

South Africans have access to safe drinking water, with 66 % estimating this to be between 30 % and 69.99 % (Figure 11). However, this is not the case, as in 2017 the Department of Water and Sanitation published a figure of 88.6 % having access to water [4]. On average, most respondents rated their water conservation at a 7 (Fig. 12), where 1 was not conservative at all and 10 was extremely conservative. Alarming, 84 of out 100 persons perceived that there are not sufficient measures in place to ensure the delivery of safe drinking water for current/future generations in South Africa (Table IV). Desalination placed second to borehole water as the preferred alternative to municipal water (Fig. 14). The largest proportion of respondents (34 %, Table XVI) elected filtration as the preferred means of potable water production. 56 % of survey takers had a good knowledge of what desalination was, although 27 % did not know or had the wrong understanding of desalination (Fig. 16). Reverse osmosis and solar distillation were believed to be the two most efficient and effective desalination methods (Table XVIII). Impressively, 85 % of respondents believed that desalination was the answer to future water shortages (Fig. 22), and 80 % expressed an interest in purchasing a desalination device (Table XXI) for either their household or business with 42 % noting start-up cost as the biggest deciding factor on whether they would purchase the device or not (Fig. 21). Solar energy was the most popular choice to power such desalination devices, amassing 79 % of positive responses (Table XIV). Using the perception study as a guide, it would appear that there is a great desire amongst citizens to become independent of municipal water supply and desalination devices powered by solar energy are their preferred alternative method of producing potable water.

V. SUMMARY

A perception study was carried out, in which 100 participants completed a research questionnaire regarding water supply and alternative means of producing potable water in South Africa. There were 29 questions and the results were summarised and graphed. The implications of these results were discussed.

REFERENCES

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- [2] P. Louangrath. Common Statistical Tables. Bangkok: Bangkok University, 2015.
- [3] R. Conroy. Sample Size - A Rough Guide. [Online] 2000. [Accessed 04 15, 2019.] <https://www.semanticscholar.org/paper/Sample-size-A-rough-guide-Conroy/4781878153e13322c028c7d8970e7f52fbaa102a#citing-papers>.
- [4] SAHRC. Water and Sanitation Research Brief, Braamfontein: South African Human Rights Commission, 2018.

APPENDIX: RESEARCH SURVEY

Research Survey

My name is Devesh Singh. I am completing a Master of Science in Mechanical Engineering degree at the University of KwaZulu-Natal through a design and research project. I am tasked with designing, modelling and analyzing a Solar Powered Water Desalination System.

As part of the qualitative approach to my methodology I am attempting to survey members of the general population. The survey includes basic information about yourself, your knowledge on water usage and scarcity in the region, alternative means of water supply and implementation within South Africa and lastly, your views on the viability of desalination systems for everyday use.

Please remember that the answers you provide are your opinions and are based on your own knowledge, as such, if you do not know or are unsure of the answer there is no need to research it. I need to gauge the understanding of the general population on these key issues.

The questionnaire should take approximately 10 - 12 minutes to complete.

Thank you for your help.

* Required

1. **Email address ***

Personal Information

Please note that all personal information will be treated as confidential. Information will only be used for research purposes. No personal information will be supplied to or handled by any third party without attaining your prior consent.

2. **First Name ***

3. **Surname ***

4. **Age ***

5. **Occupation ***

6. **Organisation ***

Name of company or learning institution to which you belong.

7. Highest Qualification *

Mark only one oval.

- Did not complete grade 12
- Grade 12
- Higher certificate / Diploma
- Bachelors degree (Including Honours)
- Post graduate degree (Masters/PhD)

8. City of Residence *

9. Number of individuals in your household *

State of Water Resources

Opinions, knowledge and biographic based questions regarding water resources in your region.

10. 1) What is your understanding of what potable water is? *

Please limit your description to less than 10 words. If you are unsure, please state "Do not know" as your answer.

11. 2) What is the primary source of drinking water at your residence? *

Mark only one oval.

- Municipality
- Borehole
- River/Lake
- Rainwater
- Bottled water
- Other: _____

12. 3) On a scale of 1 to 10 - how safe for consumption is the water supplied by your municipality? *

Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Not safe for consumption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Extremely safe for consumption

13. 4) On a scale of 1 to 10 - how scarce are water resources in South Africa? *

Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Extremely scarce	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Not scarce at all

14. 5) How many litres of water do you drink per day? *

Include water used in beverages such as tea and coffee.

Mark only one oval.

- Less than 1 litre
- 1 litre - 1.99 litres
- 2 litres - 2.99 litres
- 3 litres - 3.99 litres
- Greater than 4 litres

15. 6) How many litres of water, would you estimate, do you use per day in total to complete everyday tasks? *

Tasks may include; bathing, ablution, laundry, garden, etc.

Mark only one oval.

- Less than 10 litres
- 10 litres - 24.99 litres
- 25 litres - 49.99 litres
- 50 litres - 74.99 litres
- 75 litres - 99.99 litres
- More than 100 litres

16. 7) What percentage of South Africa's population has access to a supply of safe drinking water? *

Mark only one oval.

- Less than 30%
- 30% - 49.99%
- 50% - 69.99%
- 70% - 89.99%
- 90% - 94.99%
- More than 95%

17. 8) On a scale of 1 to 10 - how much do you attempt to conserve water during your daily activities?

Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Not conservative at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Extremely conservative

18. 9) Do you believe that there are sufficient measures in place to ensure the delivery of safe drinking water for current/future generations in South Africa? *

These measures may be put in place by the municipality or provincial/national government.
Mark only one oval.

- Yes
 No

Alternative Sources of Water

These questions relate to alternative sources of water and are opinion and knowledge based.

19. 10) Which means of water supply is the best alternative to the municipal water supply? *

Mark only one oval.

- Borehole
 River/Lake
 Rainwater
 Reclaimed/gray water
 Atmospheric water generation
 Desalination
 Other: _____

20. 11) Which method of potable water production do you prefer? *

Potable water is water that can be deemed as safe for consumption (drinking and food preparation).
Mark only one oval.

- Filtration
 Boiling
 Chemical treatment
 Ultraviolet irradiation
 Other: _____

21. 12) What is your understanding of desalination? *

Please limit your description to less than 20 words. If you are unsure, please state "Do not know" as your answer.

22. 13) Which do you believe is the most effective and efficient method of desalination?

If your answer to question 12 was "Do not know" please select "Do not know" as your answer for this question.

Mark only one oval.

- Reverse Osmosis
 Solar Distillation
 Electrodialysis
 Humidification-dehumidification
 Do not know
 Other

23. 14) Are there any large scale desalination plants in South Africa supplying drinking water to the general population? *

If your answer to question 12 was "Do not know" please select "Do not know" as your answer for this question.

Mark only one oval.

- Yes
 No
 Do not know

24. 15) Do you believe there is sufficient investment in finding and implementing alternative means of supplying water in South Africa? *

Mark only one oval.

- Yes
 No

Future of Desalination

Desalination is a general term for a process of removing salt and other minerals from seawater to make it suitable for human consumption (potable). Most desalination systems can produce potable water from both fresh and seawater. Given the aforementioned, please answer the following.

25. 16) If given the opportunity, would you purchase a desalination device for your household/business to become partially or completely independent of the municipal water supply? *

Mark only one oval.

- Yes
 No

26. 17) What would be the deciding factor guiding your above decision? *

Mark only one oval.

- Startup costs
 Volumetric output
 Input energy requirements
 Size, noise and aesthetics
 Maintenance requirements
 Output water quality
 Other: _____

27. 18) Do you believe desalination is the answer to current/future water shortage issues that may arise in South Africa? *

Mark only one oval.

- Yes
 No

28. 19) What alternative energy source, do you believe is the best means of powering desalination systems? *

Mark only one oval.

- Solar
- Wind
- Geothermal
- Wave power
- Other

29. 20) If solar energy was used to power a desalination system, do you believe South Africa receives sufficient solar irradiation on average per year to make the process viable? *

Mark only one oval.

- Yes
- No
- Do not know

Send me a copy of my responses.

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