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# Fuzzy-based criterion for groundwater quality classification in some rural parts of North-West Province, South Africa

This paper develops a decision-making algorithm using the fuzzy set theory in assessing the physico-chemical properties and microbial contaminants of boreholes located in villages around the North-West Province, where Magalies Water, a water board in the Republic of South Africa centrally operates.

Application of fuzzy rule-based optimization technique will be illustrated with 42 groundwater samples collected in the northern part of the province, an area with a sparse population trend, representing the rural and peri-urban communities in the province.

These samples were analysed for 13 different physico-chemical water quality properties and three biological contaminants namely Escherichia coli, total coliform and total plate count.

The South African National Standard (SANS) 241-2:2015 for drinking water (SABS, 2015) will be used to evaluate the borehole's quality. The water quality will be classified into 'excellent', 'good', 'acceptable', and 'unacceptable' as proposed by Enitan-Folami et al, (2019) bearing in mind the current situation of rural communities in the country.

Fuzzy-based set theory methodology provides a non-probabilistic value in expressing the quality of water in the prescribed limits of various regulatory bodies' quality class and experts' perceptions from the field of drinking water quality.

This approach will proffer an intelligent-based classification model that will help assess the water quality and identify the nature of pollution, thereby informing the immediate communities and water industry about the borehole's condition and water treatment approach deemed necessary to prevent continuous deterioration.

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None

## Consent on use of personal information: Abstract Submission

Yes, I ACCEPT

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