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WATER, SANITATION AND HYGIENE:
SUSTAINABLE DEVELOPMENT AND MULTISECTORAL APPROACHES

Application of integrated water resources management in a local earthdam (Makhondvolwane) in Swaziland

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Makhondvolwane community is situated in the heart of the lowveld with rural type of livelihood blessed with an improperly managed Makhondvolwane (Mvutjini) reservoir. The dam was intended to supply water to a 100ha farm within the vicinity and for livestock watering. Since water in this region is scarce 64% households depended on the dam water for basic household use. With the irrigation scheme dysfunctional for over 7 years and water increasingly used for domestic needs there were concerns on the economic value and potential danger from livestock and boat riders with uncontrolled access and 50% of homesteads close to the dam without toilet facilities. It was therefore necessary to have a plan for development of the area facilitated by multi-sector stakeholders with emphasis on local stakeholder participation. Geographic Information System (GIS) tools were employed during the situation analysis and a plan for effective development of the reservoir and surrounding areas was developed.

Introduction

Swaziland Water Partnership (SZWP) is a national chapter of Global Water Partnership (GWP) which is a network forum that promotes Integrated Water Resources Management (IWRM). IWRM is an approach to managing water resources in a manner that considers all stakeholder interests (cross-sector) and advocates for a holistic approach (all facets of water in its cycle) to water development and management. The SZWP is currently in partnership with the Government of Swaziland in developing a National Water Master Plan pronounced as a key requirement for water resources development and management in Swaziland through the Water Act of 2003. The National Water Master Plan is developed within an IWRM project known as the "Partnership for Africa's Water Development" which is a programme of implementing National IWRM and Water Efficiency (IWRM/WE) Plans (declared a prerequisite at the World Summit on Sustainable Development (WSSD) in 2002) in African countries including Swaziland with support from the Netherlands government.

The IWRM/WE planning project work plan for Swaziland includes a component that aims at demonstrating the applicability of IWRM on the ground. The SZWP in implementing this component conducted reconnaissance surveys to identify a site for IWRM demonstration in the country in line with principles of IWRM (from the Dublin/Rio Conference on environment and development in 1992). A site at Kalanga, the Makhondvolwane earth dam was identified as suitable to support one of SZWP's objectives of advocacy for sustainable water resource development, management and allocation for environmental health, basic human needs, and food security.

This paper highlights the nature of a project implemented by the Swaziland Water Partnership and presents results from the project implemented with collaborating partners from different sectors, namely: KaLanga / Makhondvolwane and surrounding communities, Department of Water Affairs under the Ministry of Natural Resources and Energy, Lubombo regional offices of Ministry of Health and Social Welfare and Ministry of Agriculture and Cooperatives. Other partners are non-governmental organizations that provide community water, sanitation and agricultural services and these include Africa Cooperative Action Trust (ACAT), Swaziland Farmer Development Foundation (SFDF), and Swaziland Youth Employment Summit (SYES).

Location and description of the project

The project area is located in the central Lowveld of Swaziland with the Lubombo Escarpment on the eastern border and the lower Middleveld on the western border. The Mvutshini dam is the only major source of water for four communities namely, KaLanga, Matsetsa, Mpolonjeni and Mangolweni in the Lubombo Region. This lowveld area is characterized by a rural, subsistence farming and small scale livestock rearing especially cattle. As a result of low rainfall (Mean annual rainfall being 400 mm) and the scarcity of rivers yet the soil conditions are generally favourable the productivity in both livestock and crops is very low. That has resulted in an ineffective usage of the current potential of the area both in terms of land use and water resources utilization. The continuing stress experienced by rural communities in terms of increase in food prices and transportation is becoming unbearable. The inability to improve production makes a desperate situation even worse.

The Ministry of Agriculture and Cooperatives set up the earth dam mainly to irrigate about 100 hectares of land, but these communities have since used the water for domestic purposes, livestock watering due to water shortages. The dam has not dried up in 30 odd years despite the fact that it is located in a dry non-rocky area and its capacity is estimated at 515,000 cubic metres at an altitude of 260 metres above sea level (AfroGIS, 2008). However there has been an observed shrink in the water held by the dam as a result of silting and unreliable rain events and amounts.

Project objective

The demonstration project aimed at demonstrating how an IWRM approach to water management can help improve the sustainable management of the water resources in KaLanga at Mvutshini earth dam and thereby improve the well being and livelihoods of the KaLanga Community. Generally, the project was designed to improve income generation for the community by encouraging the use of small gardens, water conservation methods, reduction of water borne diseases, through improved water management and thus improve the well being of the community even from other spin-off initiatives that could be created by the project.

Problem statement

The water resource in the dam is limited and largely relies on annual precipitation with ephemeral small feeder streams. With increased drought in recent years compounded by lack of maintenance, the quantity of the water resources in the dam significantly decreased resulting in potential conflict among the different users. The water quality had also been severely polluted with human beings taking turns with livestock (Cattle, Pigs, etc) in “drinking” from the only water source available in the area, the Mvutshini earth dam as shown in Table 1 from results sampled at points shown on Photograph 1.

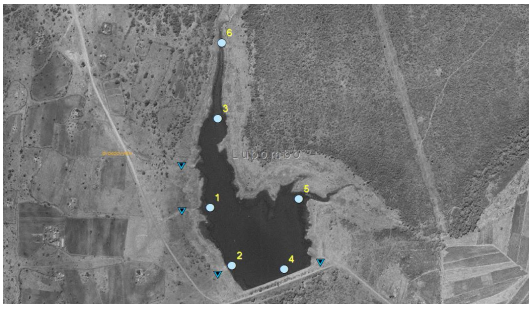
There was lack of awareness among the neighbouring community members on the need for improved water quality. Incidences of diarrhoea diseases were common as a result of heavy faecal contamination reaching the source directly with runoff, and heavy turbidity loads following rains. Results obtained from a situation study revealed the direct hazard posed by faecal pollution of human and animal origin in the water due to the fact that a significant number of homesteads (about 50%) close to the dam had no proper toilet facilities yet 64% of the area’s population relied on the dam for domestic use (see Figure 1).

Tourists from outside the community used the dam for recreation purposes like swimming, camping and would leave the dam and surrounding environment dirty, putting the KaLanga community members with more health risks as they used this water for domestic purposes such as cooking, and drinking. Tourists also fished in this dam, for leisure, and exploit the fish resources that community members relied on as a source of food.

School buildings and nearby homesteads were constructed using water from the dam leaving the water polluted. The dam was also used for religious purposes such as baptism and traditional rituals. Overall, there was lack of a comprehensive water management approach at Mvutshini. As a result, the dam had been heavily polluted, silted while it had been “shrinking in size” over the years. Women and children were at the receiving end of the lack of a comprehensive approach to managing the Mvutshini water resource with most of the women walking distances to fetch the polluted water from the dam while “competing” with livestock for the same water. Children treated the earth dam as a “swimming pool” while drinking from the same source and women spent hours there after attending to children suffering from diarrhea and related diseases. Conflicts had arisen among various stakeholder groups accusing each other of either “stealing” the water, polluting or depleting the fish resources in the KaLanga dam. There was no formal mechanism for the management of the water source and stakeholders had not attempted to address the problem.

Table 1. Water quality data results of the Makhondvolwane Earth dam							
Parameter	**Guideline value**	**Sample number**					
		6	**5**	**4**	**3**	**2**	**1**
Depth		3.40	3.58	2.98	3.13	3.14	1.30
Altitude		256.60	256.42	257.02	256.87	256.86	258.70
Biological							
Total coliform per 100mL	10*	649	1553	1414	1120	1986	770
Escherichia coli per 100mL	10*	2	4	3	11	2	2
Total Colony count per 1mL	0	555	414	507	4800	2570	738
Physical							
Total dissolved solids(mg/L)	500	319	343	346	352	354	352
Colour (mg/L Pt-Co)	15	9	10	10	10	13	10
Total Suspended Solids (mg/L)	10	20	6	12	10	8	2
Conductivity (µS/cm)	700	656	704	710	723	727	722
Chemical							
pH at 25°C	7 (6.5-9.5)	5.71	5.84	5.93	5.98	6.04	6.1
Nitrate (mg/L)	50	0.1	0.2	0.3	0.2	0.2	0.2
Alkalinity (mg/L)	500	219.38	216.51	220.66	222.37	227.69	228.33
Turbidity (NTU)	5	7.11	4.08	5.95	10.2	9.8	7.9
Chemical Oxygen Demand (mg/L)	30	25	28	22	27	20	24
Biological Oxygen Demand (mg/L)	24	10	4	11	1	4	24

Source: AfroGIS (2008).



Photograph 1. An aerial view of the Locality of reservoir sample points for the measurement of water quality and water sample collection sites

Source: WEDC – AfroGIS (2008)

The SZWP and other implementing partners applied a multi-sector approach to seek healthier and sustainable alternatives for domestic water supply and in the process to help the community organize themselves and gain knowledge and skills to protect their sole water source with minimal disturbance to the environment. The IWRM project organized the use of the dam even for purposes of eco-tourism, small agricultural production and other possible spin-off projects subsidiary to the original main use.

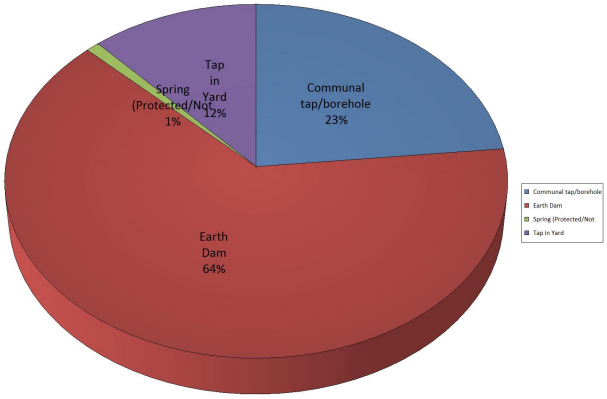


Figure 1. Percentage of households and sources of water for surveyed households at Makhondvolwane

Source: WEDC – AfroGIS (2008)

Scope of the project

This Project basically aimed at integrating all aspects that would ensure the use of the water source in a manner that recognized the interdependency of land and water issues during human development. It also contributed to the achievement of Millenium Development Goals by increasing access to safe water supply and sanitation facilities as well as developing communities' livelihoods and food security.

The SZWP project office coordinated all activities and stakeholders involved in the project. Situational analyses were performed through community meetings and implementers' meetings and by conducting a biophysical and socio-economic study. Participatory planning through meetings and workshops, stakeholders' analysis and assignment of roles and responsibilities was facilitated, and efforts to raise funds to implement identified projects were successfully undertaken.

The project involved:

- The construction of a low level bridge across the earth dam for purpose of access to opposite reaches of the earth dam which was supported by Ministries of Agriculture and Public Works
- The construction of drinking troughs for cattle to eliminate the current water pollution caused by sharing water use with livestock, construction of laundry areas, showers and development of a dam maintenance plan was facilitated by a local civil organization called SFDF
- The construction of pit latrines to control faecal polluting of the dam water by the community, training on construction of concrete water harvesters to supplement current water supply
- Setting up of an irrigation infrastructure and rehabilitation of the agriculture scheme that the dam was originally intended for facilitated through training on group formation and credit cooperative management
- Prospecting and drilling of boreholes in suitable sites to enhance potable water supply in the communities
- Generation of results on the area's environment and recommendations on other projects that could be undertaken to improve the community's livelihoods
- Youth empowerment to participate in water management through training facilitated by SYES.

All the project activities were implemented by the community members and committees for different activities were formed to oversee various aspects of the project.

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References

AfroGIS (2008) Biophysical environmental analysis and land use mapping of Kalanga Makhondvolwane, Mvutjini dam. Swaziland Water Partnership report: Mbabane

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