The water crisis: an assessment of perceptions of present and future water availability in rural South Africa

Category: Faculty Field Project

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Site: HaMakuya, Mutale Local Municipality, Vhembe District Municipality, Limpopo Province, South Africa

Key Words: community development, future perceptions, South Africa, water availability

Abstract

South Africa is a water stressed nation, with rural regions especially disadvantaged in terms of water resource availability and management. Previous studies have noted the importance of an understanding of local stakeholders' water perceptions to inform government decisions and confer water management to local communities rather than a centralized government. As such, this study aimed to gain insight about water availability in HaMakuya, a rural village in the Limpopo Province, South Africa by conducting a 42 question survey with a total of 66 residents in six sub-villages throughout 2013 and 2014. Analysis included an examination of water stress, perceptions of current and future water availability, and recommendations for increasing water availability. Overall perceptions were analyzed and further broken down into demographic groups based on gender, age, and wealth. These three demographic factors influenced perceptions of water availability, as males were more likely to report that they currently needed "a lot more" water than females, the youngest age class (18-35) was least optimistic about future water availability, and wealthy individuals were less likely to say that they currently need "a lot more" water than less wealthy individuals. Per family member, mean water use per week was 134.5 $\pm$ 20.7 liters, falling below the World Health Organization's minimum recommendations of 175 liters/week. Finally, 84.85% of respondents recommended South African Department of Water Affairs intervention to improve water availability, through construction of additional taps, dams, and boreholes. These findings underscore the water stressed nature of HaMakuya and suggest a need for government management to incorporate the varying perceptions associated with each demographic factor.

Introduction

Water is a precious resource essential to community development and prosperity. For this reason, the United Nations Millennium Development Goals aim to halve "the proportion of people without sustainable access to safe drinking water" by 2015 (Onjala *et al*. 2013). It is especially difficult for rural communities to reach this goal since water collection is difficult, requiring individuals to walk long distances and carry heavy loads in lieu of going to school or pursuing employment. As such, many rural communities worldwide still do not obtain the World Health Organization's recommended minimum of 25 liters of water per person per day. Furthermore, the lack of safe water, sanitation, and hygiene are attributed to 88% of deaths from diarrheal diseases worldwide (Onjala *et al.* 2013). Thus, both water availability and water quality are key determinants of community health and stable social systems.

The Republic of South Africa provides an ideal social-ecological climate for a case study of the interplay between water quality and availability. Despite being a water stressed region, South Africa is championed for providing some of the highest quality drinking water worldwide in urban areas (Bhagwan and Slabbert 2011). However, due to the nation's political history, there is an uneven distribution of water services and infrastructure throughout the country with poorer areas often lacking in both abundance and quality of water resources (Dungumaro 2007). In order to address this issue, policy initiatives such as the National Water Act (1998) have utilized decentralized catchment approaches to transfer management from the Department of Water Affairs to localized governments (Hope 2006). Regardless, in 2000, South Africa's Department of Water Affairs reported 17.5 million individuals still lacked access to a basic water supply (Dungumaro 2007). Consequently, reforming water management in South Africa requires a greater understanding of water use in rural communities.

The rural region of HaMakuya, located in Limpopo Province, South Africa represents the difficulties presented by water resource management in rural areas. An original Venda homeland during the apartheid era, HaMakuya is a semi-arid region where water is a major regulating factor in the everyday lives of residents. The Vhembe District Integrated Development Planning program has installed many public pipes to improve water distribution (Vhembe District Municipality 2012), but little long-term maintenance has been provided. Water storage issues, tap damage, and operation cost payment provide barriers to the continued functioning of this water-provisioning infrastructure (Rietveld *et al.* 2007). Specifically, 161 of 1358 boreholes in the Vhembe District Municipality were non-functional due to drought, vandalism, and collapse in 2012 (Vhembe District Municipality 2012). This lack of upkeep stems from a communication gap between local community members and government officials. In turn, it translates into poor water accessibility for HaMakuya residents, potentially preventing them from obtaining the WHO's recommended 25 liters of water per person per day. This has adverse consequences on human wellbeing that may be resolved by increased Department of Water Affairs awareness of HaMakuya residents' perceptions.

Previous studies have identified an analogous need for analyzing perceptions of water use among local stakeholders to gain a sense of community expectations of water resource management (Bhagwan and Slabbert 2011; Wright *et al.* 2012). In particular, past studies have examined gender and age as important demographic factors in perceptions of water quality, finding that women are less likely to think tap water is safe to drink and young people are more optimistic about water quality (Bhagwan and Slabbert 2011). Furthermore, higher socio-economic status has been found to influence perceptions of water quality (Wright *et al.* 2012). These variations in perceptions associated with particular demographic factors can provide valuable information to create a management plan with user-defined priorities. Little has been done, however, to study perceptions of water availability rather than quality based on demographic factors like gender, age, and wealth. This is especially troubling considering water availability improvements are shown to be more effective in increasing social welfare than water quality enhancements (Hope 2006). In fact, Hope (2006) discovered that rural South African communities preferred more water over higher quality water, further accentuating the need to integrate outside scientific understandings with user-defined priorities.

Therefore, this study aims to address perceptions of water availability in six sub-villages in the HaMakuya region to supplement the current body of research on water quality perceptions. The primary objectives include the assessment of: a) the degree of water stress, b) current perceptions of water availability based on age, gender, and wealth c) future perceptions of water

availability based on age, gender, and wealth, and d) recommendations for improving water availability in HaMakuya. We predict that the age, gender, and wealth effects on water availability perceptions will reflect the results of previous studies on water quality; younger individuals and males will be more optimistic in their responses. Additionally, perceptions of water availability will be impacted by socio-economic status as wealthier people will be more likely to have enough water to meet their needs. Taken together, these insights will provide valuable information to guide the Department of Water Affairs management of the HaMakuya region in a way that fosters collaboration with community stakeholders while providing clean, accessible water for those in need.

Methods

Study Site

To assess perceptions of water availability in rural South Africa, research was conducted within the village of HaMakuya in the Vhembe District of the Mutale Local Municipality, Limpopo Province, South Africa (Figure 1). HaMakuya consists of 19 sub-villages. Of those, data were collected in eight— Domboni, Dotha, Gondeni, Maluzewela, Mohotoni, Mukoma, Muthikilini, and Tshombuka. The villages in which data were collected were chosen by the Tshulu Trust, a community-based organization that arranges homestay experiences in HaMakuya for visiting research students.

The Vhembe District has an area of 25,596 km^2 with an estimated 24,239 households located in the region. It is characterized by widespread poverty, and a vast majority of this dense population is Black African. Although there has been a slow increase in the proportion of the population receiving education, as of 2011, 21.7% reached grade 12/Matric and only 9.9% had any form of higher education (StatsSA 2011). The unemployment rate is an incredibly high 48.8% (StatsSA 2011). As a result, the community demographics are influenced by the need for males to seek migrant employment. Females make up a majority of the population (StatsSA 2011) as they care for the homestead, while males leave for extended periods of time for work. Approximately 50% of households are female-headed. The population is slowly increasing; however, the average household size has declined from 4.5 to 3.9 people since 2001 (StatsSA 2011). Within the population, 55.6% of people are 15-64 years old, while 38.2% are 0-14 years old and 6.2% are 65 years and older (StatsSA 2011).

Due to poverty and limited government aid, the accessibility of water and electricity is sparse in the rural Vhembe District. Although 87.2% of people have access to electricity for lighting, less than 36% use it for heating and cooking (StatsSA 2011). Water availability is also scarce as only 3.8% of the population has a flush toilet connected to sewage, 5.2% have weekly refuse removal, and 5.8% have piped water inside their dwelling (StatsSA 2011).

Experimental Design and Protocol

This study utilized a survey to gather information about water use, reliability, and availability in HaMakuya. The questionnaire consisted of 42 questions divided into six categories: 1) Respondent/Household Information; 2) Water Consumption; 3) Water Quality; 4) Water Storage; 5) Water Availability and 6) Water Reliability (Appendix 1).

Surveys were conducted from October 6-8, 2014 in six of the selected sub-villages. This data was compiled with previous survey data from six sub-villages, four of which were the same, from October 2-6, 2013. Within each of the six sub-villages surveyed this year, 4-6 interviews

were conducted. Interviewers aimed to survey a range of genders and age groups, questioning at least one young female, one young male, one older female, and one older male per village (Table 1). Young was considered to be anyone in the 18-35 years age range, while older was any person in the middle (35-55 years) or old (55+ years) age range.

To conduct the interview, a translator employed by the Tshulu Trust was necessary to facilitate conservation between the English-speaking interviewers and Tshivenda-speaking interviewees. Consent was obtained from each participant in the study before conducting the interview. All interviews were recorded on a voice recorder and GPS coordinates were recorded.

Table 1. Summary of demographics of respondents who participated in a survey of water availability, quality, and reliability perceptions in HaMakuya, Limpopo Province, South Africa in 2013 and 2014 (n=66).

		Gender		**Age**		
Village	**Total**	Males	Females	18-35	36-55	55+
Domboni	11	4	7	3	2	6
Dotha	6	3	3	3	2	1
Gondeni	10	4	6	4	0	6
Maluzawela	6	2	4	2	3	1
Mohotoni	9	4	5	4	3	2
Mukoma	5	3	2	3	2	0
Muthikilini	8	3	5	3	4	1
Tshombuka	11	5	6	8	1	2
Total	66	28	38	30	17	19

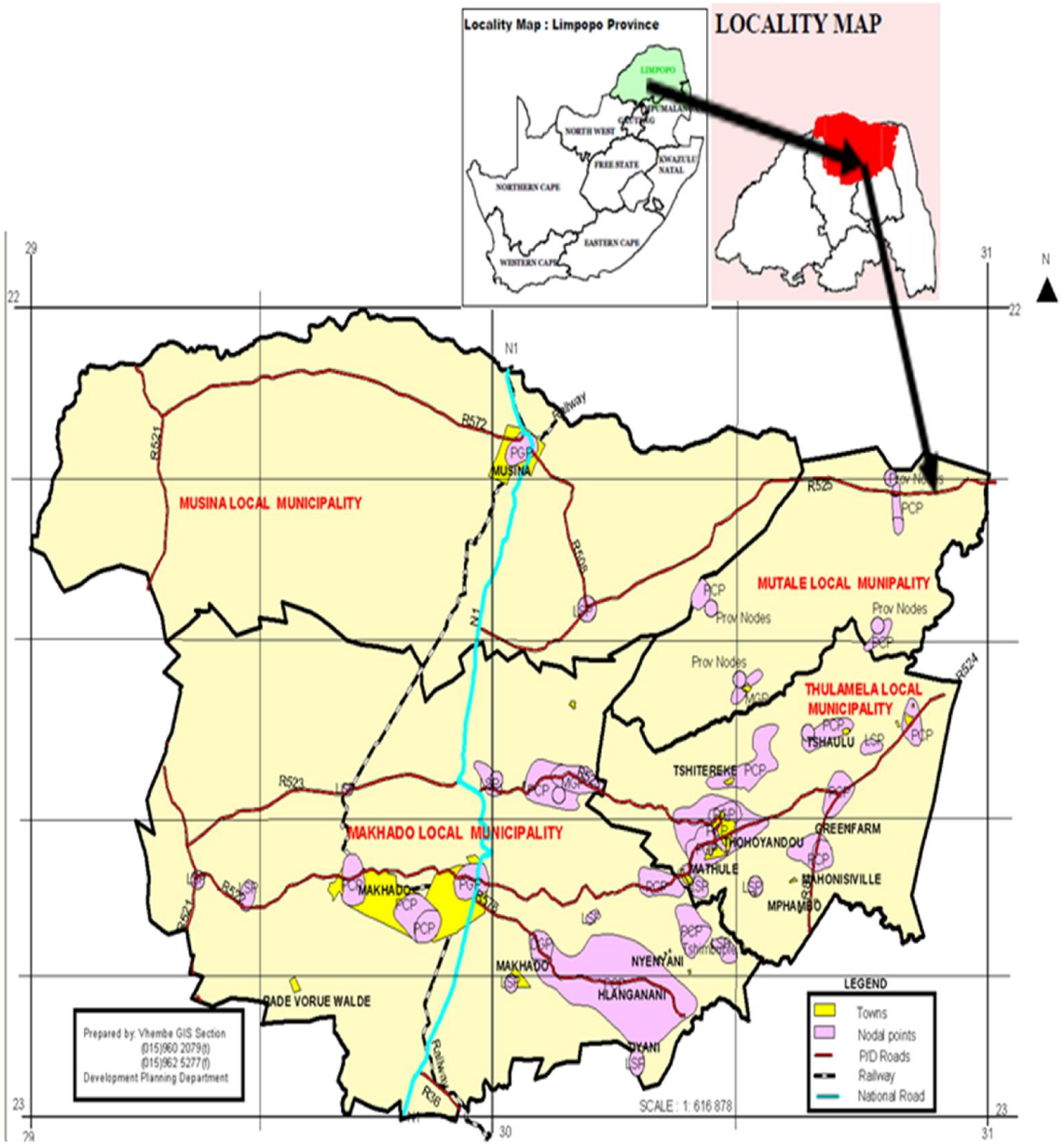

Figure 1. Map depicting the location of the Mutale Local Municipality, Limpopo Province, South Africa (Vhembe District Municipality 2012). Within the Mutale Local Municipality, surveys were conducted in six sub-villages of the village HaMakuya in the Vhembe District (n=29).

Data analyses

To analyze water stress, mean ± standard error values were calculated for water collected per household per week, water collected per person per week, and time spent collecting water per week (liters/week). The mean ± standard error was also calculated for water collected per person per week (liters/week) by sub-village to compare the water stress between different sub-villages in HaMakuya.

Percentages were calculated to analyze responses to "Do you have enough water to meet your needs?" and "Do you need more water?" to determine residents' perceptions about the current state of water in HaMakuya. Chi square tests were then conducted to determine if there was any different in response to these questions based on gender, age, or wealth. Percentages were also calculated for responses broken down by gender, age, and wealth to analyze trends related to demographic variables. Wealth was divided into two classes based on a count of wealth items, such as livestock, vehicles, and electricity, possessed: 0-7 total wealth count and 8-16 total wealth count.

To examine perceptions of future water availability, percentages were calculated for total responses of "more," "less," and "no change" to the question, "Do you think there will be more or less water in 15 years?" All "don't know" responses were eliminated from the data. The data was then again analyzed by demographic variables of gender, age, and wealth. Chi square tests were conducted on Microsoft Excel (2010) to determine if there was any difference in response based on gender or age. A multi-way ANOVA test for difference in means was conducted on RStudio (2013) to determine if wealth was associated with perceptions of future water availability. Descriptive statistics were also analyzed to identify trends in the data.

Reponses to "How do you think water availability could be improved in HaMakuya?" were divided into categories of "government intervention" and "other" to calculate the proportion of respondents that thought government aid was necessary to improve water availability. Government intervention was defined as any form of development that involved construction of a man-made water source, such as boreholes, dams, wells, and taps. Other responses included non-anthropogenic sources, such as dependence on rainfall for an increase in water supply or belief that nothing could be done to improve water availability.

Results

Water stress assessment

Mean water collected per household per week was 647.3 ± 86.6 liters. Per family member, mean water use per week was 134.5 ± 20.7 liters. Additionally, mean time spent collecting water per week was 556.0 ± 98.1 minutes. The sub-villages with the least average amount of water collected per household per week were Dotha, Muthikilini, and Maluzewela and the sub-village with the most was Domboni (Table 1). When asked about the challenges associated with water collection, Dotha residents cited village tap breakage and crowded taps that limited the amount of water available to each person. Muthikilini residents most commonly addressed the long distance to a water source. Finally, Maluzewela residents did not identify any water availability related challenges, instead pointing to the sour taste of the water—a water quality issue.

Table 1. Mean water collected per person (liters/week) and average time spent collecting water (minutes/week) per household in each sub-village calculated from responses to questions about water consumption during surveys in HaMakuya (n = 66)

Village	Mean Water Collected (liters/week)	Average Time Spent Collecting Water (minutes/ household/week)
Domboni	166.7 ± 37.5	339.0 ± 149.1
Dotha	66.25 ± 26.0	146.3 ± 40.7
Gondeni	100.4 ± 26.0	753.1 ± 65.8
Maluzewela	73.0 ± 15.64	299.0 ± 64.3
Mohotoni	134.6 ± 40.0	981.3 ± 119.6
Mukoma	138.0 ± 81.0	963.3 ± 520.6
Muthikilini	70.4 ± 16.3	862.9 ± 504.7
Tshombuka	114.8 ± 50.0	770.2 ± 528.8

Perceptions of current water availability based on gender, age, and wealth

Most respondents answered 'yes' to the question "Do you have enough water to meet your needs?" (Figure 2a). However, a majority of respondents also answered 'yes—we need a lot more' to the question "Do you need more water?" while very few answered, "Yes—we need some more" and "No" (Figure 2b). When asked, "If you had more water would you use this water for?" most common responses included proper bathing, laundry, creating home vegetable gardens, and constructing homemade bricks to build houses.

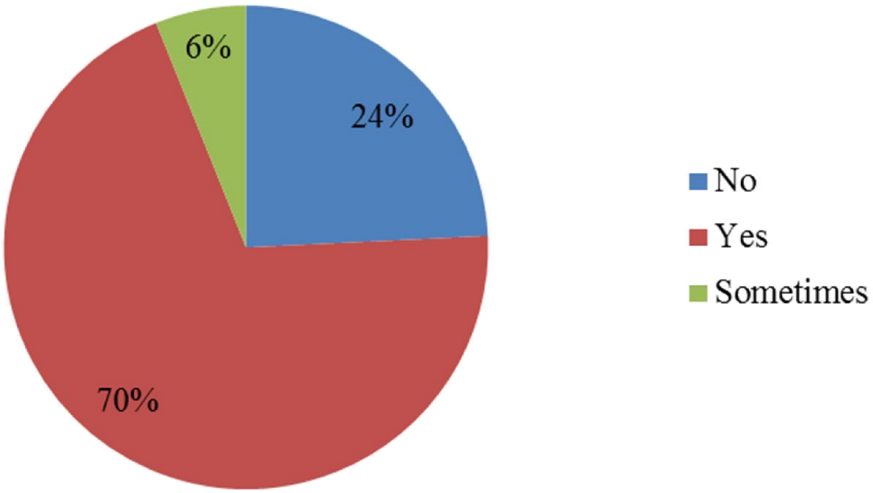

Figure 2a. Percentages of respondents answering yes, no, or sometimes to the question "Do you have enough water to meet your needs?" during surveys in eight sub-villages of HaMakuya in 2013 and 2014 (n = 66)

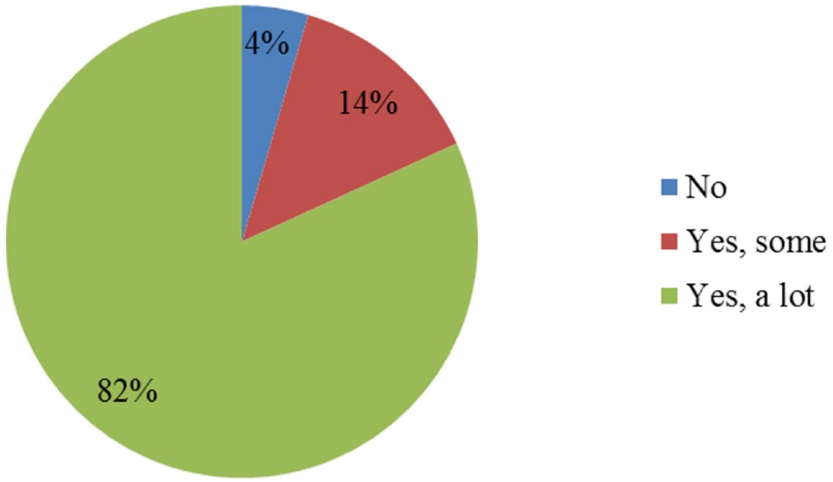

Figure 2b. Percentages of respondents answering yes—we need a lot more, no, and yes—we need some more to the question "Do you need more water?" during surveys in eight sub-villages of HaMakuya in 2013 and 2014 (n = 66)

When analyzing these responses, there was no difference in the number of respondents answering yes, no, and sometimes to the question "Do you have enough water to meet your needs?" based on gender ($X^2_{(2)}$= 0.13, p > 0.05). However, there was a gender-based difference in response to "Do you need more water?" ($X^2_{(2)}$= 19.69, p < 0.01). In particular, males were more likely to respond that they need a lot more water than females (Table 2).

In examining responses by age class, there was no difference in response to the question "Do you have enough water to meet your needs?" ($X^2_{(4)}$= 0.09, p > 0.05). However, there was a difference in response to "Do you need more water?" based on age class ($X^2_{(4)}$ = 19.09, p < 0.01). The 18-35 and 55+ age classes had a greater percentage of individuals who responded that they need a lot more water than the 36-55 age class. Although the 36-55 age class had fewer respondents that needed a lot more water, this difference in percentage was less than 10% (Table 2).

Subdividing the data into two wealth classes, there was no significant difference between responses to the question "Do you have enough water to meet your needs?" ($X^2_{(4)}$ = 2.59, p > 0.05). However, responses to the question "Do you need more water?" showed strong differences between not wealthy and not wealthy individuals ($X^2_{(4)}$ = 298.54, p < 0.01). A much greater percentage of not wealthy individuals reported that they need a lot more water compared to wealthy individuals (Table 2).

Table 2. Percentages of individuals that responded "Yes, a lot more", "Yes, some more", and "No, do not need more" when answering the question "Do you need more water?", grouped by gender, age, and wealth class (n=66)

	Gender		Age			Wealth	
	Male	Female	18-35	36-55	55+	Wealthy	Not Wealthy
Yes, a lot more	89.29	76.32	83.33	76.47	84.21	10.71	81.58
Yes, some more	10.71	15.79	13.33	11.76	15.79	82.14	15.79
No, do not need more	0.00	7.89	3.33	11.76	0.00	7.14	2.63

Perceptions of future water availability based on gender, age, and wealth

When asked, "Do you think there will be more or less water in 15 years?" 38.71% of all respondents replied that there would be less water in 15 years, 51.61% reported that there would be more, and 9.68% reported no change. When asked to further elaborate, individuals who responded that there would be less water most often attributed this to a growing human population.

There was no association between gender and whether or not an individual responded there would be more, less, or no change in water availability in 15 years ($\chi^2_{(2)}$= 0.30, p >.10). Likewise, the data showed no noticeable trend between gender and response to "Do you think there will be more or less water in 15 years?" (Figure 3).

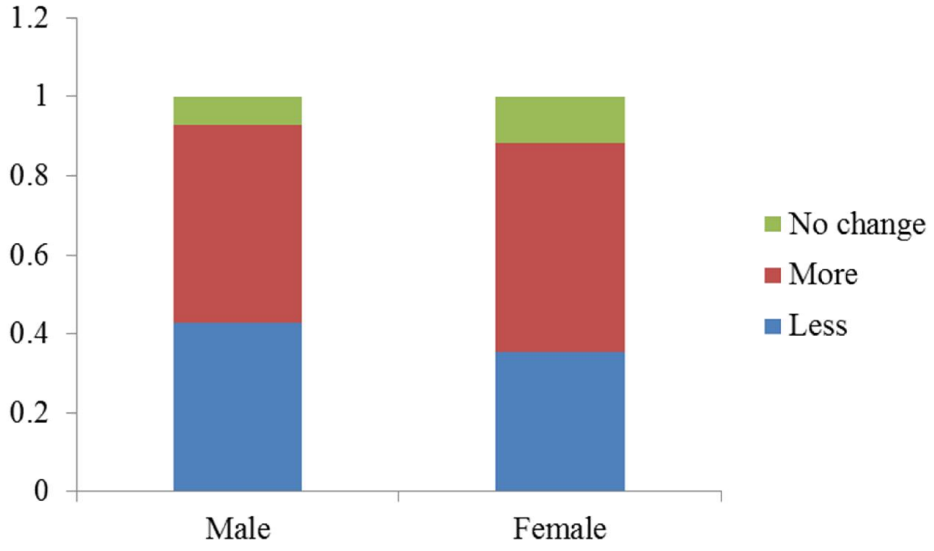

Figure 3. Proportion of respondents answering more, less, or no change to the question "Do you think there will be more or less water in 15 years?" as a function of gender (n=31)

Similarly, there was no association between age and whether or not an individual responded there would be more, less, or no change in water availability in 15 years ($\chi^2_{(4)} = 3.80$, $p > 0.10$). Nonetheless, the data reflects a slight trend that older respondents (36-55 and 55+ years old) were more optimistic about water availability in the next 15 years while the youngest age group was the least optimistic (Figure 4).

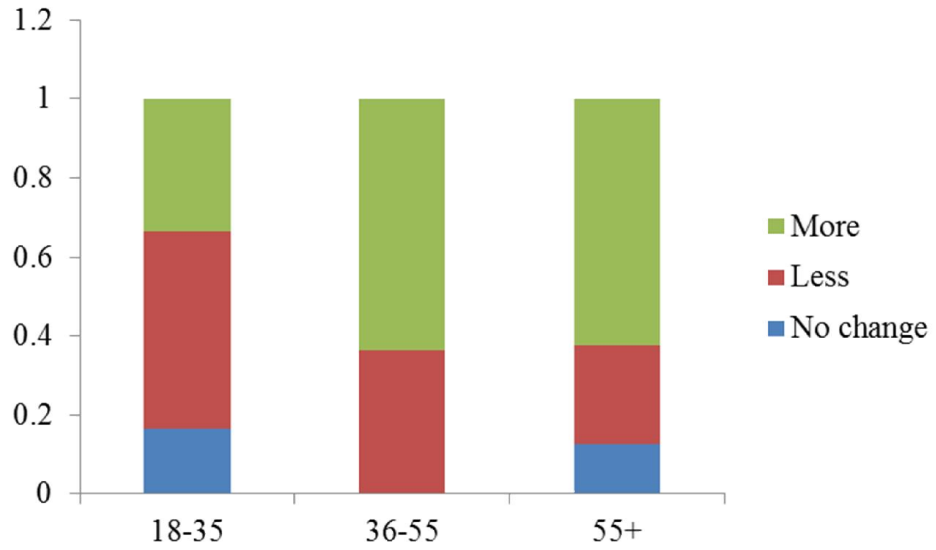

Figure 4. Proportion of respondents answering more, less, or no change to the question "Do you think there is more or less water now than 15 years ago?" as a function of age (n=31)

There was no association between wealth and whether or not an individual responded that there would be more, less, or no change in water availability in 15 years ($F_{2.00} = 2.768$, $p > 0.05$) The data, however, showed a trend that wealthier individuals predict less water availability in the next 15 years, as mean wealth count for respondents who predict less or more water in the next 15 years is 8.17 ± 0.73 and 6.81 ± 0.63, respectively.

Respondent recommendations for improving water availability in HaMakuya

When posed with the question, "How do you think water availability could be improved in HaMakuya?" 84.85% of respondents recommended some means of government intervention. The remaining 15.15% pointed to non-anthropogenic sources of change.

Discussion

HaMakuya is a water stressed region in which gender, age, and wealth influence water availability perceptions. Each household member receives approximately 40 liters per week short of the WHO's recommended 175 liters of water. Moreover, there are enormous disparities in the quantity of water collected among different sub-villages. For instance, Dotha is approximately 108 liters per week short of meeting the WHO's recommendations, while Domboni is short by only about 8 liters per week.

In addition to limited water availability, time spent collecting water creates an opportunity cost for HaMakuya residents. On average, each household water collector spends approximately nine hours collecting water each week. This consumes time that could have been spent working,

caring for children, or attending to personal health. As such, this opportunity cost may play a role in the Vhembe District Municipality's staggering unemployment rate of 48.8% by causing people to prioritize collecting water over maintaining a job (StatsSA 2011). Furthermore, since HaMakuya households are predominantly female-headed with males seeking work in urban areas, time spent collecting water detracts from a single parent female's childcare opportunities.

In an attempt to explain the disparity in water collected among sub-villages, we investigated the relationship between time spent collecting water and amount of water collected in the three sub-villages that collected the least amount of water. Dotha has the lowest mean amount of water collected and a low average time spent collecting water. Dotha residents perceive challenges of obtaining water as a matter of poor availability. Thereby, it is likely that the low amount of time spent collecting water is attributed to fewer trips made to the water source, since the village taps are often broken.

In contrast, Muthikilini has the second lowest mean amount of water collected, but has a high time spent collecting water. When asked about the challenges associated with water collection, Muthikilini residents most commonly cited the long distance to a water source. Due to the residents' perceived long distances to a water source, each trip to collect water takes more time, limiting the amount of trips that an individual may take. This would explain both the low amount of water collected as well as high time spent collecting water.

Finally, Maluzewela has the third lowest mean amount of water collected as well as a low average time spent collecting water. In contrast to Dotha, Maluzewela residents' perceive challenges to water collection as issues relating to water *quality* instead of collection. We surmise that the sour taste of the water discourages individuals from using and collecting more water, despite the low collection times. This would explain the low water amount collected, despite the apparent ease of water collection associated with low collection time.

Due to small sample sizes, we were not able to determine the association between sub-village and perceptions of water availability. We expect that with such extreme discrepancies in collection time and amount, perceptions of current and future water availability would vary by sub-village. Therefore, there is a need for future studies with larger sample sizes to consider how perceptions of current and future water availability vary by sub-village.

As a whole, however, perceptions of water availability display an interesting contradiction. A majority of respondents reported that they had enough water to meet their needs. Nonetheless, a majority also noted that they needed a lot more water. This apparent inconsistency is potentially explained by contrasting water demand for essential and non-essential daily activities. Respondents identified drinking and cooking as essential daily activities, while proper bathing, laundry, creating home vegetable gardens, and constructing homemade bricks to build houses were identified as non-essential uses of water. Many respondents explained that they had enough water for essential activities, but did not have enough water for extraneous activities that could improve their lifestyles. These responses underscore the opportunity costs associated with collecting water.

Similar to previous studies that have found demographic variables to be influential in perceptions of water quality (Bhagwan and Slabbert 2011), we discovered that residents of HaMakuya have differing perceptions about water availability based on gender, age, and wealth. Curiously, our study suggests that perceptions of water availability among HaMakuya residents clash with perceptions of water quality in previous studies. With respect to age, our study suggests that the youngest age class (18-35) is least optimistic about water availability in HaMakuya in the next 15 years, while Bhagwan and Slabbert (2011) suggest that younger age

groups are more optimistic about water quality. Regarding gender, males and females were almost equally likely to predict more, less, or no change in water availability in the next 15 years. However, males more often stated that they currently need a lot more water than females did. This latter observation may be explained by the female's role as primary household water collector. As such, females are used to collecting and rationing water, requiring a positive outlook in order to support the needs of an entire household. Men removed from the water collection process are more likely to acknowledge the lack of water since they bear less responsibility in providing water for others. In contrast, previous studies have suggested that men are more optimistic than women with regard to water quality (Bhagwan and Slabbert 2011).

Finally, wealthier individuals were slightly more likely to predict less water in the next 15 years, attributing this to a growing human population coupled with an increased standard of living. This is in accordance with the Southern African Development Community's (SADC) recognition of the two major uncertainties in forecasting future water availability—rising per capita consumption from improved socio-economic conditions and population growth from high birth rates (Herbertson and Tate 2001). However, education level is a confounding variable in this analysis, since wealthier respondents are more likely to be better educated and consider global population trends. Thus, future studies should consider respondents' education level in addition to other demographic factors. On a separate note, wealthier individuals were significantly less likely to report needing a lot more water than their not wealthy counterparts, highlighting that with a higher socio-economic status perceived water availability increases.

The overwhelming majority (84.85%) of interviewees recommended Department of Water Affairs intervention by constructing additional boreholes, dams, wells, and taps. This reliance on government aid shows that the National Water Act has not yet achieved its goals of shifting rural water management from centralized government action to local maintenance, and that residents continue to look toward the government for a remedy to the current water dilemma. The combination of community faith in the government and varying perceptions of water availability suggests an intricate relationship between demographic variation and water availability perceptions. The Department of Water Affairs needs to gain a greater understanding of these perceptions in order to facilitate improved management strategies that most effectively provide and maintain water resources for the rural region of HaMakuya.

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APPENDIX 1

QUESTIONNAIRE

OTS Fall 2013 FFP3 QUESTIONNAIRE

Perceptions of water availability, quality and reliability in villages within Ha-Makuya

Part 1: Respondent/Household Information

1. Gender (circle): Male Female
2. Age (circle): 18-25 26-35 36-45 46-55 Over 55
3. How many people are in your family? (eat meals together at least 4 days a week)
4. How many members of this household are migrants? (away for more than 3 nights a week, studying, working, looking for work)
5. Ages of family members (Indicate migrant and non-migrant)
    a. How many members of your family are over 45 years old?
    b. How many members of your family are between 18 and 45 years old?
    c. How many members of your family are younger than 18 years old?
6. a. How many people in your family are permanently employed?
    b. How many are temporarily employed?
7. Does your household earn at least half of its income from agricultural activities (e.g. selling maize, chickens, marula beer)?
8. How many rooms are in your homestead?
9. Does your household have any of the following items? (Please also indicate quantity if applicable)

Grants	Child support
	Disability support
	Pension
	Foster care support
Agriculture/Livestock	Field/Orchards
	- On homestead
	- In communal lands
	Goats
	Donkeys
	Chickens/guinea fowl
	Cattle (how many)

Essential bought items	Electricity Fridge/Freezer

Non-essential bought items	Utility	Car Donkey cart Stove
	Luxury	TV DSTV

Part II. Water Consumption

10. Which of these water sources do you obtain water from? (ask each separately and indicate as many as apply)

    Village tap

    Tap at schools, clinics, or personal

    Hand pump

    Purchase (from who/where?)
    River
    Spring
    Jojo tanks (rain water)
    Trucked water
    Other (specify)

11. Which of the above-mentioned water sources is your main source of water?
12. Why?
13. Would you prefer to get your water from an alternate source? Why?
14. What are the challenges of getting your water from your main source?
15. How long does it take you to walk to your main water source from your home?
16. (If they get water from different sources) Do you use water from different sources for different purposes? Elaborate if yes.
17. How much water is collected each time (in liters)?

    litres or drums (circle litres or drums)

    Calculate the litres collected:

18. How often do members of this household collect water?

19. How long does it usually take to collect water each time?

20. Who in the family usually collects the water?
21. How does the household transport water?

Head loads Wheelbarrow Donkey cart Car/Truck Bakkie

Other (specify) or elaborate if more than one is used

22. Think back to the activities your household used water for 15 years ago. Are they the same as they are today? Please explain.

Part III. Water Quality

23. How would you rate overall water quality for your household?

Excellent Good Unpleasant Awful

24. Why do you rate your water quality like this?
25. Do you think the water you obtain is safe to drink? Circle: Yes No
    What is the reason for your answer?
26. How do you know if water is safe to drink or not?
27. (If multiple sources of water are used) Is the water from some/a source(s) better than others? Yes No
    (If you feel they already answered this fully you can disregard)
28. Why?
29. Do you think the water quality is better or worse over the past 15 years? Please explain.

Part IV: Water storage

30. How do you keep the water you have collected? (*In water containers?)*
31. Where do you keep this water?
32. How long do you keep this water for (on average)?
33. Do you prepare the storage containers in any way before you fill them again?

Part V. Water Availability

34. Are you able to get enough water to meet your family's needs?

Yes No Sometimes

How is this possible/why is it not possible?

35. What do you do when you cannot get enough water? Please specify actions.
36. Do you need more water?

No Yes we need some Yes we need a lot more

37. If you had more water what would you use this water for? (*Make sure you get a full answer, for example, if they would like to have a garden what would they plant in that garden? Flowers or crops?)*
38. Do you think there is more or less water now than 15 years ago?

Circle one:

More Less No change

And why?

39. Do you think there will be more or less water in the next fifteen years?

Circle one:

More Less No change

And why?

Part VI. Water Reliability

40. The water at my household's main water source is?

Tick one:

Always available when we need it

Sometimes available when we need it

Not often available when we need it

Never available when we need it

41. The water at my alternate water source is

Tick one:

Always available when we need it

Sometimes available when we need it

Not often available when we need it

Never available when we need it

42. How do you think water availability could be improved in HaMakuya?