A community-based approach and its impact to sustainable rural water supply – A case of Kgotlopong 'Mountain Water Harvesting'

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Abstract Since the advent of the democratic dispensation in 1994, the South African government embarked on strategies and initiatives that speeded up the delivery of basic services, including water, to many communities. However, there are still many other communities, especially in the remote rural areas, that face daunting challenges in accessing basic water. To address these challenges, other communities have developed community-based water supply initiatives. This paper takes a keen interest in such community-based approaches and seeks to examine the case of a small rural community, Kgotlopong, which initiated a community-based 'mountain water harvesting' scheme. The paper also stems out of two current studies of the Council for Scientific and Industrial Research (CSIR) that were done in Kgotlopong, and it discusses the processes that a group of old-aged men undertook to establish a community-based water committee, the roles played by the committee in ensuring the sustainability of the scheme, and the challenges and successes thereof. Preliminary findings indicate that there is merit in encouraging community-based water supply initiatives and also suggest that there is a much needed institutional support from local government to community-based initiatives.
Keywords Basic services; community-based initiatives; rural communities; water supply

INTRODUCTION

Background

Since the advent of the democratic dispensation in 1994, the South African government embarked on strategies that were aimed at speeding up the delivery of basic services and the development of rural communities. A number of initiatives that promised the delivery of basic services, including water, were implemented by government as part of the strategies. Amid these, the former Department of Water Affairs and Forestry (DWAF) implemented the Free Basic Water Support Programme in 2003, and subsequently, the Sustainability Guidelines for Rural Water Services in 2004 to support local government in implementing the Free Basic Water policy. Recently, the National Development Plan 2030 has put a lot more emphasis on increasing the number of people with safe drinking water, and this is in alignment with the Millennium Development Goals (The Presidency, *n.d.*). Since 1994, it can be acknowledged that these strategies saw the delivery of basic water to many communities. According to the Department of Water Affairs (DWA)'s Water Services National Information System, it is estimated that the national water supply backlog dropped by about 83% between 1994 and 2012 (DWA, 2013). However, this only considered the population that has access to water services below RDP service levels. The RDP service levels between 2001 and 2011 were only measured by variables such as the distance and location of communal taps to households, the quality and the amount of drinking water that can be produced or received from the source, etc. Since 2012, the RDP service levels have been updated with estimates of Municipal Infrastructure Grant (MIG) allocations (*ibid*).

Although there is considerable progress in the provision of water, there are still millions of South Africans with little or no access to an adequate supply of safe drinking water, many of

which live in rural communities. It is acknowledged that a large portion of this population is still stuck at the bottom of the 'water ladder' with only rudimentary water services and no progressive realisation of water related rights (Tissington *et al*, 2008). In most cases, challenges relating to the supply of free basic services, including water, have been attributed to the fact that many local municipalities, especially those meant to serve rural communities, do not have sufficient resources, and thus have difficulties in addressing past backlogs and meeting their goal in terms of providing free basic services to the poor (WRC, 2009). According to Berkowitz (2009), structures that have been put in place to redress these challenges have worked for some areas but challenges still persist for most rural communities. This phenomenon, as argued by Tissington *et al* (2008), may be explained by the fact that water services (and other free basic municipal services) are provided in an unplanned manner by municipalities, mainly because of the huge backlogs and the lack of resources. As a result, municipalities mostly do not comply with national standards. It is partly due to this reason that communities develop their own projects, and why community-based initiatives have come to play an important role in bringing water to many rural communities around Africa.

A possible scope for community-based water supply initiatives

Lockwood (2004) regards community-based initiatives in water supply as mostly demand-driven, innovative and low-cost approaches to water supply in rural areas. In most communities, such initiatives play a key role in ensuring and sustaining water supply and meeting daily water needs for the poor. For example, the government of Indonesia has been supporting the construction of village water infrastructure to be managed by its users through community-based water organizations since the 1990s (WSP, 2011). This proves that community-based approaches are considered favourable over the supply-driven government-led models. In South Africa, there is also some support from government, through policy, to encourage community-based water supply initiatives. The Municipal Systems Act of 2000 makes provision for community-based organizations to enter into an external agreement with the municipality to provide municipal services, including water services. Such agreements are generally known as Municipal Service Partnerships (MSPs) and have been regarded as having potential benefits for effective delivery of services (Department of Provincial and Local Government, DPLG, 2004). DWAF's (2001) guidelines on 'Community-Based Organizations as Water Services Providers' also stipulate that Water Services Providers (WSAs) can enter into a joint venture with a community-based organization, to form what is called a 'Community-Based Water Services Provider' or CBO WSP. Under the latter, a community-based organization (or CBO WSP) should be recognized as a legal entity, should be in possession of a water license, and should be responsible for the provision of water services in a community as per agreement with the WSA (*ibid*). The agreement can be especially beneficial for small rural community-based WSPs and can also be structured in terms of water supply only, while the infrastructure and its rollout remain the responsibility of the municipality or the WSA (DPLG, 2004).

Policy and other challenges in contracting CBO WSPs

Although there seems to be some policy developments geared towards the support for community-based water supply initiatives, the process is fraught with challenges. DWAF's (2002) 'White Paper on Water Services Issues' argues that the Municipal Systems Act discourages the use of alternative water services providers, such as CBO WSPs, by placing difficult requirements on municipalities prior to engaging with community-based organizations. It further argues that other alternative water services providers are seen as the 'last option' and are not considered simultaneously with contemporary water service provider

options. The White Paper recommends an enabling policy environment where the Municipal Systems Act could be amended to encourage flexibility in the choice of water service providers, including the use of CBO WSPs. On the other end, studies have also shown that the majority of communities cannot maintain their systems alone, and that they require some form of external assistance over the longer term (Lockwood, 2004). As noted in the White Paper, not enough attention has been paid to the financial mechanisms to be used to develop enough WSP capacity and contracting thereof (DWAF, 2002). This support can be provided by a range of institutions from national and local government including the private sector. Putting resources into improving this situation has proved to be successful for most developing countries around the world (Lockwood, 2004).

Towards a solution: The concept of 'Mountain Water Harvesting'

This paper adopts the term 'mountain water' and defines it as a source of water that is located in the mountainous areas or on the hills within a village and/or its surroundings. In its basic form, the concept of 'mountain water harvesting' normally entails tapping into a water source located in an area of higher elevation compared to its target community, and diverting or channelling the water to its target community using gravity or by taking advantage of the slope to move water. This process is also known as 'spring water tapping' (Tayong, 2003) or 'mountain irrigation systems' in Pakistan (Ahmad, 2000).

While in other countries, such as Pakistan, the harvesting technique may be as rudimentary as trenching along the mountains from the water source to the community mainly for agricultural purposes, the process has received great attention in other regions across Africa where some form of protection around the water source – i.e. pre-treatment, storage, piping and a reticulation network – is incorporated into the mountain water harvesting system with the intention to provide safe drinking water (Tayong, 2003). The concept of the Kgotlopong mountain water harvesting scheme revolves around the latter.

Aim and rationale of the study

This paper seeks to demonstrate the impact that community-based water supply initiatives can make, and in the process, proposes options that could be adopted to advocate for a policy shift towards engaging local government in recognizing, formalizing and using community-based organizations not only as the 'last option' but as the appropriate solution in small community rural water supply.

APPROACH AND METHODOLOGY

This paper uses a case study of Kgotlopong village as the overarching approach and a bit of literature search to understand key developments related to the subject. The case study stems out of a current study of the Council for Scientific and Industrial Research (CSIR), the Accelerating Sustainable Water Services Delivery (ASWSD), which is a ministerial initiative from the Department of Science and Technology (DST). The initiative aims at investigating appropriate technologies that can be used to fast track the delivery of water services especially in rural and underserved communities. Linked to the ASWSD is the CSIR's Social Responsibility Project (SRP), which is a study through which the CSIR seeks to understand the underlying issues and principles that communities undergo throughout the process of developing water supply interventions.

Both studies documented issues and challenges in water supply for current and planned projects in Kgotlopong through various platforms including but not limited to the following;

- A community mobilization and stakeholder engagement process was embarked upon to get the stakeholders' buy-in into the research process that would be followed by the CSIR. Reconnaissance meetings were held at the initial stage with municipalities while community structures meetings were held in Kgotlopong
- A situational assessment was conducted in Kgotlopong village to understand the status quo with regards to current and planned water projects. This entailed engagements with key informants within the community and the district municipality responsible for provision of basic services in the village (i.e. Sekhukhune District Municipality). A particular attention was paid to the water committee that established the Kgotlopong mountain water scheme
- Technical assessments were done to understand the water sources, their locations and accessibility, water yield and quality, and to understand socio-cultural beliefs and issues that the community held around the use of natural and communal water sources
- A community survey was conducted to get a general feel of the water supply issues in Kgotlopong and to establish a baseline against which impact could be monitored on ASWSD interventions and any other future development projects in Kgotlopong
- Intervention options, which included the rehabilitation of the existing mountain water scheme of Kgotlopong, were crafted and presented to a range of stakeholders in a workshop. Stakeholders, which included representatives from Kgotlopong, were given an opportunity to participate in part of planning during the workshop

DISCUSSION AND FINDINGS

Description and key characteristics of Kgotlopong

Kgotlopong is a small rural village with a population of 430 households located about 35km north-east of Burgersfort town in the Kgautswane area under Sekhukhune and Greater Tubatse district and local municipalities in Limpopo Province. The village is located in an area of low rainfall and characterized by draught, a rocky and hilly terrain, and lots of draught resistance shrubs. Most households are unemployed, dependent on social grants, and engage in seasonal and dry farming for subsistence. There are two main sources of water (i.e. ground and surface water) that the community of Kgotlopong relies on for their daily water needs. Ground water is abstracted through boreholes while surface water is abstracted from a small perennial river that runs at the periphery of the village. There also exists a community-based initiative, the Kgotlopong Mountain Water Harvesting Scheme, which provides raw reticulated river water to some households. This initiative, the scheme and the committee, captivates the interests of this paper and forms the basis for discussion thereof.

The establishment of the water committee and the scheme

The mountain water committee. The mountain water committee, which in turn established the scheme, was founded by a group of 10 unemployed, semi-skilled and middle-aged to old-aged men in 2005 following a long period of poor water supply from the municipal borehole reticulation system. The committee was established through 'self-appointment' by a group comprised only of men with similar interests in water and the willpower. Since its establishment, the mountain water committee has never been registered as a legal entity. However, the local traditional authority and the community recognize the mountain water

committee as the approved water committee responsible for the supply of water only from the mountain water scheme in Kgotlopong.

The mountain water scheme. The Kgotlopong mountain water harvesting and water supply scheme was subsequently established by the mountain water committee in 2006. The financing of the scheme was through contributions that were made mostly by the committee members and some members of the community. Other substantial contributions that were received were a donation of 18 bags of cement and 10 rolls of PVC pipes from a non-governmental organization (NGO), Tsogang Water and Sanitation, to complete the construction of the reservoir and to connect a supply line from the weir to the reservoir. The initial design consisted of a small weir at the top part of Kgotlopong River, a concrete filter box that was intended to house a filter for the raw water, a concrete reservoir with a capacity of 9.6m³ for water storage, and a reticulation network with 22 street taps. At a later stage when the scheme was being implemented in the larger community, a flat rate of R50 per household was introduced by the committee for those who needed household connections. This figure has since increased to R200 and is argued to cater for infrastructure development, operation and maintenance.

Figure 1: The mountain water scheme weir (left) and reservoir (right)

Figure 1 shows the weir and the reservoir that was constructed as part of the first phase of the scheme using a donation from Tsogang NGO.

The impact of the scheme. Information received from the mountain water committee indicates that a total of 321 households currently benefit from the scheme; almost 75% of the population of Kgotlopong. This includes only households that have recognized connections from the mountain water scheme, and this is despite the fact that some of them have made illegal connections. According to the community survey data from the 35 households sampled by the CSIR in 2012, over half of the households sampled (i.e. 53%) ranked the river (which included the mountain water scheme) as their main source of water. These households also considered mountain water as reliable compared to other water sources. Only 79 households, which all belonged to a new settlement within the village, were without the mountain water or any other reticulated form of water.

Figure 2 shows the extent of the Kgotlopong mountain water harvesting and water supply scheme within the community. The mountain water scheme is marked by the yellow lines that spread through the village while the brown lines mark the municipal borehole supply system. Clearly, the mountain water harvesting scheme has better coverage compared to the

municipal borehole system. Although it is not the purpose of this paper to make comparisons between the two systems, this is merely meant to showcase the impact of a community-based initiative.

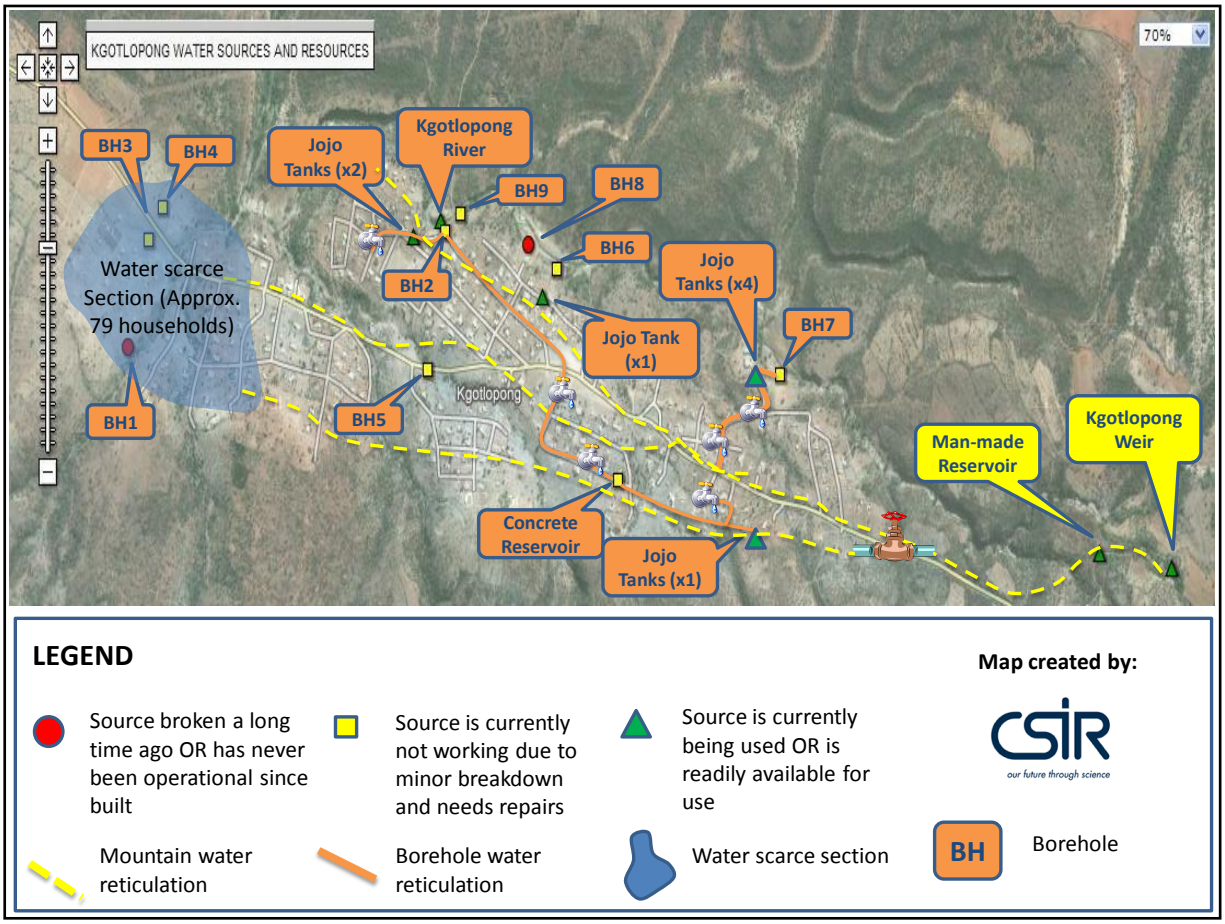

Figure 2: The layout of the mountain water harvesting scheme and the borehole water reticulation network

Another notable impact that the mountain water committee has made is changing the community's thinking towards the concept of mountain water harvesting. As will be discussed in the following section on challenges, the community of Kgotlopong was not sold over the idea of mountain water when the idea was initially conceptualized and communicated through. However, after demonstrating that the idea is feasible, the mountain water committee was able to get buy-in from a lot of households within the community.

Challenges with the mountain water committee and scheme

Initial start-up financing challenges. In the initial stages of the project, the community at large did not buy into the mountain water committee's concept of 'harvesting and consuming water from a mountain' as they thought it was less founded and had no clear direction. As a result, the community was reluctant to provide any form of support, including finance, to the mountain water committee. The only other way that the mountain water committee could use to generate community interest was by way of demonstrating their concept through developing the first phase of the scheme. This also proved to be very difficult as it would require substantial financing from only the members of the mountain water committee and a few interested members of the community who were largely also unemployed. The current

defects on the mountain water harvesting scheme could be attributed to the financial challenges that the committee has had and continues to experience on a daily basis.

Problems with portfolio allocations within the committee. When the mountain water committee was established, no portfolios, roles and responsibilities were identified and clearly defined. As a result, when there were breakdowns in the water supply system, repairs and maintenance were not attended to promptly, leading to a spiralling maintenance and repairs backlogs while the committee's team spirit also deteriorated.

Lack of external and institutional support. Since the mountain water committee and the scheme were established, the committee has been sending numerous requests to potential donors, the local municipality and the community for any support that could be offered. The only time when some form of support was received was after reports of incidences of Cholera and a possible outbreak in Kgotlopong when the local municipality only supplied a chlorine tablet that was placed into the concrete reservoir to treat the raw water. Since the incidence, the chlorine tablet has never been changed over a period exceeding two years. Even after countless attempts by the committee requesting plastic storage tanks and pipes from the local municipality to increase storage and water supply, no response was received.

Theft, vandalism, illegal connections and lack of law enforcement. Only four out of the twenty-two taps that were installed with the scheme remain; the rest were stolen. The incidence has since been reported to the local traditional authorities and to the community, but no arrests were made. Attempts to replace the stolen taps were made with little success due to financial constraints. Vandalism, which is also a common problem, has been reported as an act of sabotage on the system by individuals who are thought to have not accepted mountain water as a solution to their water supply challenges. Illegal connections, which are made without a formal request to the mountain water committee, are yet another complex issue that the mountain water committee admitted that it has failed to address. It is difficult for the committee to enforce laws to community members who make illegal connections since the committee does not have an existing constitution and thus is not recognized as a legal entity.

Technical and design challenges. The reticulation network of the mountain water harvesting and water supply scheme is in a very poor and dire condition. The design of the scheme did not take into account a number of factors, some of which were largely environmental. The following problems were identified within the system;

- There is water contamination within the system. Although the system has been designed to have a water filter, it was installed due to financial constraints. Findings of the water quality assessments also indicated high levels of Iron, Nitrates, *E-coli* and Total Coliforms. This confirms that water from the source is not safe for human consumption, therefore regular treatment would be necessary
- The system has blockages. This could be attributed to the fact that there is no filter
- There are lots of leaks along the reticulation network;
- Most pipes run above ground and are not designed to, thus contributing further to the current leaks. This could also be due to the hard rock formation and the geology of the area, which resulted in excavations not being done since they could not be afforded;
- The system has very low pressure. This could be due to a number of factors, such as;
    - An unannounced number of illegal connections made,
    - The design and location of the concrete reservoir,
    - The type of plastic pipes used in the system, which mostly run above ground,

- Unattended leaks along the reticulation network.

Figure 3: Mountain water pipe exposed above ground (left) and poor pipe joint (right)

Figure 3 shows a pipe running above ground and a poor joint of two different types of pipes.

Lack of technical expertise and resources. Although the mountain water committee is comprised of a group of people with common interest and willpower, there lacks essential technical expertise for operation and maintenance of the scheme. This issue is also closely linked to lack of resources and the assumption being made is that if there were financial resources, the committee could have easily opted for outsourcing technical expertise especially for technical designs, major system repairs and operation and maintenance. This support is also not received from the local municipality.

CONCLUDING REMARKS AND RECOMMENDATIONS

The paper has demonstrated the impact that a community-based water supply initiative has made to a small rural community of Kgotlopong; it is a positive impact. The initiative has managed to provide water, although of poor quality, to almost 75% of the households in the community of Kgotlopong. Another impact the initiative has made was to change the mindset of, and to get some buy-in from, the community in developing the 'mountain water harvesting' concept. However, the Kgotlopong mountain water committee and the mountain water harvesting scheme also face daunting challenges that hinder their potential to provide a service optimally. Some of the challenges that they face can be addressed by providing institutional support, especially through local government. Such support can be provided in various forms, ranging from financial to capacity building.

This paper also recommends that local municipalities start evaluating their service provision strategies in terms of the cost of providing a basic service in a remote rural community against the benefits of employing a community-based organization to provide a similar service at a much lower cost. It is envisaged that this approach will have far-reaching benefits not only in terms of providing a better level of service, but also in terms of skills development and job creation across the South Africa and abroad.

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