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Sustainability Of Community Based Water Management In Mulanje District, Malawi

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ABSTRACT

Statistics show low water coverage in rural Malawi. The Malawi government promotes community based management of rural water programmes. This study evaluated the sustainability of the approach by studying the system reliability, human capacity development, local institutional capacity development and financing mechanisms in 6 villages in Mulanje district. Study methods included focus group discussions with water committees and interviews with key informants and representatives of selected households. Field inspections were used to gather data to supplement data from interviews. At least 80% of the water points were functional. Trained caretakers were readily available for 12 out of 16 water point committees. There was low level of financial contribution for operation and maintenance as only 30% of respondents contributed. As such there is need to raise awareness of the communities on financial sustainability of these water points.

KEYWORDS: community based management, financing mechanism, human capacity development, institutional capacity, reliability, sustainability, water point.

INTRODUCTION

Access to safe and affordable drinking water is universally recognized as a basic human need for the present generation and a pre-condition for the development and care of the next[16]. Some experts proclaim that the International Drinking Water Supply and Sanitation Decade (1WSSD) did not achieve the intended goals because it was largely supply driven and not responding to demand, as well as lacking focus on sustainability[7]. This failure came about despite the realization during the Mal de Plata Conference in 1977 by top government officials that sustainable water supply could only be achieved by getting the beneficiary communities more actively involved[2].

By the end of 2002 it was estimated that globally some 1.1 billion people (18% of the world population) relied on unsafe drinking water sources particularly in the developing regions of Asia and Africa[18]. In Sub-Saharan Africa the proportion relying on unsafe water sources was estimated at 42% resulting in 1.8 million deaths from diarrhoeal diseases every year[18]. This is detrimental to socio-economic development of these regions. A Malawi Demographic and Health Survey (MDHS) conducted in 2004 revealed that out of 11.8 million people in the country 64% had access to safe drinking water[12].

The Malawi government states that provision of equitable potable water supplies is central to poverty reduction as it has a direct impact on health status and therefore productivity[5]. The Government promotes transferring of ownership of rural water programmes to beneficiary communities and empowering them to operate, maintain and manage the programmes. To some extent rural communities in Malawi have contributed significantly towards the development of their water supply systems[3]. Malawi is committed to attain Target 10 under Goal 7 of the Millennium Development Goals (MDGs) through the Malawi Growth and Development Strategies, MGDS. The challenges to the achievement of the targets in the water sector in Malawi include poor coordination, particularly between government and non-state actors; fragmented donor efforts in the sector, inadequate extension personnel to disseminate information, absence of water facilities inventories, lack of access roads, centralized decision-making, low community educational level, lack of monitoring and failures in reporting; and absence of water information[5].

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Mulanje district is one of the best performing districts in Malawi as far as access to safe water supply is concerned. According to the integrated household survey for 2004-2005 the district was ranked 3rd out of 30 on access to safe water[12]. The proportion of the population in the district with access to safe water was 83.5% and was above the national figure of 64%[12]. The figure for access to safe water from the survey indicated that as a district it was on the right track towards attaining the Target 10 of the MDGs as it was above the linear MDG projected target for 2005 of 60% in the 2007 Malawi Millennium Development Goals report. The high water supply coverage in the district prompted a study to investigate the effectiveness of the CBM approach was in ensuring sustainability of the water programmes in the study area.

This study was carried out in the period February to April 2008 and investigated the sustainability of community based management of water programmes in Mulanje district where programmes had been implemented using the CBM approach. Sustainability indicators considered were the reliability of the system, human capacity development, local institutional capacity development and financing mechanisms as suggested by Narayan[11]. These indicators were investigated at village level as it is the lowest appropriate level of decision making. The district covers an area of 2,056 km² (Figure 1). The mean annual rainfall for the district is 1932 mm and the mean maximum and minimum temperatures are 28.7°C and 16.6°C, respectively[12]. Mulanje's population from the previous census carried out in 1998 was 428,322 and with an annual growth rate of 3% the population was projected to reach 575,000 in 2008[12]. It is one of the most densely populated districts in the country, with a population density of 271 persons/km^2 compared to the national average density of 145 persons/km^2. The population is unevenly distributed across the district due to the presence of large tea plantations, which leave the population concentrated in the periphery of the commercially owned estates. The headcount poverty level (individuals who reside in households with consumption lower than the poverty line pegged at MK16, 165(US$115.46)[1] per person per year) is 68.6% out of which 30.6% of the total population is classified as ultra poor (poverty level whereby the total consumption per capita on food and non-food items is less than the minimum per capita food expenditure pegged at MK 10,029(US$71.64) per person per year) against the national figure of 22.4%. Subsistence crop production is the major economic activity. The literacy level of the district is 75.3% against the national average figure of 63.9%[12]. The community depends on a combination of groundwater and gravity fed surface water systems. Dating back to the 1970s, a lot of water programmes were implemented in the district with support from the Malawi Government and international NGOs such as OXFAM, World Vision, COMWASH, GTZ, ADRA and Plan International.

METHODS

The data collection methods included focus group discussions, questionnaire-based interviews and physical inspection of the water facilities. The respondents were identified using the EPI method, named after the Expanded Programme of Immunization, based on its wide application by the World Health Organization in low-income countries because of its simplicity[1]. This stratified sampling method does not use detailed sample frames making it simpler to apply than the simple random sampling and other stratified sampling methods requiring detailed frames. The EPI therefore is favourable for low income developing countries[1]. The first step involved identifying 6 villages from 5 traditional authorities, TAs (the highest administrative level in the community setup into which the district is divided) where a community based water programme had been implemented in the previous 2 or more years from the time of the study. A 95% confidence level with ±5% confidence interval, which is taken as a standard for most social science researches was used to obtain the study sample size. Based on the population from the 6 study villages a total of 480 household respondents was established and was equally distributed in the study village resulting in 80 households being targeted in each of the 6 villages.

In each village, from a location near the centre of the village a random direction was chosen by spinning a bottle and random households were interviewed along the chosen direction pointing outwards from the centre of the community to its boundary as suggested by Bostoen and Chalabi[1]. Once the boundary was reached another direction was randomly established and the households chosen randomly and interviewed. This selection procedure was repeated until the required number of households was surveyed. In each of the 6 villages separate focus group discussions were held with the village health and water committee (VHWC) or village health committee (VHC) and all the water point committees except

[1] Based on the exchange rate of MK140 = US$1 for 2007

for villages having more than 3 water points chosen for study in which case a maximum of 3 WPCs were interviewed giving a total of 22 focus group discussion sessions. The key informants included officers from the Ministry of Irrigation and Water Development District Office, Mulanje District Hospital and Mulanje District Assembly (a local/decentralised government administration unit consisting of members elected from wards (councilors), traditional authorities (TAs) and Members of Parliament from the constituencies that fall within the local government area with day to day operations ran by government appointed personnel). TAs were not included in the study because in the current setup they act as ex officios in any community development programmes. Household representatives above the age of 20 were deemed to be conversant with the issues being investigated and were therefore targeted for interviews.

RESULTS AND DISCUSSION

Reliability of the system

System reliability focused on the functionality of water points, quality of water at the source, operation and maintenance of the water facilities and access to spare parts to keep the water facilities operational.

Functionality of water points

The results presented under this section are based on field observations on 30 water points by the researchers and focus group discussions (FGDs) with the WPCs. Table 1 shows details of the water points studied.

TABLE 1: STATE OF WATER POINTS IN THE STUDY AREA

Name of village	Total number of water points	Type of water point	Number of functional water points	Number of non-functional water points	Number of water points drying up in the dry season
Chipoka	4	3 taps 1 borehole	3	1	0
Njete	8	4 taps 4 boreholes	4	4	2
Nkanda	3	2 taps 1 borehole	3	0	1
Matekenya	2	2 boreholes	2	0	1
Kambenje	11	9 taps 2 boreholes	10	1	2
Sakhama	2	2 boreholes	2	0	1
Total	**30**		**24**	**6**	**7**

All boreholes in the study area were fitted with the AFRIDEV handpump. It was found that 80% (24 out of 30) of the water points in the 6 villages were functional. The high number of functional water points could be attributed to the age of the water points as only 25% of the water points were more than 4 years. A study by De Gabriele on Kalembo Groundwater Project (KGP) implemented in Balaka district in Malawi found that 97% of the water points were in good operational condition over 4 years after installation[3]. When the researchers probed if there were significant variations in the yield of the water points, it was reported that 23 out of 30 (77%) of the water points had water all year round with the remaining 23% (1 borehole in Chipoka, 2 boreholes in Matekenya, 1 borehole in Nkanda, 1 borehole in Sakhama and 2 boreholes in Kambenje village) drying up between August and November, which is the driest part of the dry season in Malawi. The proportion of the water points which were functional was high and most of them had water all year round.

Quality of water at source

The results presented under this section are based on focus group discussions with 16 WPCs and household interviews. The data from FGDs was used to verify that collected from household interviews. When asked if they were experiencing any problems with the quality of the water from the 30 water points studied, users of 2 water points in Matekenya village reported salinity in the water while a single water point in Nkanda village was reported to have turbid water. In Matekenya village close observation of houses made of unburnt bricks made from water from the boreholes revealed some white marks on the walls which could be indicative of sodium chloride. User rejection because of poor water quality is often underestimated by water engineers and this has serious consequences[7] as users tend to go for alternative

unprotected sources. The high number of water points with water of acceptable quality in the study area implied reduced potential for water borne diseases such as diarrhoea and cholera.

Operation and maintenance

The results presented under this section are based on focus group discussions with 16 WPCs. In the study proper operation refers to utilization of the facility in accordance with the manufacturer's recommended guidelines or instructions given to the committees during training. When asked if they received training on proper operation of the water facility, 65% of the WPCs reported having received training. Proper operation of water point facilities is critical in ensuring long life of the water facility components[10]. When asked about the nature of maintenance carried out on their water facilities, 25% of the committees (2 WPCs from Matekenya village and 2 WPCs from Njete village) indicated that they carried out preventive (replacing components before breakdown of the water facility) maintenance while the remaining 12 (75%) WPCs carried out corrective maintenance i.e. maintenance which is required when an item has failed or worn out, to bring it back to working order[13]. Studies have for example shown that the life of an AFRIDEV pump can go beyond 7 years with good training, routine maintenance and the availability of parts[10]. When the committees were asked about the availability of trained caretakers within the communities, it was found out that 12 out of the 16 WPCs had trained caretakers for the water points within the committee structure. In Kambenje village 2 WPCs did not have any caretakers for water facility maintenance and relied on hired mechanics from outside the village. In Sakhama village 2 WPCs indicated that though they did not have trained caretakers for their water points, they accessed trained caretakers from neighbouring villages. Availability of trained personnel is crucial for effective operation and maintenance of the system[7]. The study concluded that trained caretakers however were not thoroughly equipped for major maintenance as water point committees were relying on external support for major repairs hence the need for further training to handle such cases.

Access to spare parts and support

Results of this section are based on focus group discussions with the 16 WPCs from all the study villages. When asked about the availability of spare parts for the water facilities, 12 out of 16 (75%) of the WPCs reported that spare parts were readily available in stock for purchase when needed. The 2 WPCs from Sakhama village indicated that they had never bought any spare part as they had been given the spare parts by the service provider. Some 2 WPCs of tap-based water points from Kambenje and Chipoka indicated that spare parts were not readily available for purchase when needed. The spare parts were sourced from both informal and formal entrepreneurs most of whom were based at the nearest trading centres. According to the WaterAid Snapshot developed in 2001[15], water technologies are likely to be sustained if spare parts are readily available for all types of repairs whenever needed. Only 20% of the WPCs had spare parts in stock. At the time of study the water point committees were still getting external support for repairs and spares from individuals, NGOs and private companies. As a result it was difficult to assess the perception of the committees on the affordability of the parts. The study concluded that spares are readily available and a few committees stocked spares. However it could not be established whether the communities would be able to purchase and stock the spares without external financial support.

Human capacity development

Human capacity development investigated the existence and management abilities of the water point committees. It also assessed the knowledge and skills of the committees and communities.

Management abilities of committees

The results presented under this section are based on focus group discussions with 16 WPCs, 3 VHCs and 3 VHWCs. Each of the 30 water points had a committee in place. In Matekenya, Sakhama and Njete villages the WPCs fell under the VHCs while in Kambenje, Nkanda and Chipoka villages they were under VHWCs. According to Malawi CBM policy water point committees fall under the VHWCs which are mandated to operate as a mother body for all water and sanitation committees in the village so that water and sanitation programmes are implemented in an integrated manner[9]. The frequency of committee (WPCs, VHCs and VHWCs) meetings was also taken to be a proxy indicator of the effectiveness of the committees. When asked about the frequency of their meetings it was found that 12 out of 22 water and sanitation committees (16 WPCs, 3 VHCs and 3VHWCs) met at least once in a month. Some 9 committees reported meeting once in 3 months and only 1 VHC in Matekenya indicated meeting once in more than 3 months. Regular committee meetings are good for continuous operation of the committees as there is continuous feedback within the committee[9]. It was learnt that 20 (90%) of the water and sanitation committees rarely arranged meetings with the community members, a situation which could affect build up of trust and shared vision between committees and the community[7]. This has a potential to affect

willingness to contribute funds for O&M, thus affecting the sustainability of the programme. All water points had a WPC. In general the WPCs met regularly although they rarely held meetings with the community.

Knowledge and skills of committees and communities

The results presented under this section are based on focus group discussions with the 16 WPCs, 3 VHWCs, 3 VHCs and household interviews with 480 respondents. When the committees (16 WPC, 3 VHWCs and 3 VHCs) were asked if they had been trained for the role they were playing in the management of the water programmes, it was found that 10 WPCs, 3 VHWCs and 1 VHC had undergone CBM training. Aspects of the training included operation, maintenance and financial management. The training of users in water programmes promotes better use of facilities. However when the household respondents were asked it they were aware of the committee training, 45% were aware of the training with 22% of the total respondents being aware of both the training and its thrust. The untrained committees from Sakhama and Kambenje villages expressed willingness to be trained. For effective functioning of the committees there is need for the community to have the right perspective on the work expected of their committees[14] so that communities will be able to evaluate and demand better performance and also to give the committees support.

It was established that 65% of the household respondents attended at least one session on participatory health and hygiene education within 6 months prior to the time of study. Organization of such activities which draw together the community members provides a conducive platform for interaction and information dissemination thereby continuously developing and empowering them to identify their own problems, decide how best to overcome them, and make plans or seek appropriate solutions and assistance[17].

As already presented 12 out of the 16 WPCs under study had trained caretakers for the water points within the committee structure. However when the committees were asked on whether they received any external support in their day to day operations, 10 (63%) WPCs indicated getting external support from NGOs, individuals and private companies. Out of the committees getting external support, 8 indicated that the type of support had to do with maintenance of their water points which could be an indication that the first phase CBM training (concerned with minor maintenance) given to the caretakers was not sufficient to rectify all the types of technical problems on the water point, an area which is normally covered in the second phase CBM training dealing with major repairs. According to the WaterAid Snapshot such communities cannot be classified as being technically sustainable as some technical skills will have to be sourced externally. Despite the availability of trained committees and caretakers for effective operation and maintenance of water infrastructure, it appeared as if the skills gained during the training were not adequate. This was possibly due to the fact that the committees and caretakers received only first phase CBM training.

Local institutional capacity development

Local institutional capacity development focused on autonomy of communities and committees; systems for learning and problem-solving.

Autonomy of communities and committees

The results presented under this section are based on household interviews with 480 respondents and 22 focus group discussions with the committees. It was found out that the communities passively participated i.e. communities were recipients of externally conceived projects in which they had a role to play at different stages of the programme mainly by providing locally available resources[4]. A total of 14 (88%) of the WPCs and all the VHWCs and VHCs were formed by the communities themselves while the other 2 WPCs in Matekenya village established by the service provider. A total of 8 WPCs from Chipoka, Njete and Matekenya villages were formed before water facility construction, 6 WPCs from Kambenje and Nkanda villages were formed during facility construction while 2 WPCs from Sakhama were formed after installation of the water facility. When the researchers tried to establish how site selection for water points was done, it was found that 60% of the water point sites were selected by the implementers based on potential yield and 40% by the village heads based on their preferred locations within the communities. Full community participation is vital in the selection of technology and location in order to ensure that interventions match the needs in the communities[3].

Systems of learning and problem-solving

The results presented under this section are based on focus group discussions with 16 WPCs. The study findings revealed that all the WPCs in the study villages had rules and regulations for control and use of water facilities. The key rules and regulations common to all the committees included user household

contribution towards the water facility maintenance fund, prohibition of washing of clothes and bathing at the water point, proper operation (according to the manufacturer's guidelines) of the water facilities, ensuring hygienic state of the water point and ensuring fairness in access to water. It was established that 80% of all the WPCs had enforcement mechanisms ranging from reporting the defaulter to the Chairman of the WPC or village development committee (VDC) and ultimately to the village head. It can be concluded that most committees had rules and regulations on water point use and strategies to enforce them.

Gender

The study went on to explore the gender issues in the water programmes in the study area. It was found out that on average the composition of the committees was 6 females and 4 males though the decision making positions were dominated by males. All the interviewed committees indicated that it was feasible for women and men to work together in water activities such as water point construction, maintenance and participating in committees. Exclusion of groups on the basis of gender leads to unsatisfactory projects, which will usually prove unsustainable in the long term[3]. It was established that the community was of the opinion that the working together of women and men ensured that the different gender groups appreciate the nature of the problems in operating the systems, as well as service continuity and equal allocation of responsibilities between the gender groups. Both gender groups were involved in the water activities. It appeared however, that males assumed most of the decision making positions.

Financing mechanisms

This section presents and discusses findings obtained from focus group discussions with the WPCs and interviews with household respondents. Financing mechanisms focused on methods of raising funds for operation and maintenance (O&M) and community contributions in the different phases of implementation of the water programmes. The study established that the communities made both cash and non-cash contributions towards the water programmes. The non-cash contributions were in form of provision of locally available materials such as sand, quarry stone, bricks and rocks as well as providing labour during the construction of the water points. It was found out that only 30% of the respondents made cash contributions for operation and maintenance of the water points. When asked about the level of cash contributions for O&M, all the committees indicated applying a flat rate which ranged from MK20 (US$0.14) to MK120 (US$0.86) per household for the different committees. Concerning the frequency of contributions, 69% of the committees called for contributions whenever there was need for maintenance of the facilities. Hoko and Hertle also found out that most of the households made contributions only when there was a breakdown of the water point[7]. The expectation by some community members that the government should maintain water points and lack of trust in the water point committees, low appreciation of the importance of the contribution and the long distances between the water points and homesteads were the main reasons why some community members were not making contributions towards operation and maintenance. When asked how much they were paying and would be willing to pay towards the operation and maintenance of the water point, the average values derived from the household respondents were MK397 (US$2.83) and MK257 (US$1.84) respectively per annum.

At the time of the study 9 (56%) WPCs reported that they had some money in their operation and maintenance fund ranging MK300 (US$2.15) in Chipoka village to MK2910 (US$20.79) in Sakhama village. All the WPCs from Nkanda and Njete villages had no money in the water point operation and maintenance fund. The money was kept by the WPC Treasurers as none of the committees had a bank account. The specific uses of the water point operation and maintenance funds included purchase of fast wearing spare parts, paying the mechanics who maintained the water facilities and acquiring stationery for record keeping. However, 13 WPCs had no spare parts in stock. Studies in Ghana and Malawi estimated the average annual cost for operating a hand pump in the first 4 years as approximately MK1372 (US$9.8) going up to MK11620 (US$83) for a period up to 15 years[6, 10]. Based on the funds and the quantities of the spare parts available, it was concluded that except for WPCs from Sakhama village, the contributions collected by all the other WPCs were not sufficient to cater for expensive maintenance such as replacement of rising mains for boreholes. Considering the Malawi government recommendation of 250 people (63 households based on the national average household size of 4.5 members established during the Integrated Household Survey 2004-2005)[12] per water source, each household would contribute approximately MK25 (US$0.18) in the first 4 years and MK210 (US$1.49) for period up to 15 years towards the established annual cost of operating a pump if all the users contributed. Since most of the communities rely on agriculture, they could contribute agricultural produce to be later exchanged for cash. Basing on the official 2008 unit price of MK52 (US$0.37) per kilogram of maize, it would translate to each household having to contribute 5kg against the annual average household production of 130kg[8]. Financing for operation and

maintenance posed a threat to the overall sustainability of water programmes in the study area. It is possible that the communities could not appreciate the need for financial sustainability since they had not experienced serious problems with the relatively new water points.

Conclusions and recommendations

The reliability of the system in the study area was generally high with 80% of all the water points functional. Water from 28 out of 30 water points studied was of acceptable quality. Trained caretakers were available for 12 out of 16 WPCs. Some 75% of the WPCs had access to readily available spare parts. However 75% of the maintenance carried on water facilities was corrective in nature. Considerable work had been done on building up human capacity for sustainability of water programmes as trained committees were in place. The concept of financial sustainability within the CBM was poorly adopted by the communities as there was low level of financing of O&M with the cash contributions being made.

The study recommended that during implementation of similar projects, preventive maintenance should be encouraged as this will ensure reduced downtimes and reliable water supply. Regular follow up by government extension workers should be made to check on the progress of the meetings of committees as well as feedback meetings with the community as this is crucial in building trust between the community and committees and possibly increase the willingness to pay of the community. The importance of regular contributions which are adequate to fund operation and maintenance should be stressed in future programmes. Opening of bank accounts with microfinance institutions for the contributions should be encouraged.

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REFERENCES

1. BOSTOEN K and CHALABI Z (2006) Optimization of household survey sampling without sample frames. *Int. J. Epidemiol* 35(3), 751-755.
2. CHILIMA G, NKHOMA B, CHAVULA G and MULWAFU W (2001) Community based management approach in the management of water resources by different organizations in the Lake Chilwa basin, Malawi. *BASIS Progress.*
3. DEGABRIELE J (2002) Improving community based management of boreholes: A case study from Malawi. *BASIS Progress.*
4. GEFEN D, RAGOWSKY A and RIDINGS C (2008) Leadership and justice: Increasing non participating users' assessment of an IT through passive participation. *Information & Management* **45**(8) 507-512.
5. GUTIERREZ E (2007) Delivering pro-poor water and sanitation services: The technical and political challenges in Malawi and Zambia. *Geoforum* **38**(5) 886-900.
6. HANKIN P (2001) The Afridev pump-problems and solutions. Proceedings of the 27th WEDC Conference, Lusaka. 419-422 pp.
7. HOKO Z and HERTLE J (2006) An evaluation of the sustainability of a rural water rehabilitation project in Zimbabwe. *Physics and Chemistry of the Earth* **31**, 699-706.
8. LEVY S (2005) Starter packs: A strategy to fight hunger in developing countries? Lessons from the Malawi experience, 1998–2003. Wallingford, CABI.
9. MALAWI GOVERNMENT, MINISTRY OF WATER DEVELOPMENT (1998) Community based rural water supply, sanitation and hygiene education implementation manual, Lilongwe, Ministry of Water Development.
10. NAMPUSUOR R and MATHISEN S (2000) Report on the performance of Afridev and Nira handpumps on the upper regions community water project (COWAP). COWAP Field Paper 27.

11. NARAYAN D (1993) Participatory evaluation. Tools for managing change in water and sanitation. The World Bank, Washington, DC.

12. NATIONAL STATISTICAL OFFICE (2006) The 2006 Yearbook. Government Printer, Zomba, Malawi. Available from www.nso.malawi.net/, accessed on 10th December, 2008.

13. SHEUT C and KRAJEWSKI LJ (1994) A decision model for corrective maintenance management. *International Journal of Production Research* **32**(6) 1365–1382.

14. SILAVWE G (1995) The need for a new social work perspective in an African setting: The case of social casework in Zambia. *British Journal of Social Work* **25**(1) 71-84.

15. SUGDEN S (2001) Assessing Sustainability - The Sustainability Snapshot. Presented at WEDC conference in Zambia, Published in conference papers.

16. THE SPHERE PROJECT (2004) Humanitarian Charter and Minimum Standards in Disaster Response. Switzerland. Available from http://www.sphereproject.org, accessed on 10th December 2008.

17. UNICEF (1999) A manual on communication for water supply and environmental sanitation programmes. UNICEF, Geneva. :

18. WHO/UNICEF (2004) Meeting the MDG drinking water and sanitation; a mid term assessment of progress. WHO/UNICEF, Geneva.