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Involvement of stakeholders in the water quality monitoring and surveillance system: The case of Mzingwane Catchment, Zimbabwe

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Abstract

Stakeholder participation is viewed as critical in the current water sector reforms taking place in the Southern African region. In Zimbabwe, policies and legislation encourage stakeholder participation. A study was undertaken to determine the extent of stakeholder participation in water quality monitoring and surveillance at the operational level, and also to assess indigenous knowledge and practices in water quality monitoring. Two hundred and forty one questionnaires were administered in Mzingwane Catchment, the portion of the Limpopo Basin that falls within Zimbabwe. The focus was on small users in rural communities, whose experiences were captured using a questionnaire and focus group discussions. Extension workers, farmers and NGOs and relevant sector government ministries and departments were also interviewed and a number of workshops held.

Results indicate that there is very limited stakeholder participation despite the presence of adequate supportive structures and organisations. For the Zimbabwe National Water Authority (ZINWA), stakeholders are the paying permit holders to whom feedback is given following analysis of samples. However, the Ministry of Health and Child Welfare generally only releases information to rural communities when it is deemed necessary for their welfare. There are no guidelines on how a dissatisfied member of the public can raise a complaint – although some stakeholders carry such complaints to Catchment Council meetings. With regard to water quality, the study revealed widespread use of indigenous knowledge and practice by communities. Such knowledge is based on smell, taste, colour and odour perceptions. Residents are generally more concerned about the physical parameters than the bacteriological quality of water. They are aware of what causes water pollution and the effects of pollution on human health, crops, animals and aquatic ecology. They have ways of preventing pollution and appropriate interventions to take when a source of water is polluted, such as boiling water for human consumption, laundry and bathing, or abandoning a water source in extreme cases. Stakeholder participation and ownership of resources needs to be encouraged through participatory planning, and integration between the three government departments (water, environment and health). Local knowledge systems could be integrated into the formal water quality monitoring systems, in order to complement the conventional monitoring networks.

Keywords: Catchment management; Participatory management; Stakeholder participation; Water quality monitoring

1. Introduction

One of the major initiatives in water management in southern Africa, developed through national water reforms since 1990, has been decentralisation of management from central government to some form of localised water authority, with varying degrees of stakeholder participation and control (Chikozho and Latham, 2005; Jaspers,

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2003). This intention is in line with one of the four principles of integrated water resource management (IWRM): stakeholders must participate in water management (ICWE, 1992). The same principles endorse the concept of water as an economic as well as a social good that should be managed at the lowest possible level (Katz and Sara, 1998). Stakeholder participation and administrative decentralisation is viewed as critical in the water sector reforms taking place in the region (Murenga, 2003). However, despite consensus on these and other principles, the translation of IWRM from concept to action still remains largely undone. For example, it has been observed that the new policies and structures do not generally penetrate to the poorer and less powerful stakeholders, who are generally part of structurally and/or politically marginalised districts, with little voice in natural resource management (Love et al., 2004). The new structures tend to be dominated by existing powerful stakeholders who renegotiate their roles and rights to water resources (Swatuk, 2005).

IWRM polices require decision-making at the lowest appropriate level. This is for two reasons: firstly, more details of the issue under consideration are available (or even obvious) at a lower administrative level, closer to the end user (Jaspers, 2003). Secondly, stakeholder participation becomes increasingly relative (or even political), as structures move further from the community. However, research has shown that many governments are reluctant to devolve actual decision-making to stakeholders (Swatuk, 2005). Within this context, it is important to review the extent to which the participatory policies and programmes have been implemented.

Water sector reform in Zimbabwe has been implemented via the creation of two parallel structures: a parastatal (the Zimbabwe National Water Authority, ZINWA) and stakeholder councils (Catchment Councils and the ZINWA Board). There are seven water management areas, termed ''Catchments''. The seven Catchments are based on hydrological boundaries: four are portions of the Zambezi Basin defined by major tributaries (Gwayi, Sanyati, Manyame and Mazowe), two are portions of the Save Basin (Runde and Save) and one is a portion of the Limpopo Basin (Mzingwane) – Fig. 1.

An estimated 70% of the national population lives in rural areas in Zimbabwe. Hoko (2005) determined that water is consumed without treatment in over 90% of cases in rural areas. Worldwide, the World Health Organisation estimates that over 5 million adult deaths per year are attributable to water borne diseases (De Regt, 2005). It is in rural areas that most deaths occur due to limited access to safe water and sanitation. Therefore, water quality is an important determinant in ensuring maximum benefits from rural water schemes. In view of the huge cost of conventional water quality assessment and the information gap between institutions that monitor water quality and the consumers (villagers), there is an urgent need to explore ways in which water quality can be monitored and appreciated at the lowest possible level. Such monitoring techniques should incorporate traditional and indigenous local knowledge.

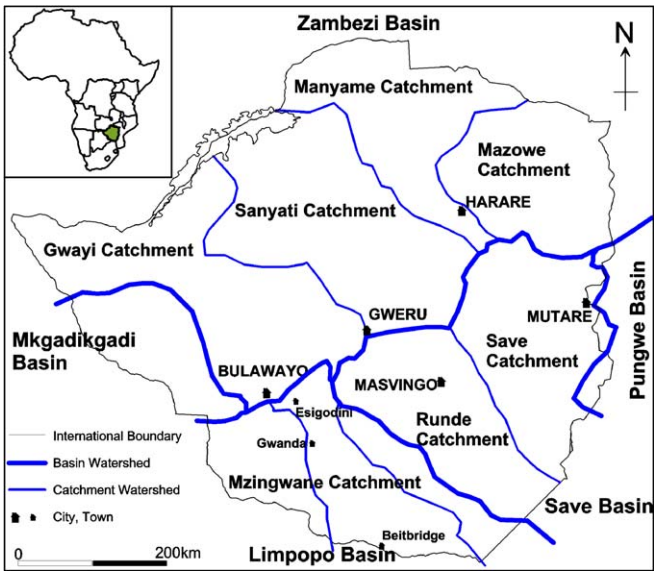

Fig. 1. The basins and catchments of Zimbabwe, showing towns named in the text.

In this article, a case study is made of stakeholder participation in water quality management in the Mzingwane Catchment. The study was undertaken in order to determine awareness of water quality problems among stakeholders, their participation in water quality management and the existence of relevant indigenous knowledge practices. The paper focuses particularly on small users: rural residents who use water for basic human needs and are not registered (fee-paying) water users.

The study area of Mzingwane Catchment is semi-arid with rainfall varying from 600 mm at Esigodini in the north to below 400 mm at Beitbridge in the south (based on 70 years of rainfall data). Water supply is problematic, especially in drought years (Nyabeze, 2004). Water quality management is important as reservoirs in the catchment supply most of the water requirements of Bulawayo, Zimbabwe's second largest city, and further developments in the catchment are expected to meet the city's growing needs (Mkandla et al., 2005). The catchment also supplies water to Gwanda, the Matabeleland South provincial capital, and some of the country's largest mines and agro-industrial estates. For rural communities, most water is sourced from boreholes: 70% for domestic supply and 35% for productive water, such as agriculture and brick-making (Nare, 2005), and is consumed predominantly without treatment (Hoko, 2005).

2. Methods

Awareness of water quality problems, practices on water quality monitoring and surveillance, as well as relevant indigenous knowledge, were assessed by administering 200 questionnaires at community level and holding 20

Table 1
Sample size for questionnaire administration within Mzingwane Catchment

Target	Study population	Sample size
Mzingwane Catchment	1	1
Subcatchments	4	2
National Provinces	3	3
Local Government Districts	9	4
ZINWA: Catchment Management	1	1
ZINWA: Water Quality Specialists	1	1
Mzingwane Catchment Council leadership	2	2
Provincial level government officials	14	14
District level government officials	36	16
Non-governmental organisations		3
Rural District Council (local authority)	9	4
Households (small water users)		200

Table 2
National officials interviewed

Organisation	Official
Zimbabwe National Water Authority	Chief Executive Officer (1) Department Heads (2) Catchment Managers (3) Water Quality Specialists (4)
Ministry of Environment and Tourism	Permanent Secretary (1) Environmental Officers (2) Natural Resources Officers (3)
Association of Rural District Councils	Chief Executive Officer (1)
Non-governmental organisations	Chief Executive Officers (3)

focus groups discussions with communities. The interviewees were all small water users. Inputs were also sought from other stakeholders such as local authorities, farmers' organisations, miners, Catchment Council and SubCatchment Council members, through the use of self-administered questionnaires (see Table 1).

Structured interviews and questionnaire administration in the study area were supplemented by interviews with key stakeholders and officials at national level, see Table 2.

3. Results

3.1. Water quality in the Mzingwane Catchment

Although there are no ecologically sensitive areas as specified in legislation (MRRWD, 2000), the catchment has all the activities specified as requiring discharge permits for operation (ZINWA, 2000), such as industry, mining, liquid and solid waste disposal facilities from urban local authorities and farming activities. According to an interview with the water quality officer for the catchment, mining and urban areas are thought to contribute the more severe pollution problems.

Ashton et al. (2001) reviewed the general characteristics of subcatchments in the Limpopo Basin, and the likely impact of mining on surface water. Although there are no published case studies on the impact of mining on water quality in Mzingwane, studies done on similar mines in the Mazowe Catchment, north-western Zimbabwe, indicate major problems with acid mine drainage and metal pollution, although these tend to be confined to the vicinity of the mine (Lupankwa et al., 2004; Ravengai et al., 2005). Gold panning is also a major problem, causing siltation of rivers and mercury pollution (Shoko and Love, 2005), and is widespread in the upper parts of the catchment. Limited results from the Beitbridge area suggest nitrate pollution from sewage (Nare, 2005). Results from the Mwenezi and Gwanda areas suggest salinity and turbidity problems (Hoko, 2005; Moyo et al., 2005).

Almost half the households surveyed (43%) reported problems with the quality of water for domestic use, mainly due to salinity (60%) or bacteria (24%). Communities are aware of the linkages between human activities and pollution of water, i.e. human activities upstream can cause pollution of water downstream. Some of the communities surveyed blame farms and mines upstream for the pollution they observe.

3.2. Water Management Institutions in Zimbabwe and the Mzingwane Catchment

ZINWA consists of a head office in the capital and offices in each Catchment. The head office, and the authority, falls under a Chief Executive Officer (CEO), to whom report heads of branches of the authority: research, water quality, groundwater and so on, as well as each of the seven catchments, which are headed by a Catchment Manager. The stakeholder councils include the ZINWA Board at national level, Catchment Councils and Subcatchment Councils. The Subcatchment Councils comprise elected or nominated stakeholder representatives. The Catchment Councils comprise representatives elected by the Subcatchment Councils within the Catchment and the ZINWA Board includes representatives elected by the Catchment Councils and other stakeholders. A significant problem in stakeholder representation is that many users are not recognised directly as users, but rather represent political authorities: for example, in the rural areas communal farmers are represented by the Rural District Councils (Love et al., 2005) and urban residents are represented by the urban councils (Manzungu and Mabiza, 2004).

These structures are parallel without direct reporting relationships between them: for example, although the Catchment Council and the Catchment Manager are responsible for the same geographical (and hydrological) area, the Catchment Manager reports to the CEO, and only consults the Catchment Council. During the early days of the water reform process, many stakeholders argued for the Catchment Manager to report to the Catchment Council (Chikozho, 2002). In law, the Catchment Manager is responsible for water resources management, administration and the control of water utilities, whereas the Catchment Council is responsible for water allocations

and planning. In practice there is much overlap: Catchment Managers can allocate water use permits and some are leading or controlling the planning process. The result is that whilst many issues are discussed at the stakeholder councils, power remains with the local offices (Catchment Managers) of the national authority. Because of this, Catchment Councils have come to be viewed by some stakeholders as an extension of ZINWA and thus of government, rather than authorities in their own right (Sithole, 2001). This is particularly the case in regard to water quality, since the principle administrative role (identification and permitting of dischargers) is held by ZINWA, not by the councils. With the expected establishment of the proposed Environmental Management Agency (EMA), water quality management will be removed from the water sector to the environmental sector – where no stakeholder-based structures exist, except in wildlife management.

In many of the Catchment Councils, control remains with the large, powerful users: city councils, large mines and large-scale commercial farmers. The Mzingwane Catchment Council is dominated by large-scale commercial farmers, cities and large mines. These powerful users also generally participate far more in water quality management and planning, at Catchment Council and elsewhere, than do other users. This trend can be related to two factors: these large users had previous experience in the (now dissolved) River Boards and the issues covered tend to be on permits and levies, which apply mainly to the larger users (Latham, 2001). Where small-scale and communal farmer representatives are active in the Councils, they tend to have interests opposed to those of the large, powerful users (Chikozho, 2002).

3.3. Stakeholder participation

It was determined that almost all respondents surveyed (98%) had never heard that there had been water sector reforms. Residents are also confused about which ministry or parastatal is responsible for water quality issues: some citing ZINWA (21%), some the Department of Natural Resources in the Ministry of Environment and Tourism (29%), others the Ministry of Health and Child Welfare (17%) and still others the local government structures (18%). Within this context, it is perhaps not surprising that there is very limited stakeholder participation in water quality management at village and district level. The largest dischargers, especially where they are large or international companies, tend to participate in water quality management – especially where this is encouraged by their corporate policies, such as Blanket and How Mines in Mzingwane Catchment, owned by Kinross of Canada and Metallon Corporation of South Africa respectively. The same is not true for small companies, such as many small industrial and mining concerns, which operate often on thin profit margins and are not inclined to cooperate with the statutory authorities, let alone participate in water management.

Rural communities do participate at village level in water quality management (to a limited extent), mainly through structures that are either informal, or those which were designed for another purpose. These include committees such as the water point committee, which are responsible for the day-to-day management of a water point (such as a community borehole). It was found that 80% of respondents felt that the main function of the community structures in water quality monitoring was upkeep of water points, including minor maintenance and the maintenance of hygiene standards at the water point.

However, above village level, stakeholder participation is very limited. Although local government structures such as Ward Development Committees and Rural District Councils are responsible for coordinating development, they are not seen as having a major role to play in water quality management. From the communities surveyed, more than half the respondents (53%) reported that water quality issues are not discussed at community meetings and structures. Almost all of the respondents (95%) said technicians from central government were responsible for testing water but less than a third (28%) said that they were ever informed of the results of such tests. Despite this, almost all respondents (89%) felt that the community had the capacity to run and manage a water quality monitoring system at their own level.

For ZINWA, stakeholders are the paying permit holders, to whom they give feedback following analysis of samples and charge under the discharge permit system. However, the Ministry of Health and Child Welfare generally only releases information to rural communities when it is deemed necessary for their welfare, such as during a cholera outbreak. There are no guidelines on how a dissatisfied member of the public can raise a complaint – although some stakeholders carry such complaints to Catchment Council meetings.

3.4. Indigenous knowledge

It was determined that indigenous knowledge and practices are widely used by communities in the study area. With regard to water quality, such knowledge is based on sensory perception: i.e. the smell, taste, colour and odour of the water resource. The visible presence of foreign elements and aesthetic characteristics such as smells, taste and colour are used to determine water quality. Other indications used by the communities in the area are use-specific, and shown in Table 3.

Table 3
Indicators used by rural communities to suggest contamination

Water use	Indicator of contamination
Domestic	Unpleasant smell or taste
Domestic	Health problems such as upset stomach
Domestic	Failure to form lather
Irrigation	Failure of crops
Livestock watering	Livestock refuse to drink

Some of the indicators raised by interviewees can be and/or have been verified. For example, salty taste and failure of crops are linked to high salinity levels. This has been verified in studies from some parts of the catchment (Hoko, 2005; Moyo et al., 2005).

Water quality problems raised by rural residents in interviews showed generally a greater concern about physical parameters, such as salinity, than the bacteriological quality of water. This is a sharp contrast to urban residents for whom the reverse is true (Zingoni et al., 2005). Residents are aware of what causes water pollution and the effects of pollution on human health, crops, animals and aquatic ecology.

Rural communities have ways of preventing pollution and are aware of appropriate interventions to take when a source of water for domestic use is polluted, such as boiling water (80%), protecting the water source (7%) or abandoning a water source in extreme cases (3%). Boiling water is clearly the preferred intervention, despite the labour costs involved in the process, e.g. in collecting firewood and boiling the water. It can be seen, therefore, that lack of a safe water supply may contribute to deforestation.

Communities are less empowered to deal with problems in water for agricultural purposes, with a plurality (46%) responding that they did not know what to do and 26% suggesting abandoning the source.

4. Discussion

The participation of communities in water quality management is well below both their capacity and their interest: most residents surveyed have a desire to be more deeply involved. The focus of official water quality management structures on those users who are paying discharge permits (or those who should be paying) is disempowering the communities. At the same time, local communities' perceptions that natural resources management is the domain of traditional structures (Chikozho and Latham, 2005), and confusion over which line ministry or parastatal is the responsible authority, can also tend to discourage their participation in the parallel water management structures. This confusion is in part a reflection of the competition for responsibility and authority between line ministries and the new water management structures (Van der Zaag, 2005). Stakeholder participation and ownership of resources needs to be encouraged through participatory planning, and integration between the three principle responsible government departments (water, environment and health).

Local knowledge systems should be integrated into the formal water quality monitoring systems. This will have two major benefits: (i) communities will be better able to participate in water quality management decisions and (ii) decision-makers will be able to complement the data supplied by government monitoring networks with reports from communities. One way to do this would be to train community structures, such as water point committees, to expand their current functions to include monitoring water quality using simple techniques such as smell, colour, taste and bio-monitoring. They could also be responsible for implementing any intervention strategy that would have been agreed upon with government extension workers, if results of samples taken indicate any problems. Stakeholder participation would therefore be built and strengthened through existing structures already valued by communities – rather than through the creation of new institutions whose functions are not immediately clear to the rural resident.

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