

Water, Households & Rural Livelihoods

Rural water supply and productive uses: a rapid survey in the Sand River Catchment

K. Mokgope¹ and J.A. Butterworth²

¹Association for Water and Rural Development, Acornhoek, South Africa

²Natural Resources Institute, University of Greenwich, UK

Research promoting
access of the poor
to sustainable water
supplies for domestic
and productive uses
in areas of water
scarcity

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Preliminary results of research for
discussion and comment

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CONTENTS

1	Background	1
2	Methodology	2
3	Results and discussion	7
3.1	Water use in villages	7
3.2	Sources of water	10
3.3	Management of water supply systems	13
3.4	Wealth and productive water use	13
3.5	Gender and productive water use	15
3.6	Payment and productive water use	16
3.7	Constraints and possible future trends	18
4	Conclusions and recommendations	20
5	References	21

PREFACE

This working paper was prepared as a contribution to a joint Indian, South African and UK research project on Water, Households and Rural Livelihoods (WHIRL). The objectives of the paper are to provide a broad overview of the productive uses of domestic water sources within the Sand River Catchment in South Africa. It is targeted at organisations responsible for the delivery of water supply and sanitation (WSS) services and management of land and water resources. It aims to promote discussion and dialogue between the research partners and these organisations. Your comments would be welcomed.

This paper can be downloaded from the project website at <http://www.nri.org/whirl>. The authors may be contacted at kgopotso@award.org.za and j.a.butterworth@gre.ac.uk

1 BACKGROUND

The water sector in South Africa is currently going through a period of major change and reform. This has profound implications for both water management and water services in rural and urban areas. The recent National Water Act (RSA, 1998) has established the basis for management of water resources on a catchment basis (for equity, efficiency and sustainability), and the Water Services Act (RSA, 1997) aims to ensure everybody has access to basic water supply and sanitation services.

The contributions to rural incomes, food security and the wider economy from small-scale irrigation are widely acknowledged, but the contributions to livelihoods of water use for productive activities at the household level, and for normally ‘informal’ village-based enterprises are rarely considered. Productive water use at the household level includes activities such as backyard irrigation, beer brewing, dairying, brick-making and construction. Other village-based enterprises include activities such as community gardens and raising poultry. Such productive water uses have been shown to have important economic, nutritional and other benefits (e.g. improved shelter) for poor communities in dryland areas (see for example, IRC, 2001; van Wijk *et al.*, 2001; WaterAid, 2001; Perez de Mendiguren & Mabelane, 2001). Such studies have highlighted the role of water supplies in sustainable development and poverty alleviation, and the overall contribution to livelihoods in dry areas and in the lives of the poor. Often livelihoods in these regions are ‘water-based’. It is argued that productive activities must be better recognised in order for rural water supply (RWS) to become more demand-responsive, and there may be expected to be positive impacts on both ability and willingness to pay for water supply (Moriarty, 2001).

However, productive uses of water at the household level over and above basic needs are not as yet explicitly recognised in policy in South Africa. Since the National Water Act clearly recognises water for the agricultural sector, a mechanism for improved allocation of water to emerging farmers exists. But other productive uses of water are largely invisible – the sector is largely informal, fragmented and lacks representation - and the false assumption is often made that domestic water is only required and used to meet domestic needs such as drinking water, washing and cooking. The Water Services Act also focuses on meeting basic needs for water supply. Until policy changes, water is unlikely to be allocated for such productive uses at the household level on a wide scale.

The actual uses made by rural communities of primarily ‘domestic’ water supplies (focused on meeting basic human needs) or mixed-use water supplies (i.e. systems providing water for multiple purposes such as a spring providing water for a community garden and domestic use) are poorly understood. Design of new water supply developments is therefore often based on the assumption of providing for only basic human needs such as drinking, cooking and sanitation. However, the contributions of water use to rural livelihoods from such systems can be categorised as:

- Water for basic human needs – these uses are focused on survival providing water for drinking, cooking, sanitation and hygiene (washing body, house, clothes etc.), and are focused on health impacts and benefits
- Water for productive activities – these uses impact on food security or income. Products may be for own consumption (e.g. subsistence productive of vegetables, brick-making) or

for sale (normally informal commercial activities such as sale of vegetables, fruits or ice blocks). Activities may also be associated with providing services (e.g. hair salons).

- Water for other activities – these uses are not focused on production and mainly have religious or environmental significance, for example, the use of water to grow flowers and lawns to improve the household environment.

Policies in the WSS sector in developing countries normally always focus on the development of water for basic human needs only. This is understandable given the enormous challenges in providing water for just these basic needs. However, to do more than just to ‘keep the heads of the people above the water’, it is important to provide for uses that support the livelihoods of the rural poor. Productive water uses are generally only addressed in relation to other water supply systems e.g. focusing on the supply of surface or groundwater for irrigation. The other livelihood contributions of informal and small-scale productive water uses, which use water from systems primarily designed for ‘domestic’ use, are rarely explicitly catered for.

This paper aims to continue to add to the knowledge of productive uses of so called ‘domestic’ water in South Africa. It is based upon fieldwork that addressed key knowledge gaps such as the range of productive activities people are engaged in, who within the villages is involved in such activities and what constraints these people perceive in making improvements to their water-based livelihoods. Just how important are ‘domestic’ water supplies to their livelihood options? The rapid survey was designed to get a broad and brief initial understanding of productive water uses within the Sand River Catchment. It will be followed by more in-depth research in a smaller number of villages.

2 METHODOLOGY

The study involved collection of data from two main sources: 1) village visits including discussions with groups representing the main institutions and structures in the village, and 2) a previous AWARD report on ‘Economics of productive uses for domestic water in rural areas: a case study from Bushbuckridge, South Africa’ by Perez de Mendiguren, & Mabelane, M. (2001) and discussions with the lead author of this report.

The study area encompassed the ‘middle’ parts of the Sand River Catchment where most of the rural population are located. These areas form part of Bushbuckridge. The catchment (1910 km²) is located in the north east of South Africa draining parts of Northern and Mpumalanga Provinces. It is part of the larger Sabie and in turn, Inkomati Catchments. Important land uses - roughly from the upper to the lower parts of the catchment - include plantation forestry, dryland and irrigated agriculture, relatively dense rural settlements (a legacy of the apartheid system), game reserves and the Kruger National Park towards the Mozambique border. It is a relatively dry area, but water scarcity for the majority of the population has been exacerbated by the political and social engineering of the apartheid government. As a result, 44% of the population were estimated to have supplies below government minimum levels (25 lpcd of potable water from a standpipe within 200 m of each household) (Pollard & Walker, 2000).

The study covered 11 villages. Site selection was based upon two main criteria:

- geographical position and especially rainfall, covering the relatively ‘wet’, middle and ‘dry’ parts of the catchment,

- villages where AWARD have good working relations and has had or is planning to implement water supply development projects.

The primary factor that was taken into consideration was rainfall which is an important influence on the availability of water resources, such as boreholes, rivers or springs. The highest rainfall occurs in the western parts of the catchment, while the east of the catchment is relatively dry. The catchment was divided into three rainfall zones; 'wet', 'middle' and 'dry'. 'Wet' areas were identified as those with the average rainfall of above 750mm, the medium have rainfall of 650-750mm and dry areas, 550-650 mm.

The second consideration was to identify villages where AWARD had a working relationship or contact with the community. This was important because the research will not offer immediate tangible benefits to the communities. AWARD as an organisation is well known within the catchment for providing water supply projects. In order not to falsely raise expectations of a water supply project within needy communities, it was decided that this phase of the research would be undertaken in communities where AWARD has already implemented a water supply project or is likely to do so in the near future.

It was also necessary to consider possible biases induced by AWARD's reputation. In Zoeknag, it was apparent that participants clearly wanted to portray a particular picture of the water situation in the village, to promote a request for assistance in improving the water supply. This affected the way they responded to questions, tending to paint an exaggerated picture of limited water supply. Respondents were not willing to list all activities in which water is used in the village, for fear that this might be interpreted to mean that with so many activities, there is enough water.

The villages that were chosen for the rapid survey were Shortline, Rooibok Township, Violet Bank F, Zoeknag B, Dingleydale, Dumfries C, M P Stream C, Athol, Dixie, Shere and Utah. The first four are in wetter western part of the catchment (>750mm rainfall), and the last four are situated in the drier eastern part (550-650mm rainfall). The remaining three villages are in the middle of the catchment.

Some of these villages (Utah, Dixie, Athol) have had water supply projects implemented with the facilitation or assistance of AWARD. There are possibilities that Shere and Dumfries C will get assistance for their water supply through AWARD in the near future. AWARD has been working with the two communities to explore options, and at this stage there are proposals for fund raising for the two communities. Unlike other villages where the benefits to communities are through water supply projects there are also other projects that AWARD is engaged in at the communities. In Zoeknag there has been a land rehabilitation project, funded through the Save the Sand project.

The majority of the villages considered in the snapshot survey were included in the Perez de & Mabelane (2001) study. These were Dingleydale, Utah, Township, Shortline, M P Stream C, Dixie. The snapshot survey relied heavily on this comprehensive study.

The questions for the snapshot survey were based on the overall purpose of this phase of the research, that is, to get a general broad understanding of productive uses of domestic water or water-based activities at the household level in the Sand River Catchment. To understand the uses of water, there was a need to also understand the sources of the water and the profile of the users. For the latter this was in terms of gender and wealth differentiation. Lastly, there

was a need to get an understanding on constraints or problems encountered in water use and management of water supplies at the village level.

The study addressed the following seven main questions:

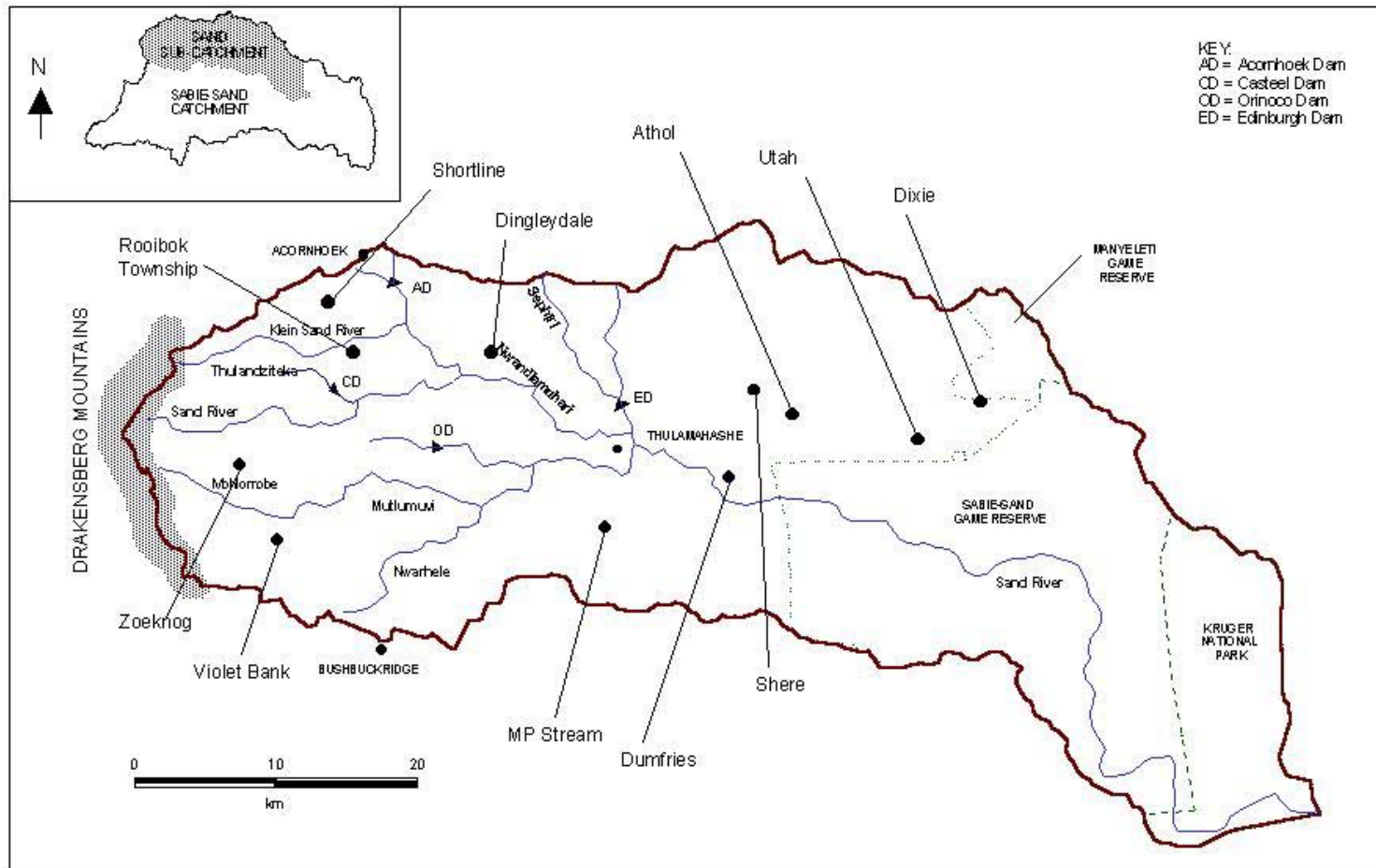
1. What productive activities is water being used for? And how much water is used for each listed activity?
2. What are the sources of water in the village?
3. How are water supplies managed?
4. How is productive water use related to wealth groups?
5. How is productive water use related to gender?
6. How much are rural communities paying to access water supplies?
7. What are the constraints in productive use of water? And If you had a better water supply that provided more water, what activities would it be used for?

Both primary and secondary sources were used. In four of the eleven villages, fieldwork activities were conducted. A one day workshop was held in each village, and participatory methods used to address each of the questions. The seven questions listed above were specifically asked and discussed with the participants. For the remaining villages, there was heavy reliance on data collected by the Perez de Mendiguren & Mabelane (2001) study with some gap-filling based on the experience of AWARD staff. Information was supplemented with data from AWARD files based on reports and other documents on water supply projects undertaken. Furthermore, the background knowledge of some of the team members of the snapshot survey was used, for instance in Township.

Table 1 Details of study villages

Village	Zone	Location	Population	No. of households	Contact with AWARD
Rooibok Township	A(wet)	Situated along the Acornhoek/Bushbuckridge road, and to the south of Champagne citrus farm	1765	314 stands	Economics of productive uses study
Shortline	A	Situated along the Acornhoek/Bushbuckridge road.	165	35 houses	Economics of productive uses study
Violet Bank F	A	Situated along the Acornhoek/Bushbuckridge main road, and on the border of the two former homelands of Lebowa and Gazankulu.	1800	360 stands	Economics of productive uses study
Zoeknog	A	Located closer to the forestry area by the mountains on one end of the sand river catchment, and 12 km from the Acornhoek/Bushbuckridge tar road	Approximately 2000 (1998)		Save the Sand land rehabilitation activities
Dingleydale	B (medium)	Situated to the north of greater Bushbuckridge, on the Eastern side of the Champagne citrus farm.	1759	286 stands	Economics of productive uses study
Dumfries C	B		2400 estimate	400 stands	Proposed water supply project
M P Stream C	B		1 200 estimate	207 stands.	Economics of productive uses study
Athol	C (dry)	In the Manyeleti area, approximately 150km north of Nelspruit, in the East, part of the former Gazankulu homeland	2, 465 including an estimated 869 former Mozambican refugees	908 stands, of which 382 are occupied by former Mozambican refugees	Previous water supply scheme; home of a staff member
Dixie	C	Located close to Utah village, on the border	460	76 stands	Previous water supply scheme; Economics of productive uses study
Shere	C		1 800	300	Proposed water supply project
Utah	C		Approximately 1250 in 1999	221 stands	Previous water supply scheme; Economics of productive uses study

Figure 1 Map of Sand River Catchment showing location of villages



3 RESULTS AND DISCUSSION

3.1 Water use in villages

What productive activities is water being used for? And how much water is used for each listed activity?

Activities at the village level include basic uses focused on health and hygiene, productive activities, and other uses. Within the ‘basic human needs’ category, there are a whole lot of uses, which go beyond drinking, cleanliness and hygiene. There are even health activities that use water, which are alternatives to conventional health care, such as innovations like drips being made for dehydrated people mostly children. There are also religious uses, which are neither basic nor productive, but that more or less border on the health and hygiene-focused basic category. Some of the religious activities in this regard use significant amounts of water, for example, steaming, go gabha and go peita, with the last two undertaken as a way of cleansing one’s bodily functions or system. There are also recreational activities, especially for children, such as swimming in the rivers and dams.

This study focuses on the significant number of productive activities that take place in the study villages. These are summarised in Table 2. The types of productive activities utilising water supplies in all the villages were generally similar. However, in Shortline, beer brewing was not engaged in for religious reasons, and in Township there is no vegetable gardening most probably due to water supply problems. In Dixie, ice block making was not mentioned as an activity although it was not clear if this was due to the lack of electricity supply or another reason.

The most common productive water use is vegetable gardens. These are generally small backyard gardens of a few square meters. Onions, tomatoes and leaf vegetables are typical crops. This featured strongly as an existing activity and as an activity that is aspired to if there were more favourable conditions such as an improved water supply. Irrigation of vegetable gardens and fruit trees at the homestead is more widespread compared to irrigation of crops in community gardens. It could be that the latter needs more organisation at the community level, whereas the former is highly dependent on individual resolution and commitment. Importantly, the entry costs to poor people of utilising domestic water for backyard irrigation are low – there are no committees to join, and little equipment is required.

Table 2 Main productive water uses in sample villages

Activity	Shortline	Rooibok Township	Violet Bank F	Zoeknog	Dingleydale	Dumfries C	M P Stream C	Athol	Dixie	Shere	Utah
Beer-brewing	X	✓	X	✓	✓	✓	✓ (nine people, two brew each week)	✓	✓	✓	✓
Irrigation – vegetable garden	✓ Major activity but prohibited by community resolution	X	✓	✓	✓	✓	✓ But not enough water in the stands	✓	✓	✓	✓ Promoted by a resident Community Rehabilitation Worker
Irrigation – community garden					✓ irrigation scheme		✓ b/h at garden			✓	
Irrigation – fruit trees	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓
Flowers and lawns		✓		✓		✓		✓		✓	✓
Livestock drinking				✓		✓	✓ small dam		✓		✓
Livestock dipping				✓		✓	✓ hand pump				
Brick making				✓		✓					
Building	✓	✓	✓ major activity as new village	✓	✓	✓	✓	✓	✓	✓	✓ the most significant increase in water use
Ice blocks	✓	✓ 40 businesses	X	✓	✓	✓	X	✓	X	✓	✓
Hair salons	None	✓ four	✓	✓		✓	✓ one	✓	✓ one	✓	✓

Many more activities, that are not listed in the table, were cited in one or two villages. These included grass mat weaving, duck ponds, smearing and plastering of walls and floors, medication and religious uses, dust control, baking, poultry, duck ponds, and car washing.

Table 3 Productive water uses using the most ‘domestic’ water

Village	Productive activities that use most ‘domestic’ water
Shortline	Vegetable gardens (14.3lpcd), fruit trees (7.2lpcd), cattle (4.3lpcd)
Roobok Township	Cattle (6.2 lpcd), goats (1.4lpcd), building (0.9)
Violet Bank F	Building (5lpcd), vegetable gardens (2.6 lpcd), fruit trees (0.6lpcd)
Zoeknog	Brick making, building, and cattle dipping (from which source?)
Dingleydale	Cattle (24.5lpcd), Fruit trees (7.9lpcd), Building (7.5 lpcd)
Dunfries C	Vegetable gardens, brick making, building ?and water for livestock drinking
M P Stream C	Cattle (27.3 lpcd), goats (2.7 lpcd) and building (1.1 lpcd)
Athol	??Irrigation, brick making, building, and ?beer brewing
Dixie	Cattle (17.3 lpcd), goats (5 lpcd) and building (2.7lpcd)
Shere	Vegetable garden, building, and beer brewing
Utah	Vegetable gardens (14.4 lpcd), cattle (9.7 lpcd) and building (3.4lpcd)

The activities that were considered to use the most water are summarised in Table 3. Where actual consumption figures are given, these are taken from Perez de Mendiguren & Mabelane (2001) and are average values for the village (litres per capita per day). The survey found similar patterns in the other villages included in this study. The activities that uses most water are building/brick making, vegetable gardens, and watering fruit trees. Livestock drinking, cattle dipping, and beer brewing were some of the other major consuming activities.

Cattle are important ‘consumers’ of ‘domestic’ water. However the source of water for cattle is often not from a ‘domestic’ system, but outside the village. For instance, where there is a reticulated water supply system such as in Zoeknog or Shere and there are perennial rivers nearby, cattle drink water from the rivers. However where there is only one primary and reliable source of water (e.g. the river in Dumfries) humans and livestock share the source. In times of stress during droughts, competition for water between livestock and people is more important (Perez de Mendiguren & Mabelane, 2001). When rivers and dams that are normally reserved for cattle and other animals dry up, they are often provided for from within the reticulated water supply system. This has resulted in damage to facilities and health hazards (Perez de Mendiguren & Mabelane, 2001). On the other hand, where there is no reticulated or proper water supply for humans, the latter often share the source of water reserved for cattle.

There are differences in terms of the level or extent to which each of the activities that use water are engaged in within each village. Obviously, the most water-consuming activities are engaged in at a larger scale in communities where there is better access to an improved and reliable water supply. The best example in this regard is vegetable gardens, whereby all the villages with bad water supply system have consumption levels much lower than the villages with better water supply systems. The exceptions are watering cattle and building, due to the fact that there are other factors involved. For example in Violet Bank F, building was the major activity at the time of research given that the settlement is new, and thus almost everybody was engaged in this

activity. Furthermore, because of its new status, Violet Bank ranked among the lowest villages in terms of water consumption for the most water-consuming activities.

As noted above, except during times of drought, livestock rearing is not dependent on the 'domestic' water supply because there are alternative sources of water. Therefore, in villages where the water supply system is not very good, people who aspire to cattle rearing can still do so. This is particularly the case in M P Stream C which had a problematic water supply system, yet it has the highest water consumption for cattle out of the seven villages considered.

3.1.1 Key findings and implications

Important findings from the Perez de Mendiguren and Mabelane (2001) study and this survey are that:

- rural people in Bushbuckridge utilise so called 'domestic' water for a wide-range of productive water uses. There are high-levels of water use for productive activities in villages with both poor and good 'domestic' water supplies, ranging from 23 lpcd to 40 lpcd above the amount used for basic needs (21-22 lpcd).
- the notion that it is possible just to provide a limited amount of water (e.g. 25lpcd) for basic human needs (drinking, cooking, washing etc.) only is a myth.
- water consumption for all productive activities, except for ice blocks, is much higher in villages with better water supply systems – and these systems thus contribute significantly to rural livelihoods.
- most 'additional' water in villages with good systems is used for backyard irrigation, watering trees and construction (brick making and building) - all activities where the relative economic returns are low for example 0.01-0.02 R/l for vegetable gardens and fruit trees
- the economic returns from other productive uses can be much higher e.g. 1.2-1.6 R/l for beer brewing and ice block making. These uses typically use limited amounts.

3.2 Sources of water

What are the sources of water in the village?

The sources of water in each village and the key characteristics of these sources are summarised in Table 4. Communities typically rely upon several different water sources. They include both surface and groundwater sources with significant variation in the quality and quantity of available water. Different sources are used for different activities, although many sources are also used for multiple purposes. However, generally there is one main or most reliable source in each village.

In 4 cases, rivers or wells in the river bed provide the main source. In two of these locations, Dumfries C and Zoeknog, abstraction is by bucket and involves long walking distances. In others there are piped water systems. There are springs in one village. In four more cases, groundwater from boreholes is the main supply. In two villages, it was not clear what is the 'main' source. Roughly it seems fair to say that groundwater (from springs and boreholes) and surface water (river or wells in river bed) are of equal important across the sample villages. This probably reflects the overall pattern in the Sand River Catchment. Surface supplies are of most importance

in the wetter western parts of the catchment where river flows are more reliable. In the eastern parts, groundwater is of relatively more importance.

The problems associated with borehole supplies include high levels of breakdowns, electricity shortages, low yields and the high cost of fuel for diesel pumps. On the one hand, hand pumps are considered to be too hard work, and on the other hand, pumped supplies are often unreliable due to pump or system failures (e.g. high rates of leakage). In Athol, high fuel costs have resulted in the community deciding to operate the pump for only a few days each week. In the eastern part of the catchment, there are problems of salinity, which affects usage of borehole water. Some people argue that the water has a bad odour.

Surface water sources suffer more water quality problems. In eastern area, rivers are less reliable. Rivers are polluted due to upstream activities e.g. washing clothes, bathing, dead animals, and lack of sanitation. In Dingleydale, people complain that the water is not purified adequately from the river except that a basic chemical is used just to kill germs only (presumably chlorination). It was not clear what treatment water supplied in Rooibook Township receives.

Roof water harvesting is not very popular at present, even in areas of water scarcity. Its application suffers from low and irregular rainfalls, particularly in the eastern portions of the catchment. It also requires individual storage facilities, and a roof and gutters. It can be a useful additional source, but is never the main source.

3.2.1 Key findings and implications

- Communities rely upon a complex system of multiple sources, which are generally used for multiple activities including productive uses.
- There are some sources that are used for other uses that are non-potable. For example there are small dams that are often used for washing of clothes, thus catering for domestic uses
- Should use participatory mapping to identify the location of sources, and map uses and users of different sources
- Ranking the relative importance of sources was often difficult and confusing to do. Difficulties included the relative importance of different sources in parts of the same village, and differences in importance on a seasonal or temporal basis. For example in Zoeknog the borehole was heavily relied upon, but for those who were located very far from taps, the only feasible and accessible source of water was a well dug in the river bed. For them the well was much better compared to the public taps.
- productive use of water relies heavily on a reliable, and well-functioning water supply system. This is a case for serious concern in the catchment, as even in places where water supply systems exist they are often unreliable, for example in Thulamahashe.
- Tap water is often perceived as being of better quality

Table 4 Sources of water for household use in study villages

	Shortline	Roobok Township	Violet Bank F	Zoeknog	Dingleydale	Dumfries C	M P Stream C	Athol	Dixie	Shere	Utah
River	?	*** yard taps, about 2/3 times a week. Water reaches only some taps	Yes	* polluted by upstream users (washing clothes, bathing, dead animals)	*** Sand River, abstraction via electric pump, reservoir and a reticulation system. Most houses have yard taps	*** collection with buckets and wheelbarrows. Reliable but polluted (washing u/s, sewerage)	Yes	* Quality affected by upstream unhygienic uses, ephemeral, ploughing along river banks	No data	* dirty, ephemeral, far	No data
Spring	?	None	?	None	No data	none	Yes, outside the village, there were plans to have a community garden at the spring	None	No data	*** 4 protected springs, one used for community garden, limited supply	No data
Well in river bed (scoop hole)	?	None	Yes	*** dirty/polluted, diseases	No data	** Polluted, bad odour, disease risk (no longer disinfected)	Yes	* Not well protected against animals, limited quantity, but improves in the mornings and after rainfalls	No data	* reliable and useful, limited quality, polluted/diseases	Dig wells in river bed in times of stress
Borehole	*** equipped with electric pump to yard taps	** About 8 private b/h (most with electric engines; mostly teachers), 2 selling water (expensive), one b/h with hand pump at school	One b/h with hand pump, hard to pump, long queues	*** b/h with electric pump to standposts, good quality, limited supply, pump breakdowns, shortage of electricity	No data	* Diesel b/h. Greasy/salty water, limited, expensive, frequent breakdowns. Broke down in 1999, never been repaired	10 existing, two equipped, One with hand pump, one in community garden with removable engine	*** 3 diesel pumps to both communal and yard taps, water on limited number of days to save diesel. Two other b/h, one with hand pump and one with animal powered/hand pump,; saline water	*** 2 diesel b/h, one shared with Utha to public standposts, salty, frequent breakdowns, long walking distances;	** one equipped with handpump, hard to pump, far, takes time, rusty/ bad smell 3 unequipped,	***? 2 b'h, one shared with Dixie
Bulk water supply system	None	None	None	None	No data	* Thulamahashe scheme. More water but very infrequently, limited treatment, dirty pipes	Hoxani Water works, infrequent supply	Thulamahashe scheme, but never gets water	Edinburgh scheme, water does not reach the village	* Unreliable, once in 3 months, but clean and plenty when it comes Edinburgh scheme	Edinburgh scheme
Sources outside village (Water vendors)	?	None	?		No data	?	No data	?	No data	* Some hire bakkie/ cart to Hluvukani	No data
Rainwater	?	No data	?	* Good for washing clothes	No data	* Cheap, easy to treat, but low rainfall. Use at creche, collected using buckets	No data	* Limited rainfall, need garters	No data	* Even for drinking in bad times, but dirty tanks at the clinic for vegetable garden	?
Other	?			** Canal from defunct irrigation scheme						* Jojo tanks for filling by tanker	?

*** primary source ** secondary source *other sources

no data – the 1998 survey did not provide data on secondary sources

3.3 Management of water supply systems

How are water supplies managed?

In most of the villages there is a water committee established to focus on addressing the communities water needs and problems. Their primary function and responsibility is around the maintenance of the water system so that it functions well. In villages where there are contributions towards water supply costs, such as Athol where a monthly payment of R5 is collected towards buying diesel to pump water from the borehole, the water committee is in charge of the collection of money from households. Major repairs to the water supply system infrastructure are the responsibility of the Department of Water Affairs and Forestry.

Management is restricted to the piped water supply systems, both bulk water supply and borehole supply systems. There were no cases found during the study, or from the secondary data, showing that there are management systems for water from such sources as rainfall, rivers (not pumped but individually collected), wells, and springs, unless these are connected to a reticulation system. However there are cases, such as Dumfries C and Shere, where even though there is no reticulated water supply system there is a water committee. The water committees in these two villages are tasked primarily with ensuring a better water supply system for the community by liaising with organisations and government departments involved in water supply provision.

Out of the eleven villages, eight were found to have established water committees, with data on two not available. It is possible that there are water committees in these two, particularly in Dixie, as AWARD has had a water project there. It is the working practice of AWARD to facilitate the establishment of a water committee and to implement projects through these committees. There was only one village (Shortline) where there was no water committee, and generally this community lack any popular organised structure. A committee of three elder men was undertaking the role of the water committee.

3.4 Wealth and productive water use

How is productive water use related to wealth groups?

In almost all villages, three similar wealth categories were defined by the participants. Poor households were defined primarily as those who are unable to meet basic needs, such as food, clothing, shelter, energy, and education and others. The poor group consists of people who are unemployed, and who also do not own property and other assets such as livestock. The richest, on the other hand, were identified as those who were able to afford basic needs, as well as items considered to be 'luxuries'. The richest group are families where someone is employed and earning a relatively high salary and also business people. The middle category, can afford to meet basic needs normally, but at times barely so. The group consists of people who are employed but earn less, mainly domestic workers, and those who receive old age and disability grants. However, there is clearly a particularly wide variation in the levels of poverty within this one category.

Table 5 Characteristics of wealth categories as identified by participants

Village	Poor	Middle	Rich
Zoeknog	Unemployed, often work or beg for food and clothes, mainly women and widows, have a number of children, children often do not go to school.	Not miserable and suffering, employed but earn little, can afford to meet basic needs, pensioners,	Have all they need, employed, have large fields, hire others to work for them, can afford tertiary education for their children.
Dumfries C	Unemployed, struggle to meet basic needs, usually beg, poor housing.	Employed but earning little, pensioners.	Employed and earn enough to meet all basic needs. Government employees. Businesspeople. Own large livestock herds. Property.
Athol	Work for others for food or cash, unemployed, cannot afford to take children to school, more likely to steal to survive, do not own livestock.	*	Employed, can afford most things, own livestock, own businesses, hawkers, have fields/farms
Shere	Unemployed, physically disabled, no assets such as livestock, begging for food and clothes, single women and people with no intact family unit.	Pensioners, a few livestock, better houses than the poor.	Employed, have businesses, large herds of livestock, bigger houses, big farming fields, and employ others.

Note: * when this task was done in Athol, only 2 categories were identified

In terms of productive water uses, the three listed wealth categories (poor, middle and rich) are all involved with few exceptions. Rather, there are differences in terms of the scale or extent of involvement, with capability and affordability being the key factors. The amounts of water used for each activity by each category also seem to differ, given that in most cases one group engages in a particular activity more than the others. However in this study, the exact amounts used by people within different wealth groups were not looked into in detail and this will be done in the next phase of research.

In terms of water use among the categories, ability to access inputs and equipment, infrastructure and capital investment, were key factors. This also emerged not only in the productive uses of water but also basic uses. The question was asked for both productive and basic uses of water. For basic uses such as washing, it was argued that the poor washed less than the rich because they often lacked soap to wash with. However in one of the villages where there has been an improved water supply, it was noted that there was an increase in washing of clothes particularly among the poor, because they have fewer clothes, and therefore have to wash them regularly to ensure that they have clean clothes.

Households in the rich category are more likely to be engaged in livestock related activities such as dipping and drinking, because they own large herds of livestock. Other activities that people in this category are mostly engaged in to a larger extent than other categories are those that require a higher level of investment, for example, ice block making which requires refrigerators, electricity, cooler bags and ice bags used to contain the ice blocks.

For the poor, beer brewing is an important activity which they engage in at a larger scale, in fact this activity is the exclusive domain of the poor. It generates a steady income, with minimal investments and has a lot of customers, yet it is looked down upon by those who have alternative

opportunities of bettering their lives. In one of the villages, Shortline, this activity is not engaged upon in the whole village for religious reasons.

Construction/building together with brick making are two activities that all three wealth categories are engaged in, yet at a different levels. Poor people are engaged in making mud bricks, and building using mud or clay and poles. The rich, on the other hand, engage in making cement bricks and cement plastering. Furthermore the poor were said to engage in this activity more or less continuously given the low quality of their housing and constant need for repair and rebuilding.

3.4.1 Key findings and implications

- Richer families are involved in activities such as shopkeeping or teaching and productive uses of water are not central components of their livelihoods. But they are still important. Poorer families are engaged in almost all activities, but at a smaller scale. Productive water uses form a crucial component of livelihood strategies. But they are not the most important, being probably less central than rainfed farming, wage labour and pensions/ remittances.
- This question generated a lot of discussion and reflection by the participants.
- When three wealth categories were recognised, the middle group includes a wide spread of people who don't fit into the poor or richest groups.
- Issues around wealth to focus on in detail at a later stage include the need to explore wealth and poverty as a dynamic condition. Need to explore shocks and stresses, such as misfortunes and disasters, and how these shape engagement in water-based livelihoods and how particular activities determine or influence how people cope with misfortune or how they are affected. Also need to explore positive things, such as growing up or life development, e.g. marriage, which though a good thing could induce negative changes.
- The key question is to what extent productive uses of water form an important contribution to the livelihoods of rich and poor groups. Is it a coping mechanism, or does it provide opportunities for accumulation? Need to consider individual examples of where productive water uses have really made a difference.

3.5 Gender and productive water use

How is productive water use related to gender?

Gender plays a key role in the participation of men and women in the collection and use of water for basic needs and productive activities. Women were involved in fetching water in most of the activities, with the exception of water for livestock dipping at times. For all the basic uses, women fetched and used the water, that is, engaged in those activities. The occasional involvement of men in such activities would be limited to those men who did not have wives or whose wives were not available at the time, and they did not have children who could assist in the absence of the wife. The findings on gender and water use supports what has long been documented and known in gender literature, particularly that around the household women are key in most of the activities, especially those that are for the survival of the household.

There are activities that are exclusive domains of one gender group, in terms of involvement in that group. The tendency is that for those productive activities that take place within the

confines of the home, it is women who engage in these activities. For example, women engage in activities such as beer brewing, ice block making, and backyard vegetable gardening. Women were also exclusively involved in hair salons. For men, it is activities around livestock, in this case livestock watering and dipping. However there are cases where even though a particular activity is usually the responsibility of men, it is women who fetch the water to be used by men in that activity. In Shere, women assisted in fetching water for dipping, even though they did not engage in the actual dipping of livestock, unless in cases when their husbands are not around. In activities such as building and brick making, involvement by each gender group depended on the type of building and brick making. In clay bricks and mud building and plastering it is women who are involved, whereas men are involved in the making of cement blocks and building and plastering using cement.

3.5.1 Key findings and implications

- This question was often confusing as some activities have more than one task.. There are important differences in gender roles between collection and use of water
- Another shortcoming of the question was around the fact that it focused on adults. Need to find out more about role of youth and children. It appears that age differences play a major role in the listed activities.

3.6 Payment and productive water use

How much are rural communities paying to access water supplies?

There are many cases where actual or direct payment is made for water. However, the payment that is most common is hiring others to fetch water or buying from water vendors. The former involves hiring trucks or vans, and at times hiring head carriers to fetch water. There are incidences where children are also paid a small fee to fetch water in small containers. There is one case of a village (Violet Bank F) where water scarcities were so severe that people, mostly children, were often hired to queue for others at water points.

A common regular payment is also towards operations of a water supply system, and in most of the cases where these regular payments are made, the money is used to buy diesel to be used for operating the water pump at the borehole. In Athol, an amount of R5 is paid monthly and used to buy diesel. However the amount of diesel bought with this money, is not enough to enable the pump to run everyday. Therefore the community has decided to only pump water a few days per week. To be able to pump everyday, they might have to increase the set fee of R5 per household.

Another form of payment that is related to access to water are contributions by households towards expenses incurred in attempts to secure access to water. The most common are travelling expenses incurred by the village water committee, in liaising with organisations and government departments involved in the provision of water supply. This is said to be the case in Dumfries C, where occasionally the community would contribute some money, at times R1 per household, towards travel expenses incurred by the water committee. However it was noted that it is not for all expenses incurred that the community contributes money, and at times the water committee use their own cars for such travel, and do not get paid or refunded.

Private investment in boreholes is another type of cost in accessing water. Over the past 5 years in Township there has been a significant increase in the number of private boreholes, with about nine new boreholes completed. These mostly belong to teachers.

Table 6 Payments for water

Village	Type	Prices	Activities/Uses
Rooibok Township	<ul style="list-style-type: none"> Buying from water vendors/private b/h Hiring bakkies to fetch water 	<ul style="list-style-type: none"> 50c per 25 litre or 30c per 20 litre container R30 to R100 per trip (average of 500 litres) 	Mainly for basic uses, and for building, and beer brewing
Violet Bank F	<ul style="list-style-type: none"> Buying from water vendors Hiring bakkies to fetch water 	<ul style="list-style-type: none"> R0.50c to R2 (25 litres) R30 to R50 per trip (average of 500 litres) 	Mainly for basic uses, then for building and food gardens
Zoeknog	<ul style="list-style-type: none"> Minor infrastructural repairs Hiring of head carriers 	<ul style="list-style-type: none"> R2 a household per repair R12 per 200 litres 	Building and brick making
Dumfries C	<ul style="list-style-type: none"> Buying of diesel when the borehole is working Hiring of bakkies (pick up trucks) to fetch water, even as far as Thulamahashe Hiring children to go and fetch water Travel costs for the water committee 	<ul style="list-style-type: none"> R30 to fill 3 large containers R2 to fill a 25 litre container R1 per household 	
M P Stream C	<ul style="list-style-type: none"> Buying from water vendors Hiring bakkies to fetch water Hiring people to be paid in cash or food 	<ul style="list-style-type: none"> 10c to 25c per 25 litres R40-50 per trip 	Basic uses, building, beer brewing
Athol	<ul style="list-style-type: none"> Operations (buying of diesel) costs Hiring of bakkies or wheelbarrow pushers to fetch water Individuals buying diesel for use in the community/public pump, for the benefit of all 	<ul style="list-style-type: none"> R5 per month per household R40 to R50 per bakkie load, and R50 per 400 litres for wheelbarrow pushing individuals 	
Dixie	<ul style="list-style-type: none"> O & M costs buying from water vendors - not widespread 	<ul style="list-style-type: none"> R7 per household per month 10c per 25 litres 	Building
Shere	<ul style="list-style-type: none"> hiring of bakkies and donkey carts to fetch water 	<ul style="list-style-type: none"> R30 a bakkie and R25 a donkey cart per trip 	Basic needs, community garden, building and brick making
Utah	<ul style="list-style-type: none"> O & M costs 	<ul style="list-style-type: none"> R7 per household per month 	

Apart from monthly contributions in some of the villages, it appears that more water payments take place in areas where there are water shortages. It also appears that prices paid for water, particularly from water vendors are higher in areas where water shortages and problems are severe. For instance in Township and Violet Bank, prices for water bought from water vendors are high, as shown in Table 6.

3.6.1 Key findings and implications

- Need to look into the other costs of getting water apart from monetary costs, which includes time, effort and drudgery etc.
- Also need to explore the costs of private connections.
- In the next phase of research need to consider the relationship between free basic water and O & M costs. Is this different in other areas such as those relying on bulk water supply and those from ground water and boreholes.
- Also need to consider use of ‘free basic water’ for productive uses. Do people trade ‘free basic water’?

3.7 Constraints and possible future trends

What are the constraints in productive use of water? And with a better water supply that provided more water, what activities would it be used for?

Some of the possible constraints associated with productive water uses include training, markets, knowledge of markets and marketing skills, quality control and micro-credit facilities.

In all of the cases where data is available, vegetable gardening features as the preferred activity that people cited they would engage in if there was access to improved or better water supply (Table 7). In the two cases from the Perez de Mendiguren & Mabelane (2001) study where the water supply had actually improved, the recorded increases in water use were for vegetable gardens, along with use in building, for irrigation of fruit trees and gardens in Utah. This preference can be attributed to the need for food security, in the context of high poverty levels in the Bushbuckridge area. Perez de Mendiguren & Mabelane (2001) noted that vegetable gardens serve as an indicator of the status of the domestic water supply, as vegetable and fruit production were the first activities that people would undertake if they had access to improved domestic supplies.

In two of the villages, the expressed needs in a context of a better water supply, reflect poverty and the need for alternative income generating options given the lack of employment opportunities in the area. In Athol and Shere, participants expressed the need for hair salons, car washes, laundry and fish ponds, all of these activities aimed at income generation.

Table 7 What people said they would use more water for, and what they actually did in some cases

Village	Response
Shortline	Irrigation of backyard vegetable gardens has increased with an improved water supply system
Township	No data
Violet Bank F	No data
Zoeknog	Irrigation of vegetable gardens (sweet potatoes and yams/marope) and fruit trees, and building
Dumfries C	Brick making, vegetable garden and water for livestock
M P Stream C	No data
Athol	Irrigation of vegetables and fruit, water for livestock, car wash, fish ponds
Dixie	No data
Shere	Brick making, expand on the existing community garden, irrigated small scale vegetable and fruit farming, hair salons, car wash and laundry
Utah	Recorded increase in building and irrigation of vegetable gardens, fruit trees and flowers and lawns, after improved water supply

Of the listed factors that are considered to be constraints in terms of using available water for productive purposes, lack of cash (for capital) was the primary one. Without money it was argued that it would be difficult to use water for productive activities. Other possible factors such as equipment, infrastructure, transport were often perceived as minor constraints, given that with money most of these could be overcome as they could afford to invest in equipment, and inputs such as fertilisers, medicines, fences, drinking troughs, dipping tanks, and refrigerators. In Zoeknog and Athol, it was argued that even though it is relatively easy to access small personal cash loans from moneylenders, which could be used towards start up capital, it is very difficult for poor people to repay these loans at high interest rates. This is due to the fact that any profits are often used to meet other basic needs, crucial to their survival.

The fact that there are high unemployment levels and a general lack of cash or income, leads to a situation where there are problems with markets. There are few potential customers. Given that some of these proposed activities are intended to be at the scale of production for sale, one of the constraints identified was markets. In this case this concept referred to both consumers and to places where to market the products. For goods such as vegetables and fruit, even though there is the need for these, people were often bad payers as they often buy on credit.

In Zoeknog and in Shere it was noted that labour is not a constraint due to high unemployment rates and the fact that most people, particularly the poor, are always willing to work and earn money for their living. In Shere it was even noted that labour could be said to be a problem in the sense that there are so many people who are ready and desperate to provide labour, that one would be at a dilemma on who to employ or leave out!

3.7.1 Key findings and implications

In areas where there is no reliable and improved water supply in terms of quantity, water is viewed as the primary constraint to productive uses of water, ahead of other constraints. Productive activities rely heavily on good and reliable water supply systems

4 CONCLUSIONS AND RECOMMENDATIONS

The key findings of this rapid survey are:

- Water from the domestic supply services is not only used for basic needs such as drinking, health and hygiene, but for a wide range of productive uses. These uses form essential components of the livelihood strategies of poor people in the Sand River Catchment.
- There are complex water supply systems in all villages. People depend upon different sources and there are often multiple uses associated with each source.
- Wealth was not a determinant in actual engagement in most productive uses. Generally all wealth groups are involved in activities, but it is a factor in the scale of involvement given need for capital.
- Payment for water does take place in all villages. It occurs in various forms, including buying water from water vendors, hiring bakkies and individuals to fetch water, and monthly contributions towards operation and maintenance of water supply system infrastructure.
- Women mostly are involved in fetching of water for almost all productive activities. Women are engaged in productive activities that are related to traditional women's work, such as beer brewing and making ice blocks.
- Management of water supplies at the village level is mainly focused on piped water supply systems, and not on traditional sources of water such as wells, or springs. Water committees exist in all but one of the eleven study villages.
- There are often other constraints, other than an adequate and reliable water supply, making it rather difficult for people to use water for productive activities, with money (assuming that there is a good water supply) as the major constraint

Issues that require further study include:

- there is a need to take into consideration the potential environmental impacts of small-scale productive uses of water.
- it is necessary to explore other possible negative impacts of promoting productive uses of water, in addition to looking at the positive contribution to livelihoods. These might include negative impacts on availability (quantity and quality) of water for basic needs for some people.
- looking at different wealth groups in more detail, specifically the dynamics of wealth and poverty, which is important given the high levels of retrenchment and unemployment. In terms of responding to shocks and stresses, how important are productive water uses?
- how does the composition of the household along gender lines affect the household's engagement as a unit in productive uses of water? At the household level, what other developments or factors influence the ability to engage in productive uses of water.
- most importantly, there is a need to fully explore the role of water in rural livelihoods, the exact contributions in terms of livelihoods, that is, beyond meeting basic needs and beyond economic or income gains.
- how important is rainwater harvesting as a potential supplementary water source for productive water uses.

These issues will be addressed through more detailed case-studies, including household level analysis. It is proposed that the next phase of the research will look comprehensively at water use

within four study villages over a period of one year. The methodology will facilitate comparison with a similar study in India. For the need phase it is proposed to select at least one village from each of the three geographical/ rainfall zones. Possible case-study villages include:

- Zoeknog B, the most western and probably the ‘wettest’ of all the villages. There have been rice and coffee plantation projects here, however the current poor water supply system does not reach everyone and some people rely on wells dug in the river bed. The water supply system was put in as a temporary measure with plastic tanks for a reservoir. This could also be a good case study in terms of looking at villages with poor water supply but good natural water resources, and therefore to look at productive uses of water from ‘natural’ water resources.
- Dingleydale in the ‘middle’ zone. This is a farming community with irrigation infrastructure. Most houses have yard taps, without compromising other households’ access to water as often happens in other villages. It would be interesting to see whether the availability yard taps means more household-based productive uses of water.
- Utah in the ‘drier’ zone. Unlike Zoeknog B and Dingleydale, AWARD has implemented a water scheme here. This case-study would indicate how schemes that have existed for a relatively longer period of time impact on productive water uses, and if the fact that systems are well-established is a key factor. Here there have been recorded increases in productive use of water by activities such as irrigation of vegetable gardens. The village is bigger than Dixie, with whom they share a borehole, and could also look at whether sharing a borehole or any source of water with another village is an influential factor.
- Options for a fourth case study village include Shere or Dumfries – villages where AWARD expect to be implementing water supply projects in the near future.

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