

Water Manager Perceptions of Stakeholder Participation and Influence on Water Management Decisions in Limpopo and Luvuvhu-letaba Water Management Areas of South Africa

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Abstract

The study was conducted in Limpopo and Luvuvhu-Letaba Water Management Areas (WMAs) of South Africa to investigate the perceptions of municipal water managers on stakeholder participation and influence on water management decisions. The perceived stakeholders were Department of Water Affairs (DWA), Limpopo Department of Agriculture (LDA), District Municipalities (DMs), Local Municipalities (LMs), Water Users Associations (WUAs) and Community Based Organizations (CBOs). Stakeholders discussed water policy, infrastructure, allocations, charges, and use. For broad resource decisions, DWA was more influential (rating=4.1), municipalities were influential (DMs=2.6, LMs=2.5) and CBOs and WUAs were less influential (1.9). On specific topics, DWA was more influential on policy (3.7) and influential on allocations (2.6), DMs were influential on infrastructure (2.6) while LMs were influential on water charges (2.9) and uses (2.7). Community based stakeholders (WUAs and CBOs) should be strengthened and capacitated to influence water decisions.

Keywords: Perception, Stakeholder, Water management area, Municipality, Community based organization.

1. Introduction

South Africa is a relatively arid country with rainfall that is extremely variable and erratic in time as reflected in its rivers whose total flow can vary ten-fold from one year to the next and a further ten-fold from one month to the next (Muller, 2001).

The social and economic development of the country was accompanied by a continued increase in the demand placed on its water resources. According to Komnenic *et al.* (2009), a country that does not have adequate water to meet the needs of its people is water scarce. Manase *et al.* (2009) argued that close to 6 million South Africans do not have access to a reliable source of safe drinking water while 13 million do not have access to adequate sanitation, revealing that the country suffers from water scarcity.

In this situation of water scarcity, increasing its productivity is a growing concern and objective within the research and development community (Twomlow *et al.*, 2008). Participation by all stakeholders in the management of the water resource is important for its fair allocation (Shah *et al.*, 2001) and increased productivity. Schreiner and Van Koppen (2000) argued that water scarcity is more severe among the poor and this makes it important for them to be represented among stakeholders responsible for water management decisions. Van Hofwegen (2001) defined stakeholders as people or groups of people with a legitimate interest in water resource issues. The necessity of stakeholder participation in water management decisions was well stated by Mashau (2001) who indicated that greater participation by stakeholders is important for sound management of the water resource. The influence of the stakeholders on water management decisions is equally important as it determines the effectiveness of their participation in decision making forums.

Municipal water managers are important decision makers in the management of water resources in their areas of operation. As a result, the perceptions of the managers on stakeholder participation and influence in water management decisions inform the extent of involvement of the stakeholders in the resource management programmes. The objective of the study was to investigate the perceptions of the managers on water stakeholders and their participation and influence on resource management decision making. The study was necessitated by community discontent about lack of involvement in water management decisions.

2. Research methods

2.1 Study area

The study covered ten local municipalities in the Limpopo and the Luvuvhu-Letaba WMAs located in the Limpopo Province of South Africa. Five local municipalities were sampled from each WMA and those were Makhado, Musina, Lephalale, Polokwane and Aganang in the Limpopo WMA and Letaba, Thulamela, Tzaneen, Giyani, and Mutale in the Luvuvhu-Letaba WMA (Figure 1).

2.2 Sampling frame and sampling procedure

A sampling frame was defined by Welman *et al.* (2005) as a complete list of units of analysis in which each unit is mentioned only once. The sampling frame for this study was at two levels, the WMA and local municipality levels. Four WMAs fully or partially located in the Limpopo Province made up the sampling frame, namely: (i) Limpopo, (ii) Luvuvhu-Letaba, (iii) Olifants and (iv) Crocodile West and Marico.

Fourteen local municipalities were representative of the study WMAs and constituted the sampling frame. The Limpopo WMA had nine of these municipalities, namely: (i) Musina, (ii) Aganang, (iii) Lephalale, (iv) Blouberg, (v) Mogalakwena and (vi) Modimolle that are wholly located in the WMA and (vii) Makhado, (viii) Polokwane and (ix) Molemole that share a larger portion of their land area with the WMA. The Luvuvhu-Letaba WMA had five such municipalities with the (i) Letaba and (ii) Giyani contained and the (iii) Mutale, (iv) Thulamela and (v) Tzaneen sharing a larger portion with the WMA.

The units of analysis for the study were selected through purposive sampling defined by Welman *et al.* (2005) as a sampling where researchers rely on their experience, ingenuity and / or previous research findings to deliberately obtain units of analysis that are regarded representative of the relevant population. The two sampled WMAs were administered by the Limpopo Regional Office of the Department of Water Affairs (DWA) and were selected for ease of access to their information while the ten municipalities were purposively sampled for their available information on runoff as determined in a previous study (Tshikolomo *et al.*, 2009).

2.3 Data collection and analysis

The information for the WMAs was obtained through semi-structured interviews with relevant officers of the Limpopo Regional Office of DWA.

The data for the municipalities was collected using a structured questionnaire used to interview water managers of each of the 10 municipalities sampled for the study. A questionnaire may be used to obtain information on opinions, beliefs, convictions and attitudes (Welman *et al.*, 2005) and was therefore relevant for collecting information on perceptions of the water managers on stakeholder participation and influence on water management decisions. The questionnaire had both closed-ended questions that collected quantitative data and open-ended questions that collected qualitative data and the study was therefore described as a mixed research (Leedy and Ormrod, 2010). The interviews on closed-ended questions were more structured with less flexibility while those on open-ended questions were less structured with more flexibility for respondents to provide information that the researcher had not anticipated.

The interviews with DWA officers dealt with broad policy issues affecting the water sector in the two WMAs. The questionnaire used to interview municipal water managers covered perceptions on stakeholders in water management decisions and their participation in resource management forums with a focus on frequency of meetings and issues discussed. Also covered were the stakeholder influence on water management decisions with particular attention given to their reliability as sources of water management information and their level of influence, both on broad water management decisions and on specific topics discussed in meetings.

Quantitative data was captured and analysed using the SAS package (SAS Institute Inc, 2009). The Proc FREQ procedure of SAS was used to generate simple frequency tables of occurrence in each class utilizing one-way tables. The procedure is appropriate to give descriptive statistics about categorical data such as the demographic datasets. The syntax is provided to the SAS software, which automatically calculates the percentage of observations falling within each category of response. The output contains both the actual and the cumulative frequencies. Qualitative data was summarised and analysed using subjective interpretations (Lee, 1999; Leedy and Ormrod, 2010).

3. Results and discussions

3.1 Stakeholder organizations and their roles

Stakeholders in water resource management were defined by Van Hofwegen (2001) as people or groups of people with a legitimate interest in water resource issues. Some 90% of the municipal water managers perceived DWA to be a stakeholder, 40% regarded the Limpopo Department of Agriculture (LDA), the same number (40%) identified community based organizations (CBOs), and 80% viewed Water Users Associations (WUAs) as stakeholders in their water management decisions. District Municipalities (DMs) and the Local Municipalities (LMs) themselves were also mentioned as stakeholders participating in water management decisions.

In terms of the roles of the stakeholders, DWA is responsible for administering various aspects highlighted in the National Water Act (Act No. 36 of 1998) on behalf of the Minister. The major responsibilities of the department include the development and implementation of strategies and internal policies, plans and procedures, and regulatory instruments. The department is also responsible for planning, developing, operating and maintaining state-owned water resource management infrastructure, and for overseeing the activities of all water management institutions (RSA, 1998; DWAF, 2004).

The main interest of the LDA, on the other hand is the availability of water for agricultural use particularly for irrigation purposes. The role of the department is therefore mainly to lobby for water allocations for the agricultural sector directly from DWA with no involvement of the interviewed municipal managers. The CBOs would mostly form part of WUAs and participate in the activities of the associations. The roles of the WUAs differ according to the purpose for which they were formed, and those may include water use for recreational purposes and that for agricultural use (DWAF, 2004).

The DMs and LMs compose local government, a constitutionally distinct sphere of government. While the DMs are responsible for development of water reticulation infrastructure, the LMs are the sphere of government closest to the communities and according to DWAF (2004) they were mostly designated as water services authorities and are responsible for the provision of water services in their areas of jurisdiction. The stakeholders identified therefore ranged from national department involved with policy and strategy issues through to local authorities involved with the provision of water services to communities.

The water stakeholder organizations as identified by the municipal water managers seem to have covered all major stakeholders. At the level of individual municipalities, some omissions were noted where, for instance one municipality excluded DWA and 60% of them excluded LDA from their lists of stakeholders. Municipalities should therefore convene public consultative water summits to update their stakeholder databases.

3.2 Stakeholder participation in water management decisions

The participation of stakeholders in water management decisions determines the quality of decisions made and the extent to which the stakeholders contribute to the productivity of the water resource. The participation of stakeholders in water management is informed by the frequency of meetings attended, the number of issues discussed and the actual topics discussed in the meetings.

3.2.1 Frequency of stakeholder meetings and number of issues discussed

As indicated by Mashau (2001), greater participation by stakeholders is essential for sound water resource management and therefore the frequency of stakeholder meetings and the range of issues discussed are important. The frequency of meetings reflects the opportunity created for participation by the stakeholders in water management decisions.

Stakeholders in 60% of municipalities reportedly met monthly (twelve meetings in a year), and those municipalities were Lephalale and Aganang in the Limpopo WMA and Letaba, Thulamela, Giyani and Mutale in the Luvuvhu-Letaba WMA. Monthly meetings in municipalities under the Luvuvhu-Letaba WMA were double those in municipalities under the Limpopo WMA. Stakeholders met quarterly in 30% of the municipalities where all of them (Makhado, Musina and Polokwane) were in the Limpopo WMA. Stakeholder meetings in the Tzaneen Municipality were once in a year with their meetings not having a fixed schedule (Figure 2). The stakeholder forum without a fixed schedule of meetings could have been newly formed and not having strong issues to regularly communicate.

Considering the number of water management issues discussed in meetings in the Limpopo WMA, two municipal stakeholder meetings (Musina and Polokwane) had only one issue each, one municipality (Makhado) had three issues, the other (Lephalale) had four and the last (Aganang) had five issues to discuss. In the Luvuvhu-Letaba WMA, one municipality (Letaba) reportedly discussed only one issue in their stakeholder meetings, two (Thulamela and Giyani) discussed three issues and another two (Tzaneen and Mutale) discussed five issues (Figure 2). The results suggest that more water management issues were discussed in stakeholder meetings in the Luvuvhu-Letaba (18 issues) than in the Limpopo WMA (14 issues).

With proper planning, quarterly stakeholder meetings would be adequate for good consultative management of the water resource. The Tzaneen municipality convened stakeholder meetings based on need and this would need to improve. The municipality should convene properly planned meetings quarterly with a pre-arranged schedule agreed upon. Monthly meetings as convened by 60% of the municipalities are rather too frequent and could provide too little time for participants to implement the water management decisions made in meetings. This frequency of meetings may be recommended at the start of operation of stakeholder forums for participants to know each other and for systems to be established. The number of issues discussed would continue to vary among stakeholder fora and among different meetings within a forum.

3.2.2 Water management issues discussed in stakeholder meetings

The water management issues discussed in the meetings of water stakeholders would likely be the ones included in strategic and annual performance plans of stakeholder organizations and should therefore receive due attention. Three municipalities were reported to have discussed five water management issues in their stakeholder meetings, namely: Aganang in Limpopo WMA and Tzaneen and Mutale in Luvuvhu-Letaba WMA. The issues discussed were the same for the three municipalities and were reported to be policy, infrastructure, water allocations, water charges and water use issues. This could be indicative that these municipalities had matters of concern with the five water management issues. The Lephalale Municipality discussed four water management issues and they only left out water charges from the five issues enlisted for Aganang, Tzaneen and Mutale municipalities (Table 1).

Three municipalities (Makhado, Thulamela and Giyani) reportedly discussed three water management issues in their meetings and they all included infrastructure and water charges. The third issue discussed by each of the three municipalities was water use for Makhado and Thulamela and water allocations for Giyani. Infrastructure was reported to have been discussed at meetings of all municipalities. This suggested that all municipalities had issues of concern with the water infrastructure, and this could have included siltation of dams, breaking down of boreholes and repeated bursting of reticulation pipes. The stakeholder meetings could therefore have focussed on required interventions such as the development and maintenance of the infrastructure.

Issues of water charges were discussed at water stakeholder meetings of 60% of the municipalities. The water charges were discussed in municipalities that seemed rural with some relatively newly proclaimed urban centres, either towns or townships. Relatively new towns occurred in Aganang, Thulamela, Giyani and Mutale while newly proclaimed townships would be in Makhado and Tzaneen. The systems for implementing the charges in the new urban areas could still not be well established and therefore residents would be over- or under-charged. The discussion of water charges could be a result of the dwellers not used to these charges or being unhappy with the water charge systems themselves. Residents in municipalities with long proclaimed urban centres would be much used to the water charges and their charge systems would be well established and will therefore not have to discuss the charges in stakeholder meetings.

As was the case with water charges, water use issues were also discussed in 60% of the municipalities. Municipalities that discussed water use issues in their stakeholder meetings seemed to be those that had major economic activities that demanded water thereby creating competition with domestic demand. The municipalities of Makhado, Thulamela, and Tzaneen are strong in irrigated agriculture while Lephalale and Mutale are strong in mining. Water allocations were discussed in meetings in half of the municipalities and these could be where some stakeholders had concerns with this water management issue. Municipalities that discussed water allocations mostly also discussed policy. This suggests a strong link between policy and the implementation of water allocations. Policy issues were discussed in meetings in only 40% of the municipalities. With DWA being the custodian of water policies, these could be municipalities where the department was most active. Merrey (2000) stated that rural communities were unaware of the provisions of the new water law, and this could be reason for policy issues having been discussed in stakeholder meetings of fewer municipalities.

3.2.3 Relationship between stakeholder participation and municipal runoff

Pretty (1995) argues that the concept of stakeholder participation remains as vague as concepts like sustainability. For this analysis the number of water stakeholder meetings attended is assumed to be an important indicator of stakeholder participation (Figure 2). The amount of municipal runoff determines the amount of water naturally available in the municipality and could influence stakeholder participation in resource decision making. The runoffs of the study municipalities (in million m³) were 269.2 for Makhado, 21.0 for Musina, 282.1 for Lephalale, 17.9 for Polokwane and 12.5 for Aganang in the Limpopo WMA and were 88.2 for Letaba, 359.1 for Thulamela, 352.3 for Tzaneen, 37.5 for Giyani and 61.2 for Mutale in the Luvuvhu-Letaba WMA (Tshikolomo *et al.*, 2009). There was no correlation noted between the level of water stakeholder participation and the amount of municipal runoff ($R^2=0.032$). The result reveals that the number of stakeholder meetings was not influenced by the amount of municipal runoff. While stakeholders in wetter municipalities could have had more meetings to discuss strategies of taking advantage of the available water resource, those in drier municipalities could also have had more meetings to discuss strategies of coping with the scarcity of the resource. This could have led to the number of meetings remaining unchanged even though the amount of runoff was changing across municipalities.

A very weak correlation ($R^2=0.3474$) occurred between participation of external water stakeholders and the amount of municipal runoff. External stakeholders were mostly composed of national and provincial organizations and were more knowledgeable on water resource management. The municipalities with more runoff are of strategic importance and were therefore prioritized by these higher level stakeholders who sought to influence their water management decisions. It would be necessary for the external stakeholders to also give attention to drier municipalities to assist in programmes such as rainwater harvesting and on efficient use of the water resource. These would reduce the demand for water from runoff collected in wetter municipalities. The DWA is the custodian of water in the country (RSA, 1998, DWAF, 2004) and should lead the mobilization of the knowledgeable external stakeholders to the drier municipalities for introduction of efficient water use programmes.

3.3 Stakeholder influence on water management decisions

The number of stakeholder meetings attended alone does not reflect on the effective contribution of stakeholders to water management decisions. The effective contribution of stakeholders to the water management decisions is determined by their level of influence which is itself dependent on the reliability of the information they provide.

3.3.1 Stakeholder reliability as sources of water management information

Availability of reliable information is necessary for informed decision making. Reliability of the information is dependent on the source of the information. This was confirmed by Bembridge and Tshikolomo (1992) who indicated that communication is more effective when the source of information is considered reliable. It would be expected for stakeholders that are perceived to be reliable sources of water management information to better influence decisions in the sector. Participation of stakeholders perceived to be reliable sources of water management information would therefore result in them influencing the decisions made. DWA was perceived to be a more reliable source of water management information (rating=3.7) followed by LMs who were regarded less reliable (2.3). The rest of the water stakeholders were reported to be least reliable as sources of water management information. Government based stakeholders of DWA, LDA, DMs and LMs provided more reliable water information than their community based counterparts of WUAs and CBOs (Figure 3).

This result suggests that community based stakeholders could not have influenced decisions in water stakeholder meetings as they would reportedly not have reliable information to present. Water management decisions would be made by government based stakeholders perceived to be reliable sources of water information. Communities were therefore justified in their perceptions that municipalities were not taking them on board when making water management decisions.

With the weaker formation of the community based stakeholders, it is likely that they may not have the capacity and the expertise to provide quality and reliable information. These stakeholders are representative of the communities to be served by the government and their views should inform decisions for managing the water resource. Government should therefore develop and empower these community based stakeholders through lead agents such as DWA and the Department of Local Government and Housing.

3.3.2 Stakeholder influence on broad water management decisions

The level of influence a water sector stakeholder has over the other role-players determines the extent to which he/she can influence water management decisions. Lord and Israel (1996) mentioned the need for influential stakeholders to make decisions that take into account the needs and desires of all the different water users and role players.

The municipal water manager ratings of the stakeholders according to their levels of influence in water management decisions revealed DWA to be more influential (rating=4.1). The department was followed by three other main groupings – firstly the municipalities that were perceived to be influential (ratings were 2.6 for DMs and 2.5 for LMs); secondly community based groups regarded less influential (rating was 1.9 for WUAs and for CBOs); and lastly LDA also perceived less influential (rating=1.5) (Table 2). With DWA being the custodian of water in the country, it is not surprising that the department was perceived to be more influential. Municipalities also play important roles in water resource management with DMs being responsible for reticulation infrastructure and LMs for water services and it was logical for them to be reported to be influential stakeholders.

Although agriculture consumes the largest quantity (62%) of water in South Africa (DWA, 2004), the municipalities rated LDA least in terms of level of influence. This low rating was a result of the interviewed municipal managers having no responsibility for provision of agricultural water. The LDA is therefore more active as a water stakeholder at national and provincial levels. At a provincial level, a Coordinating Committee on Agricultural Water (CCAW) was established where LDA and DWA discuss issues of agricultural water for emerging farmers. Agricultural water for commercial farmers was discussed at meetings of irrigation boards.

As opposed to good ratings of government based stakeholders of DWA and municipalities, the community based group composed of WUAs and CBOs was perceived less influential. DWA (Undated) stated that there were ten WUAs at different stages of establishment in the study area (Mid 2011). Only the Groot Letaba WUA under the Luvuvhu-Letaba WMA was established and operational.

Three WUAs were established but were not yet operational, namely: Nzhelele in Limpopo WMA and Mutale and Middle Letaba in Luvuvhu-Letaba WMA. Six WUAs were at different stages of establishment, namely: Mokolo, Glen Alpine and Mogalakwena in Limpopo WMA and Mutshimbwe, Letsitele, and Tzaneen in Luvuvhu-Letaba WMA. It is possibly because the WUAs were not yet operational that they rated so poorly in terms of the level of influence. The results placed stakeholders representing government institutions at the top positions of influence, and this justifies the feeling of exclusion on the part of communities.

For the WUAs to be more influential stakeholders the process of their formation has to be concluded and they must be operational entities as a matter of urgency. Those already formed should be capacitated to function properly, and this could be achieved through funding for training and institutional establishment. The process of formation of the WUAs and their capacitation should be led by DWA and should be regarded critical for communities to actively participate in decisions on water resource management.

3.3.3 Stakeholder influence on specific topics discussed

The influence of stakeholders on specific water management topics discussed is as important to development as the overall influence of the stakeholders on water management issues in general. The perceptions of municipal water managers revealed that DWA was more influential on policy (rating=3.7) and was influential on water allocations (2.6) (Figure 4). The results are not surprising as the department has the mandate of developing the water policies and accordingly transforming the allocations (RSA, 1998 and DWAF, 2004). The department had less influence on use (rating=2.3) and charges (1.8) for water and on infrastructure (1.5). While the results for use and charges for water would be understood, it would be expected for the department to be influential on infrastructure as they champion the development of major dams. The perception of the department being less influential on infrastructure issues suggests that respondents were less involved in these operations.

The LDA was perceived to have least influence on all the topics discussed. This result could again have been caused by the fact that interviewed municipal managers have no role in agricultural water provision and would therefore not regard LDA an important stakeholder for their water management decisions. The DMs were reportedly influential on infrastructure (rating=2.6) and this was logical as the districts were responsible for development of water reticulation infrastructure. The districts had less influence on the rest of the topics discussed as they had lesser roles in those issues. The LMs were influential on the charges (rating=2.9) and use (2.7) of water. Municipalities were mandated to provide water services (RSA, 1997) and that would be reason for their influence on water charges and uses. The WUAs were least influential on all topics discussed while CBOs were less influential on policy (rating=1.6) and least influential on the rest of the topics discussed.

The more influential stakeholders on the water management topics discussed were still government in its different spheres, namely: DWA, LMs and DMs. Community based stakeholders such as WUAs and CBOs were not perceived as important leaders of decisions on the water management topics discussed. Kgomotso and Swatuk (2006) revealed that communities have high level of interest for participating in decision making for water projects and their exclusion from this process could be frustrating to them. Accordingly, Nare *et al.* (2006) reported a lot of frustration for communities in Mzingwane catchment in Zimbabwe arising from their marginalization in a water quality management project.

For sound management of the water resource, stakeholders should be representative and should consider those that were disadvantaged when they make decisions (UNDP, 1995; Chancellor, 1996; Carney, 1988; and Van Koppen, 1990) and these results affirm that communities were not properly represented and could not be catered for by the decisions made. The situation could lead to deep disgruntlement among members of community expecting improved delivery of water services.

3.3.4 Relationships between perceived reliability of stakeholders as sources of water information and their level of influence

Stakeholders perceived to be reliable sources of water management information would likely have more influence on the water management decisions made. The reliability of the stakeholders would determine the credibility of the information they provide and subsequently their influence on water management decisions made. A moderate to strong correlation ($R^2=0.6997$) was revealed between the reliability of stakeholders as sources of water management information and their level of influence on resource management decision making.

An increase in the reliability of a stakeholder as a source of water management information was accompanied by an increase in the level of influence the stakeholder had on resource management decision making (Figure 5).

The results suggest that stakeholders should be capacitated to be reliable sources of water management information in order for them to influence decision making in the sector. Effectively, sound management of the water resource would be influenced by building the capacity of stakeholders to be reliable sources of water information, and this could be achieved through training these role players on pertinent water issues.

4. Conclusions

The organizations perceived to be stakeholders in water management decision making were Department of Water Affairs (DWA), Limpopo Department of Agriculture (LDA), district municipalities (DMs), local municipalities (LMs), Water Users Associations (WUAs) and Community Based Organizations (CBOs).

The issues discussed in stakeholder meetings were policy, infrastructure, water allocations, water charges and water use issues. Only the three municipalities of Aganang, Tzaneen and Mutale discussed all the five with the rest discussing fewer issues. Infrastructure was the only discussion topic that was discussed by all municipalities and this suggests that it is the most important water management issue in the study area.

DWA was rated a more reliable source of water management information (rating=3.7) followed by LMs rated less reliable (2.3). The rest of the stakeholders were reported least reliable. Government based stakeholders such as DWA were perceived more reliable sources of water information than their community based counterparts of WUAs and CBOs. There was a moderate to strong correlation ($R^2=0.6997$) between the reliability of stakeholders as sources of water management information and their level of influence on resource management decisions.

Accordingly, DWA was reported more influential (rating=4.1) in broad water management issues, followed by the influential DMs (rating=2.6) and LMs (rating=2.5) and last the less influential community based stakeholders of WUAs and CBOs (rating=1.9). Considering specific topics discussed, DWA was more influential on policy (rating=3.7) and was influential on water allocations (2.6). The department had less influence on water use (rating=2.3) and charges (1.8) as it had less to do with these topics.

The DMs were influential on infrastructure (rating=2.6) due to their involvement in developing reticulation infrastructure. The LMs were influential on water charges (rating=2.9) and uses (2.7) as a result of their roles as water services providers. The WUAs were least influential on all topics discussed while CBOs were less influential on policy (rating=1.6) and least influential on the rest of the topics discussed. Based on this result, community based stakeholders should be empowered to be reliable sources of water information and to subsequently influence decision making in the sector. The government based stakeholders have different complementary roles and should work together to generate better decisions for water resource management.

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6. Figures and Tables

6.1 Figures

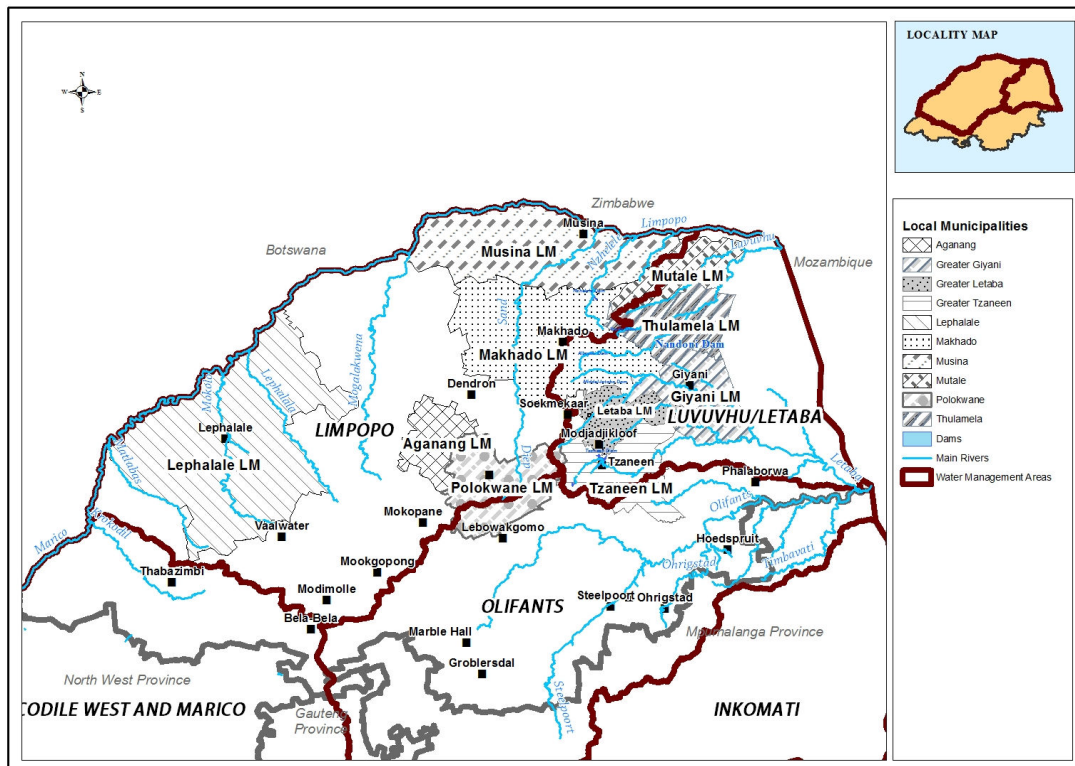


Figure 1: Map of Limpopo Province with Water Management Areas and municipalities comprising the study area

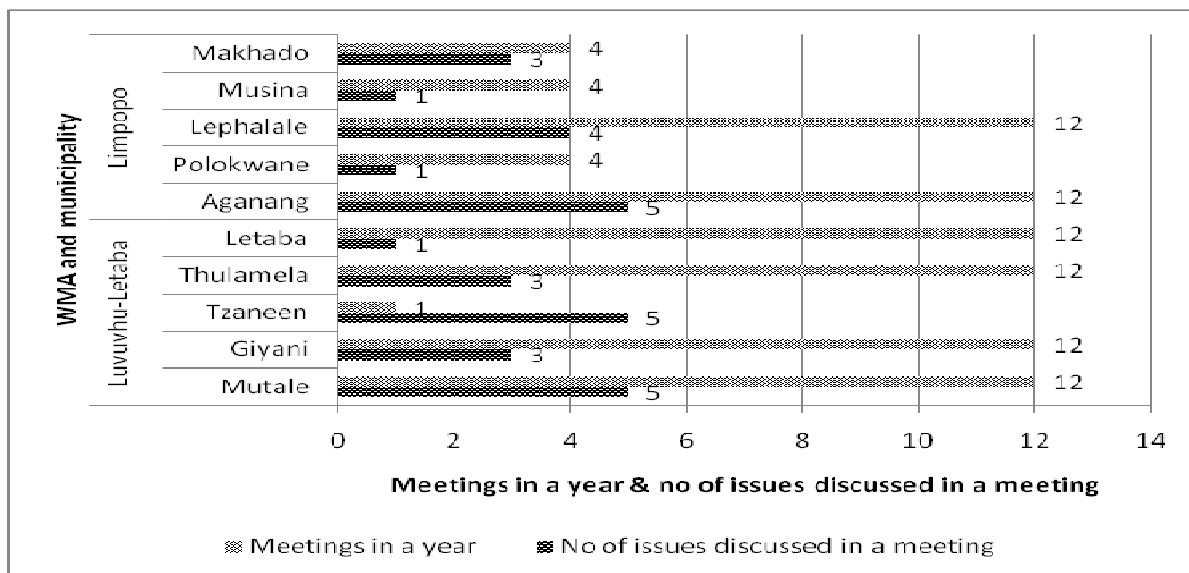


Figure 2 Frequency of stakeholder meetings and number of water management issues discussed in each meeting

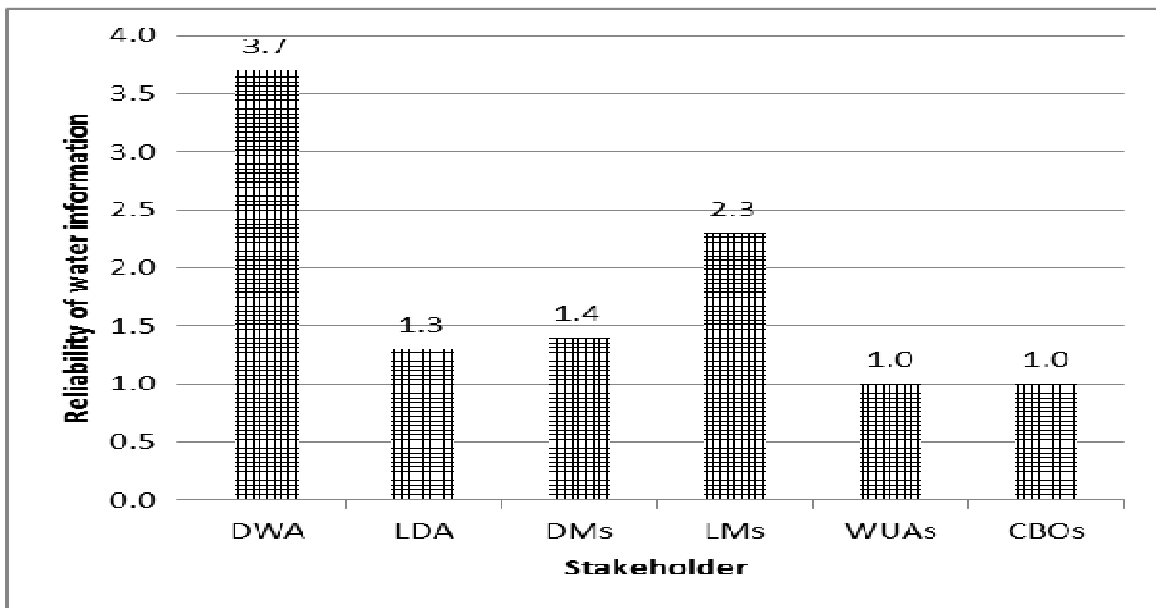


Figure 3 Water stakeholders and ratings of their reliability as sources of water management information.

Key: 1- Least reliable, 2- Less reliable, 3- Reliable, 4- More reliable, 5- Most reliable

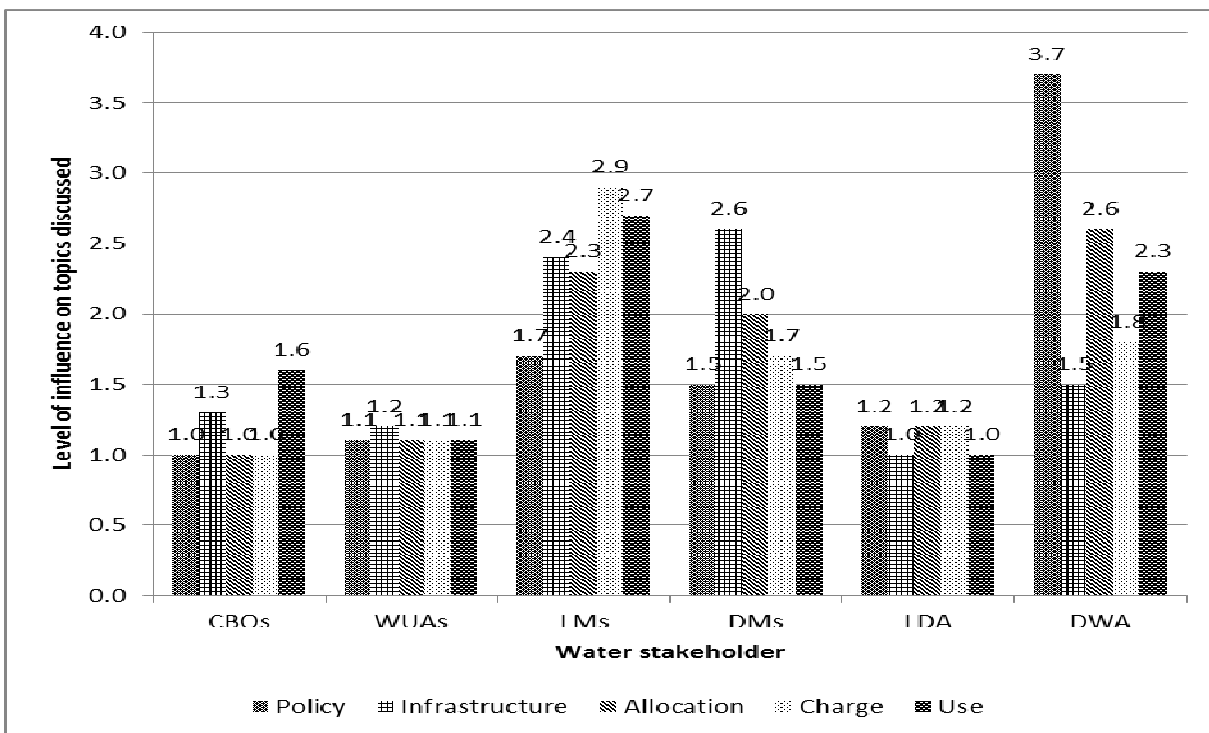


Figure 4 Rating of different stakeholders according to their level of influence on specific topics discussed in meetings

Key: 1- Least influential, 2- Less influential, 3- Influential, 4- More influential, 5- Most influential

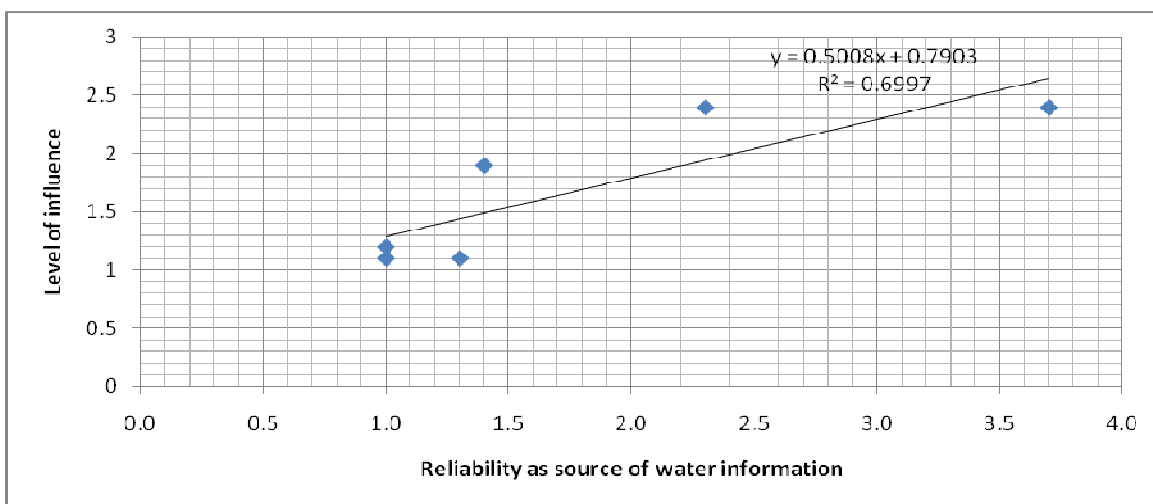


Figure 5 Relationship between stakeholder reliability as sources of water management information and their level of influence on resource management decisions

6.2 Tables

Table 1 Issues discussed in water stakeholder meetings of the study municipalities in the Limpopo and Luvuvhu-Letaba WMAs

Water Management Area	Municipality	Issues discussed				
		Policy	Infrastructure	Water allocations	Water charges	Water use issues
Limpopo	Makhado	2	1	2	1	1
	Musina	2	1	2	2	2
	Lephalale	1	1	1	2	1
	Polokwane	2	1	2	2	2
	Aganang	1	1	1	1	1
Luvuvhu-Letaba	Letaba	2	1	2	2	2
	Thulamela	2	1	2	1	1
	Tzaneen	1	1	1	1	1
	Giyani	2	1	1	1	2
	Mutale	1	1	1	1	1

Key: 1- Issue was discussed; 2- Issue was not discussed

Table 2 Perceived levels of influence of water stakeholders on broad water management decisions in study municipalities under Limpopo and Luvuvhu-Letaba WMAs

Water Management Area	Municipality	Perceived levels of stakeholder influence					
		DWA	LDA	DMs	LMs	WUAs	CBOs
Limpopo	Makhado	4	1	2	3	2	5
	Musina	1	1	1	1	1	1
	Lephalale	5	1	1	1	3	1
	Polokwane	5	1	1	4	1	1
	Aganang	4	1	5	3	1	1
Luvuvhu-Letaba	Letaba	2	1	3	1	4	5
	Thulamela	5	4	1	3	2	2
	Tzaneen	5	1	4	3	2	1
	Giyani	5	2	4	3	1	1
	Mutale	5	2	4	3	2	1
	Mean	4.1	1.5	2.6	2.5	1.9	1.9

Key: 1- Least influential, 2- Less influential, 3- Influential, 4- More influential 5- Most influential