontein dam that stores water flowing from a mountain stream, as well as the overflow from the main domestic supply reservoir. This water is delivered via open irrigation furrows. The furrows are in a state of disrepair. IR2 on the issue;

> [We] do have irrigation gardens in Bereaville, Voorstekraal and Berea. This is for people who want to engage in subsistence gardening by planting sweet potatoes and this are where our water runs to when our dam is full it runs to a smaller dam and this is where the irrigation water is distributed to.

Agricultural activity in the inner commonage came to a standstill because of the collapse of the irrigation infrastructure. This collapse happened over an extended period of time and is related amongst other things, to changes in the “culture” of the town.

> [You] see the gardens are overgrown, not because the water is too little, but because the water infrastructure is not a good working order for example irrigation furrows are not in good working order, the installation of pipe here or there … I grew up here, the wooded areas were all gardens… the infrastructure is a problem. (IR4)

IR1 provided the following comment in terms of the lack of large-scale agricultural development;

> [We] have enough water to farm. The land is sufficient. The fencing and the input costs is what is largely missing.

IR7 blames the demise of the “urban” irrigation infrastructure to the planning and management systems employed by the Apartheid government;

> [Man], Genadendal had a system, most people probably forgot, in this system the council [local government] would appointed a Water Bailiff the council also ensured that every gardener

participate in an annual clean-up of the furrow system. This involved clean-up of the furrows, plugging all mole holes. This would be done on rotation including maintenance of Sewefontein dam. The dams should be maintained. Then it is the case of the then Coloured Affairs Department (CAD), their newly qualified engineers, with no experience came and closed some of the channels by building a wall which blocked the run-off that ran into a small dam and could be used for irrigating adjacent land. So, a proper furrow irrigation system existed. The system is there now, but it is not being maintained, so it is not in good working order, it should be regulated, anyone could not just irrigate, every man had to get a turn. Many a time fights almost broke out, some people forgot about these systems.

5.5.3 Agriculture on the outer commonage

The outer commonage comprises in excess of 1300ha, with some of the most fertile land on the bank of the Riviersonderend River. Farmers accessing this land get their water from the river under a communal right of 34.5ha (of 6kl/ha/a) from 1 November to 31 March. Their current irrigation investments are limited to overhead sprinklers or open channel flooding.

There are indications that the farmers do not always have access to their full water allocation. Respondent IR4 alludes to this when he says:

> [The] farmers out there [outer commonage] if people want to plant, there is an opportunity for them, but the water is a problem, it does not matter if you plant now [August] and when you get to November/December, when it is very hot, then you do not have water available…. Provision should be made. This river [Baviaans River] can be channelled.

Neither does it seems that the DWAF or the DoA knows how much water is used by the farmers.

> [Currently, 2004] both the DoA and DWAF are not clear on the total impact of agriculture on the current water consumptions patterns of Genadendal. How much water is pumped? Is there a relationship between the use of the allocated water and the use of the water in terms of the crops cultivated. To date there has been disputes over whose responsibility it is to monitor this aspect. DWAF and the DoA are taking joint responsibility to collate this data. Criteria: crop type and area cultivated, type of irrigation, no of pumps used, flow requirements. (ER2)

Water is measured based on the pump capacity. If the farmers do not use the water, they lose it to downstream users. Respondent IR5 felt strongly about the under-utilization of the water and the possible gain by downstream users;

> [It] is our worry that the water is running away, because the farmers downstream from Genadendal they get the benefit of the water… they use it, they are all commercial farmers. They use the water for large-scale commercial production. There are some of them who also store the water.

ER5 provided the following comment on the issue of the current under-developed agricultural potential;

> …[The] farmers downstream or like anyone up-stream should use the resource within his right… they have established a water user association and the case in point is that the water right has been allocated and that right should be respected and it does not matter where you are situated. When Genadendal will be in a position to use more of its water then there will be less or under-utilized water downstream from Genadendal for the use by any other guy.

Other than the Sewefontein Dam and the domestic supply for the outstations, GG does not have any off channel storage facilities to store the daily unused quota for later application. All of this contributes to the notion of water being scarce.
Apart from shortages caused by inadequate infrastructure, there is also a perception of shortages created by less water being available to the GG than the area of land available for cultivation. The total water allocated to the GG is 135ha whilst there is in excess of about 1300ha irrigable land available. However, from the external stakeholders perspective, that although the allocation in limited more can be done with the water depending on the crop mix.

ER3 expressed the following views on this issue;

> [They] need to decide do they want to do it or don't they want to do it, but we're there to start of the planning, because part of the thing is that people decide on a crop but they don't know the market. So if, [they] say "cabbage", we can say cabbage? hang on, you can't plant 5000 cabbage in Genadendal, where the hell are you going to sell it, and if you have to drive to Epping [Central market in Cape Town +/- 150km from GG] the cost of getting it there is not worth it. Look rather at a mixed vegetable setup that you can structure it so that it can get ready at different times. So that is what I see our role should be. So they decide that they want to do Proteas and we don't have the knowledge, part of the planning has to be outsourcing. We have to outsource it to somebody that can give that kind of advice. But it must make economic sense. It is no use just doing it and people don't know why they want to do it. They need to have their vision which I suspect in Genadendal is to make money.

ER2 commented as follows;

> [It] would be important to note that the allocation is per ha of land for which the farmer has access to irrigate. The crop type would be a farming decision. This leaves the farmer with flexibility in terms of the crop type… [since] the farmers are allocated water per ha based on an estimation of the requirements of the highest yield crops/soft fruits/stone fruits farmers could maximize their utilization by shifting to less water intensive crops E.G. for each 1ha of water they can plant 6ha of Proteas.

Apart the fact that the farmers do not access their full allocation because of infrastructural constraints, IR1 felt strongly that the additional rights purchased by the Department of Agriculture should be registered;

> [DWAF] must register the 55plus the 60ha in the Riviersonderend and then they, together with the DoA should plot it on a map. That is what we want. We want to investigate our catchments with DWAF and the DoA, the two of them together revisiting the water from the mountain and which water can still be collected.

The farmers' perspective is that there appears to be a scarcity of water, in that when they need the water in November, they do not have access to the water. Furthermore, the farmers feel that they should be allocated sufficient water to irrigate the full compliment of available irrigation land. On the other hand, the external stakeholders are of the opinion that if the farmers employ the proper crop mix and appropriate infrastructure, the water should be sufficient.

5.6 Water cost and payment

All water is subject to the policy of cost recovery as a key aspect of the national water policy (DWAF, 2004). The TWKDM is responsible for implementing

appropriate financial management strategies for domestic water supply whereas the DoA is responsible for agricultural water.

Resident's in the Western Cape all benefit from the 6kl Free Basic Water per month. In the case of Genadendal, the domestic connection is recognized as a source for use in domestic consumption as well as subsistence production. This probably impacts on the affordability of the present domestic supply and raises questions as to whether the existing block tariff pricing strategy is the most appropriate.

TWKDM withdraws 989.840 kl/a from the different streams feeding the main village and outstations. Historically one third was allocated for domestic use and two thirds for irrigation. Overflow from the local dams and retention walls are channelled to two main irrigation furrows traversing the village and outstations.

This section explores the cost and price of domestic and agricultural water. Most of the user rights were protected by the title deed of Lang Gezocht, a farm owned by the Moravian Mission. This farm is also the source of the Baviaans River that is the main source for the area. This protection was rescinded by the National Water Act (1998) that effectively revoked (expropriated) all riparian rights and replaced it with a water-use-licensing system.

5.6.1 Domestic supply

Prior to the implementation of the new policy and legislative frameworks, residents paid an annual fixed charge for water irrespective of consumption levels. This is reflected in the interviews where a number of respondents spoke about the "free water" and how they should "not be paying" for the water. The following views were expressed;

> Yes, we have only started reading the meters from March this year. The installations were completed two years ago. The

> people are currently busy reading the meters and to charge the users. We only paid a basic tariff for water availability at the outset since there was not metering system in place… we have 99.9% coverage. (IR2)

Further:

> [The] water should be cheaper, because I feel, and we say, you have to pay for services, but at this stage I cannot see great service delivery. When the municipality took over the projects were completed. The dam was there, they had storage for the water and the people literally paid nothing. Then the municipality increased the tariffs without actually delivering any services. The service they delivered was the installation of meters that is to their advantage, because the meter is being read and you have to per kilolitre for the water use. (IR4)

Despite raising the issue of the price of water, IR5 also provided comment about the payment culture and history;

> [Genadendal] [residents] struggles with their water payment, because they do not have a culture of paying for water.

There are indications that payment for water seems to be a problem. The following alludes to this;

> It is difficult for me to say, I don't work with the finances, but I know that there are problems in that certain people are not paying and that we cut the water and things of the people. I know that the rate of payment [for services] in Genadendal is only 40% that is low. (IR2)

> I know that we have a lot of drama about payment for water and that residents received free water for many years. (IR4)

Non-payment seems to be related the low incomes although one interviewee indicated that people who can afford might also not be paying their water bills;

> [Peoples] income here is very low, we can estimate, a lot of people are seasonal workers [in agriculture] and they are extremely needy, you can estimate their weekly income at R300. That is what I mean by the income levels are low. (IR4)

Views related to the price of domestic water were expressed as follows;

> [Our] biggest problem is that our water is now more expensive than the water in Cape Town. (IR5)

> But they charge you a heap of money. You see there are a lot of people who cannot afford to pay that money. I think there are a number of people in this street whose water has been disconnected. (IR6)

Linking non-payment with lack of income IR2 mentions;

> [Yes], I think that is largely the case, but there is also one or two well-off, in the sense that they have good jobs, but they also do not pay.

5.6.2 Irrigation Supply

The agricultural water cost and pricing regime is entirely different to that of the domestic supply. Beneficiary households accessing water varies and depends on who have access to the land and the right attached to the patch. There are two main sources for irrigation water — one from the local streams that is also referred to as “our water” and the other a 34.5 ha summer irrigation right allocated to the farm Remainder of Genadendal (39). Subdivision of the 34.5 ha

summer right is managed by the TWKDM and allocated as part of the PTO agricultural land leases.

Indications are that water derived from the 34.5 ha summer irrigation right as well as the newly acquired 100ha right is not paid for by the farmers.

IR 1 on who should be paying for the water?

> [No] one. The water is already paid for. The water rights had been paid for. The Department of Agriculture paid for it. The water should be used. It must be registered and it must be used. This will result in the cultivation of more land and more vegetables will be planted. The farmers will get busy and there will be more jobs in the community. The one activity will provide reaction to others.

Respondent IR1 does acknowledge that a system needs to be generated whereby farmers pay for their water;

> Currently the municipality is paying for the water rights, but we will be developing a system where the small farmers would pay, for example to the Farmers Association and the Farmers Association would in turn pay the municipality.

In connection with the 100 ha right, IR1 had the following to say;

> [The] immediate plans are to use the water rights that have been purchased. To have the water rights that have been purchased registered. Water rights had been paid for. The DoA paid for it. The water should be used. It must be registered and it must be used. This will result in the cultivation of more land and more vegetables will be planted. The farmers will get busy and there will be more jobs in the community. The one activity will provide reaction to others.

IR5, a part-time farmer and member of the Genadendal Farmers Association is adamant that the 100ha right is that of the farmers, and gave a very emphatic response as to the purchase and ownership of additional irrigation rights;

> We are not getting water. We bought water for R1million, but we did not get the whole 100hectares, this is not domestic water, it is irrigation water.

In contrast to the view expressed by IR5, ER5 shed a different light on who paid for the water;

> [About] a year or so ago [2002/3] we [DoA] bought the water rights for them with the idea that we legalise the right that the water that they are currently using… I think they have a right of about 34 ha already allocated to them, but they are using more water than what is allocated to them. To legalise this use, we provided the funds for them to purchase the water right.

Members of the Genadendal community are not too clear on how the water rights operate; the buyer of the water right is a once off capital cost to the purchaser. This is coupled with an annual water charge levied against that right irrespective of whether the water is used or not. Respondent ER3 identified this as a major stumbling block in terms of the sustainable development options through agriculture.

> … [it] is a nightmare, because Genadendal, the current water that they have they can't pay. JR [Official in the Regional DWAF] has informed the municipality in no uncertain terms, they are actually paying for it, but they did not realise it. So, what we [DOA] thought of doing is we keeping the water, it's theirs, but there are developments in the valley that also needs water. Land Reform and we're saying you can't pay 35 ha of water.

ER7 about the development of infrastructure and the cost of water, he refers to a some of the dams upstream form the study area Water Management Area;

> The more obvious reason is to build bigger dams not only for places like Genadendal, but for more users, that [is] where schemes like Brandvlei come and that's where new schemes will come in. We talk of dams like La Se Cheur and other dams where you can use that water and pump it into Brandvlei Dam. You can even bring it to Cape Town then. At would mean that affordability. There is a difference in affordability for household use than for irrigation, because a normal household, we [residents] pay [in] Cape Town, R4 up to R10 per cubic meter a farmer can't farm water if it's more than 0,50c.

And what if you have not been farming for years and you do not have the capital outlay?

> So for emerging farmers, in other words it can be worse, because they can't afford the too expensive schemes initially. So for urban purposes it is still affordable to build dams, but for irrigation it is almost not and that's why there are no schemes built in South Africa only for irrigation. It is really the urban component that's made it possible. Of course you have the exceptions. You have small dams, just a nice site that [With] the municipality makes it more affordable.

When shifting the focus on the conjunctive use between domestic and irrigation allocations IR2 talks about the allocation of irrigation water to the domestic gardens and inner commonage;

> [It] is under municipal management. We own it and it is rented to the person who gardens. The person who applies gets it under a long-term rental contract. In other words, if you rent it, and I am

not sure, you pay R26 a month for the right to have water for the garden and so on.

On payment for this water IR5 held the following view;

> That water that is running there, now, you do not pay for that water. People are not paying for that water, but we who farm on the outside land, pays for that water.

Domestic and irrigation water tariffs are developed and implemented separately. In the case of GG, the TWKDM is currently responsible for implementing both systems. The revenue collection for the domestic water services is possible since the area has almost 100% coverage in terms of metering and all users are receiving monthly water accounts (TWKDM, 2005). The irrigation water accounts to the farmers are not clear and neither is the relationship between the TWKDM and DWAF, but it appears as if only the farmers accessing the summer right from the Riviersonderend Water User Association are currently paying for their water right.

The views expressed on water cost and pricing by all stakeholders is clearly focused on their relationship with the resource. A number of stakeholders referred to the historical water management systems, which in their views, offered households a better financial situation. What is not clear is whether the TWKDM as the primary custodian of the resource and whether they are in a position to change this view. The cost and pricing of water seem to have a particular influence on perceptions of water scarcity in the study area.

5.7 Conclusion

Stakeholder perceptions of water scarcity in GG were presented in this chapter. In conclusion, the following critical issues were observed:

In Section 5.2 (Ownership of the Resource) we learnt that the local respondents have a particular affinity to the water sourced in the confines and next to farm Remainder of Genadendal (39). The area, referred to in this thesis as Greater Genadendal (GG), is well known to the locals and even the external respondents expressed a reasonable knowledge of the topography and main feature of the water resources. Respondents placed a high premium on the local resources and considered it sufficient to meet the domestic requirements. Available data further supports this view.

In Section 5.3 (Seasonal Water Shortages) internal and external respondents agree that under the current water management regime there are seasonal water shortages in GG. Supporting evidence for this view offered are the dry season low flows and complete disappearance of the surface water on some of the streams originating in the boundary of the study area.

In relation to Domestic Water Supply (Section 5.4), a number of different challenges are raised. The most significant comments are the periodic problems with the filtration and chlorination systems resulting in poor quality domestic water being supplied. We are also made aware of the challenges in meeting domestic and agricultural demand from the same source.

Agricultural development is at varying levels in the village and outstations. Irrigation practices are influenced by the available technology, topography and access to the resources. Section 5.5 (Agriculture) focused on the type of gardens planted, i.e. household subsistence and recreational gardening, small-scale commercial production for the domestic market and commercial production for a regional market. The lack of off-channel storage was raised as a critical shortcoming and a contributing factor to the perception of water scarcity.

Indications are that payment for domestic and agricultural water is an issue in GG. Water cut-offs and the inability to pay are still issues of note despite subsidies through the Free Basic Water policy, the purchase of agricultural rights and the Municipality footing the bill for the current agricultural consumption. This inability to pay seems to contribute to the perceptions of water scarcity.

The next chapter discusses the results and draws on the perspectives derived from the interviews, as well as placing these within the contexts of the literature on sustainable development, sustainable livelihoods, integrated water resources management and various views on water scarcity.

CHAPTER 6: RESULTS AND DISCUSSION

6.1 Introduction

The views expressed by a senior water resources manager seem to be an appropriate introduction to this chapter.

His thoughts about scarcity are as follows: *The definition of scarcity in my book is when the demand exceeds the supply. As soon as your demand for water or your need for water is greater than the supply of water, then you have scarcity. So it is not only rainfall or yield or whatever, it is. The question is what the demands on the water are. And that is why Cape Town, although we are situated almost next to a very high rainfall area, the mountains next to us, we are regarded as the most water scarce city, if you want to call it that and the first to run dry from natural sources than the rest of the other six metropolitan areas and there are 3.5 million people to look after plus the economy and for them the available supplies are not enough. If Cape Town has only 1 million then we have water in abundance. So it is really what the dynamic is. Then you go to specific areas like Genadendal or wherever, it depends what water is available there and what are their needs and their needs are not only domestic or urban water where you can readily translate it to per capita per day, but you must look to other purposes like farming. Genadendal also wants to extend farming as a job creation but also as a wealth generator to break the poverty cycle and that's where the scarcity comes in. To provide Genadendal with water to drink is one problem, but to provide Genadendal also with enough water to make a standard input into irrigation for farmers, to increase their economic and financial situation then there is a scarcity.*

This view on water scarcity is quoted extensively, as he has (theoretically at least) the required opportunity to influence processes impacting water scarcity in Greater Genadendal (GG).

One of the definitions of scarcity, points to three solutions — increasing supply, decreasing demand, or both. However, when scrutinizing the perceptions of scarcity as extracted from the interviews and relating them to conceptions of scarcity in the literature and specifically to that of Mehta (2001), a more articulated understanding of water scarcity can be developed and distinctive approach to a solution or solutions can be pursued.

In the case of GG, the total amount of water available from run-off and groundwater seem to indicate that the community should not experience any real water scarcity.

6.2 Water scarcity

In many of the instances where water scarcity has been perceived to exist, the human impact can be discerned and this is clearly the case referred to as manufactured scarcity by Metha (2001). In the case of GG, manufactured scarcity is also not homogeneous and is manifested in different ways:

GG experiences infrastructure induced scarcity in a number of ways - A primary concern is the lack of a water storage capacity such as dams (Kwezi-V3, 2004) to store water for more than a season or over a number of years to meet both the domestic and agricultural supply requirements. They are therefore unable to capture and store excess runoff in dams or through artificial aquifer recharge. To the community this is manifested as water scarcity since their existing infrastructure in this regard is considered inadequate.

Compounding this situation, the farmers do not own any off-channel storage facilities to meet their irrigation demands or have the opportunity to expand their planting strategies, as in the case of many other commercial farming operations elsewhere in the catchment. They are unable to store the unused summer irrigation allocation, leaving their crops vulnerable as well as limiting their crop

variety since they have to automatically consider hardier plants with less market access that is a further manifestation of infrastructural water scarcity.

Another instance of infrastructural water scarcity in the GG is a lack in the use of advanced irrigation technologies and infrastructure such as bulk water meters to monitor irrigation consumption at farm level. Without the meters, the individual farmers are unable to monitor whether they are using more or less than their entitled water quota.

Continuing with Metha's (2001) conception on water scarcity, the focus shifts to institutional-induced water scarcity, another challenge faced by the people of GG. A primary area where it can be observed is the unreliable nature of the infrastructure feeding the domestic water supply systems that causes periodic water scarcity. Consumers experience this situation as water scarcity irrespective of the frequency of its occurrence.

Producers in the inner commonage who rely on the existing irrigation infrastructure are concerned about the collapse of the furrow irrigation system, resulting in an almost complete abandonment of urban agriculture. The lack of revenue collected for the water irrigation between the TWKDM and the end users is an institutional gap. In the instance of the study area, the unavailability of this revenue translates into limited or no investment into the repair and maintenance of the infrastructure, and hence a greater perception of water scarcity.

Politically induced scarcity is another distinction that can be drawn under manufactured scarcity. Politics in this context would mean "social relations involving authority or power" (Hyperdictionary, 2005). In the case of GG, this is manifested at two levels - The first is related to the belief that since there are other resources available (land and labour), sufficient water should be provided to irrigate the total potential despite the current under-utilisation of available irrigation water. DWAF refers to this as demand for water for potential future use.

Secondly, it concerns whom and how many people are accessing water for productive purposes. The number of households engaged in commercial agricultural development is less than conservatively over-estimated value of 20. BKS (2000) showed that agriculture could be a good avenue for economic development and poverty alleviation. A major challenge is to understand why, if the resources are available, do more members of the community not engage in agricultural development activities.

GG is not an egalitarian society and there are definitely very pronounced class divisions. The majority of those engaged in small-scale commercial farming ventures are able to cross-subsidise this activity with money earned in other activities such as building construction or transport contracting. Because these farmers are able to actively participate and are easily recognised as an interest group, they are in a much stronger position to access information supporting these activities. To the rest of the community (the have-nots), women (single female headed households) and the unemployed youth, access is restricted, not through any public processes or societal sanction, but from within a personal situation of hopelessness and a perception of deliberate social exclusion by those able to engage with the institutional processes governing land and water use. It can also be equated to a general distrust held over from the area's social and political history.

The views raised on politically induced water scarcity is thus largely an insinuated view, the evidence is anecdotal rather than concrete, but it does seem to leave a large percentage of the people with an even stronger perception of resource scarcity.

In the absence of a targeted training and capacity building programme enabling the community to understand the relevant issues about water resources management in GG, it is very difficult to break down the popular perceptions of water scarcity. Such a capacity building process would have to be participatory in

nature and draw on farmers' indigenous knowledge and experience of farming in the area that can feed into the formal institutional structures and systems of water management currently.

6.3 Integrated Water Resources Management (IWRM)

Jonker (2004) suggests that for any water management activity to be classified as integrated water resources management the activity has to (i) be located within the largest possible hydrological unit, minimally management should consider upstream-downstream interactions; (ii) take the complete water cycle into consideration even those diversion brought into the cycle by human activity (sewage and storm water); (iii) focus on sustainable development.

IWRM as a water resource management framework offers a number of solutions in terms of the general water resources management challenges. Crucial to this process, however, is an understanding that for IWRM to be implemented successfully, managers of the resource should have knowledge about or have access to information about the resource (Savenije and Van der Zaag, 2000).

In the case of GG, such an understanding exists (BKS (1997); DWAF (1998); Kwezi-V3 (2004). The fact that the prevalent opinion seems to be that water is scarce, is probably premised on a lack of access, socially-constructed scarcity and marginalization emanating from the apartheid policy making era (Conca 2005).

The perceptions of water scarcity in GG could not be refuted despite the availability of a 207 000m^3 summer irrigation right from the Berg-Riviersonderend Government Water Scheme situated downstream from the Theewaterskloof Dam (The allocation is controlled by the Zonderend Water Users Association), as well as 989, 840 m^3 of water originating in GG from their own sources (i.e. Baviaans River, Boschmanskloof-, Voorstekraal- and Bereaville retention walls, Kat River and Boschmanskloof dam).

Using the gap between land and water availability as the main arguing point, the GG farmers approached the Premier of the Western Cape to assist in dealing with their water crisis. Their advocacy paid off when the Premier at the time (2002/3) mandated the provincial DoA to find a solution to this problem of water scarcity in GG by purchasing an additional 100 ha irrigation right from other users in the Berg-Riviersonderend Government Water Scheme on behalf of the farmers of GG for almost R1million. This process left the GFA with what they feel is a legitimate claim to this full right. Indications are that the DoA, however would like to use part of this right (40 ha) to settle other farmworkers in the vicinity of GG as part of the governments land reform and rural development strategies.

GG's farmers are expecting to utilize this additional right to optimize their agricultural potential and they do not seem to be too keen to lose it to competing users. Notwithstanding the additional water, the GG farmers still feel that they are short-changed as far as access to water is concerned, because technically they have more irrigable land (1300ha) than what a mere 134,5 ha water right can support. Until such time that additional water rights are transferred to the community the GFA firmly believes that water is scarce.

It seems as if the only recourse to this impasse would be the implementation of a water management regime within an IWRM framework to facilitate the development objectives of the GG community. Various studies BKS (1997); BKS (2000) indicated that the water available to the community is of a good enough quality to grow a number of possible crops, so that IWRM would be an ideal solution.

Some of the strategies that can make a difference would be:

- Improving irrigation efficiencies;
- Valuing water as and economic good but at the same time offsetting this principle with well targeted government subsidies to meet the equity requirements of the NWA (1998);

- Increasing the number of households engaged in commercial agriculture, thereby expanding the beneficiary base and the per capita subsidy enabling the purchasing of a larger portion of the irrigation rights from the Zonderend Water User Association;
- Trading water with other economic development sectors, such as tourism could possibly expand the farmer's perspectives of water scarcity.

A vital step in the IWRM framework implementation process would be to develop an integrated water resources management plan for the GG area. It seems as if the current Water Services Development Plans, a compulsory outcome of the implementation of the NWSA (1997), lacks the insight and inputs from both a water user and manager perspective.

The research results further reflect an institutional view by DWAF and DoA that leans toward a broader view and proposes the development and maintenance of an integrated water development plan for the GG. The farmers seem only to be interested in irrigation development and the consultants and the local government comes across as being primarily pre-occupied with domestic water supply issues.

6.4 Sustainable Development

The lack of long-term agricultural development, hence the strengthening of livelihood capacity, is the result of the perceived water supply shortfalls as well as the precarious land tenure arrangements. Genadendal's land is held in Trust by the Minister of Land Affairs and is administered by the TWKDM. Even though farmers enjoy inter-generational access, the leases are only signed for between five and 10 years, leaving farmers vulnerable and less likely to invest in long-term infrastructural improvements. Government, as the custodian, understands this precarious situation and the process to transform the land ownership situation has started (ER6). The community however, is still uncertain in terms of the land

situation and the impacts on their perceptions of how the land and water can be used to improve their livelihood situation. In the meantime, the farmers are only entitled to short-term agricultural development support.

Currently household gardeners are excluded in terms of the irrigation development planning, since they are using their domestic allocation to water household food gardens. Yet, their agricultural contributions are considered as essential to the local development situation and they are part of the target audience for extension support.

GG has undergone an extensive Integrated Development Planning (IDP) process. Key development targets for the GG include:

- An extensive short, medium and long-term agricultural development plan with the land and water requirements spelt out;
- A water supply and sanitation development strategy focusing on the long-term domestic water supply requirement of the GG; and
- An Integrated Development Plan for Genadendal and Outstations to meet the provincial planning requirements.

In all these processes, seasonal water stress is stated as a critical issue impeding the local development options. For GG to be able to create sustainable livelihoods for its people a number of issues would have to be addressed simultaneously:

Locating these tasks within a Sustainable Livelihoods framework it translates into the building of the:

- Natural assets (like finalising the land tenure arrangements, water and biodiversity);
- Financial assets (grants, subsidies and loans as well as enabling savings);
- Physical assets (irrigation infrastructure, dam construction);

- Human assets (education, training and capacity building of all stakeholders); and
- Social assets (establishing appropriate and strengthening water management institutions).

6.5 Conclusion

Ohlsson (2000) proposes that water resources management passes through three sequential phases in dealing with water scarcity, i.e. an infrastructure-, institutional- and social response. GG appears to be simultaneously affected by all three phases. In other words, the inability to overcome seasonal scarcity is about much more than a supply-side intervention. It concerns changing mind-sets among key stakeholders. The author believes that no blue print exists in terms of as to how this can be done, but there should be an attempt to change the view of those in positions of power but outside the resource base who feel that residents lack initiative. At the grassroots level it is about changing the views of those with limited power who are currently using or not using the resources, who feel that the post-apartheid state should make things right.

It could therefore be argued that since perceptions of water scarcity in GG is built upon its history, the progression from real water scarcity conditions, albeit seasonal in nature to institutional, infrastructural and politically induced scarcity, water scarcity in GG seems to be primarily a social construct.

It is difficult to comprehend that GG, a community where significant investments have been made in terms of feasibility studies, well endowed with natural resources, operating in a favourable economic climate and within an enabling policy and legislative environment, still suffers the effects of chronic poverty.
It is not the objective of this thesis to produce solutions to the development challenges. One elder in the community said: “We are celebrating a decade of

democracy but to the people of Genadendal it is a decade of Hypocrisy". This statement embodies a level of frustration and concern about finding collective solutions to the development challenges of Greater Genadendal.

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