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Evaluation of community water quality monitoring and management practices, and conceptualisation of a participatory model: A case study of Luvuvhu Catchment, South Africa

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## ABSTRACT

South Africa has projected itself as a democratic society and one of the cornerstones of democracy is community involvement and participation in development. The democratic projection needs to be given meaning at community level. Institutional frameworks need to be put in place to allow communities to participate in the democratic dispensation of the country. Therefore, a study to evaluate and conceptualise a model for effective community participation in water quality monitoring and management was carried out in Luvuvhu Catchment.

The study was divided into three tasks. The first task was to prove that the communities in the catchment were vulnerable to water quality problems. Literature available on water pollution problems in South Africa generally creates the impression that the northern part of the country is relatively free of pollution despite availability of potential pollution sources. The methods included review of literature relating to potential sources of water pollution in the catchment and interpretation of both ground and surface water quality monitoring results obtained from DWA stations in the catchment. It also involved monitoring microbiological quality of water from a tap in each of 15 participating villages. Views of communities relating to quality of their supplies were obtained through structured interviews. Water treatment efficiencies for water treatment plants in the catchment were calculated. Analysis of diarrhoeal diseases trends from data obtained from clinics in the study area was done. Microbiological water quality was monitored from street taps using the Most Probable Number (MPN) method to show that consumers were vulnerable to water quality problems and were at risk of contracting waterborne diseases even from use of treated water. Health statistics were used to confirm that cases of diarrhoea related to use of polluted water occurred among communities in Luvuvhu Catchment.

The second task was to review the contemporary water quality monitoring and management framework to determine its capacity to reduce the vulnerability of communities to water pollution related problems in the catchment. The policy, legal and institutional framework relating to water quality monitoring and management in South

Africa was reviewed. The extent and quality of participation by communities in Luvuvhu Catchment in water quality monitoring and management was reviewed to determine any gaps relating to community involvement, participation and empowerment.

The third task was to evaluate indigenous knowledge, attitudes, practices and perceptions relating to water quality monitoring and management among communities in Luvuvhu Catchment to identify any indigenous knowledge and practices that could be incorporated into the contemporary national water quality monitoring and management framework as a way of *"giving communities a voice"* in the management of water resources. A community survey involving over 8000 participants was carried out using participatory methods.

The findings of the study showed that communities from Luvuvhu Catchment were vulnerable to water quality problems and they faced the risk of contracting waterborne diseases. Results of water quality monitoring from ground and surface water sources showed varying degrees of pollution. Treatment efficiencies calculated from the water treatment plants showed that communities were vulnerable due to accessing inadequate amounts of water and poor quality of water. Results of water quality monitoring at street taps and analysis of health statistics from local clinics further confirmed that communities were vulnerable to pollution problems.

Although the policy and legal framework in South Africa guarantees the citizen the right to access safe water, the contemporary water quality monitoring and management framework is failing to achieve this. It lacks resources and strategy to monitor water quality to the point of consumption. While South Africa has an extensive policy and legal framework to support community participation in water quality monitoring and management, the institutional framework has not been fully operationalised to accommodate that. Despite the fact that, the communities felt it was critical for them to take part in water quality monitoring and management and were even willing to contribute financially towards the program, the system could not accommodate them.

There was a wealth of useful and relevant indigenous knowledge and practices that could be incorporated into the national water quality monitoring and management framework. For example the communities said they depended on the physical appearance of water to identify polluted sources. This fact could be used to develop simple technologies based on indigenous knowledge and practice to monitor water quality using either colour or turbidity as an indicator.

Based on the above results, a model for effective community participation in water quality monitoring and management was proposed and its acceptability and reasonableness determined. The model is anchored on three frameworks; technological, empowerment and communication frameworks. The model envisages a situation where simple technologies based on indigenous knowledge are developed to monitor water quality at community level as a way of empowering communities to take responsibility for managing their own resources, including water.