

**STAKEHOLDER PARTICIPATION IN WATER RESOURCES PLANNING AND DEVELOPMENT:
A ROADMAP TO THE SUSTAINABILITY OF MUTASA DAM IN WARD 6
OF BUHERA NORTH, ZIMBABWE**

Ellen Nhedzi Gozo

Lecturer: Department of Rural Development, Great Zimbabwe University, Masvingo, Zimbabwe

ABSTRACT

Water resources development is key to the improvement of both rural and urban communities. However, access to adequate supply of water by these communities has increasingly become a challenge in many parts of the world, mainly in the arid and semi- arid regions. To alleviate problems associated with water scarcity, most Governments have embarked on dam construction among other water development projects as a way to ensure availability of water to their citizens. In most cases, the development of dam water resources have remained the sole responsibility of central governments. However, central governments are under pressure to deliver social services with ever shrinking budgets and as a result, they have reduced funding for dam construction and water resources management. This has led to the failure of many Government initiated and financed projects. Additionally, these projects have often been viewed as Government projects and have resulted in lack of will by other stakeholders to sustainably utilize and manage water resources. Given that there are diverse players in the water sector, water resources development planning, implementation and management should no longer be the preserve of a few stakeholders as all have different roles to play to ensure sustainability of dam projects. This paper assessed the contribution of stakeholder participation in the planning, development, utilization and management of water resources with special attention to Mutasa Dam. This dam was constructed with full participation by all the key stakeholders who include the Government through different departments, a Non-Governmental Organization - Africare, the private sector, and Ward 6 community members. It was observed that the concerted efforts by all stakeholders have led to the successful development and sustainability of Mutasa Dam water resources project.

Keywords: sustainable development; participation; water resources development

INTRODUCTION

Water resources development is key to the improvement of both rural and urban communities. The development of water resources improves the quality of rural people in their localities through unlocking the irrigation potential of their respective areas; ensuring adequate supply of water in terms of both quality and quantity for meeting their agricultural, domestic, ecological, mining, industrial and social needs. This then leads to the realization that water is a basic necessity such that its management should no longer be the preserve of a few stakeholders (GOZ, 2000) and wherever water is situated, it is locally thought of as 'our' water (Ingram, 1971), therefore, in order to maximise the benefits of the water

resource and to ensure equitable use of water, the needs of all the water users (and discharges) in the catchment should be balanced (DWAF, 2004). These needs can only be assessed through effective stakeholder participation.

Stakeholder participation is in line with international conventions such as the Agenda 21 and The Regional Protocol on Shared Water Course Systems to which Zimbabwe is a signatory. To encourage stakeholder participation in the planning, development and use of water resource, Zimbabwe embarked on a water reform system which saw the initialisation of the Water Resources Management Strategy in 1995 with the assistance of the Governments of the Netherlands, Norway, United Kingdom and Germany and the promulgation of two Acts of parliament, namely the Water Act [Chapter 20:24] and The Zimbabwe National Water Authority (ZINWA) Act [Chapter 20:25] in 1998. These two Acts established stakeholder institutions namely the Catchment Councils and Sub-Catchment Councils. The water resources management strategy for Zimbabwe aimed at ensuring a fair share to all Zimbabweans and create an enabling environment for strong stakeholder participation amongst others. As stated in the Water Act [Chapter 20:24], the Government through the Ministry of Water Resources has been mandated to encourage participation by consumers in all the sectors referred to in paragraph (c) of subsection (1) and catchment councils in the development, exploitation and distribution of water resources (GOZ, 1998).

BACKGROUND INFORMATION

Water is a basic need for human societies. It is required in every sector of the human economies - agriculture, mining, energy, tourism, transport, manufacturing industry, fisheries and recreation. The functioning system of the biosphere is also dependant on water. Therefore, its availability dictates how well off a human society or an ecosystem is. However, access to adequate water supplies for both domestic and productive systems has continued to be limited in many countries across the globe owing to several factors such as global warming, pollution and unsustainable utilisation by plant, animal and human communities.

Several water harvesting techniques have been developed worldwide to curb the problems of water scarcity. Development of water resources through dam construction is one of the techniques that has been adopted by several governments. Dam water projects have provided many development opportunities in the places they have been implemented. Sustainability of some dams has however been compromised as many succumbed to breaching, massive siltation, over abstraction and pollution. Some identified possible sites have remained undeveloped for quite long periods, whilst some dams have had their foundations developed but construction never got finished. The reasons range from lack of enough financial resources, lack of technical support, poor catchment management, poor workmanship and natural disasters.

To ensure agricultural productivity of the rural poor, particularly in arid and semi-arid areas, the Government of Zimbabwe embarked on a massive dam construction programme to ensure that each district had some dams developed. The process included the identification of suitable dam sites by technocrats and dams were constructed on those sites with little involvement by the private sector and the rural populace who resided in those dam localities. This programme resulted in the construction of several large dams such as the Osborne in Manicaland. In some instances, irrigation projects were established accompanying the dam construction to assist the rural poor to increase their incomes through

increased productivity. The Government was the principal financier of these dam projects. Some dams were proposed but construction never started or never got finished. The proposed Muchakata dam in Chiwundura communal area is an example of dams whose development stopped before completion. The dam project was proposed way back in the 1960's, surveyed in the 1980's by the Department of Water Resources (DWR) and construction started in the 1990's. Only a coffer dam in the form of a masonry weir was constructed and the construction of the main embankment never took place. Most of the completed dams have however considerably lost their capacities to siltation due to inappropriate catchment management. Suri-Suri dam in Sanyati catchment is a very good example. This dam has lost over a quarter of its capacity to siltation. Some dams dry up during summer seasons, such as Mutorahuku dam in Chiwundura communal lands when irrigation demands are at peak thereby crippling crop production. Upon completion, dams constructed in Zimbabwe are fenced and gated for protection and to facilitate management. However, most dams have lost the fence to vandalism and theft. Overfishing is also a common phenomenon in these waters rendering the lakes unproductive fisheries eg in Siya Dam of Runde Catchment in Masvingo province. Over-abstraction and water pollution are also other forms of challenges associated with Government initiated, developed and financed water development projects. Cases of over-abstraction have also been recorded in the Mupfure River system.

Stakeholder participation becomes a very crucial element to ensure sustainability of water resources development projects as all sectors that utilise and require these water projects take part during all stages of the project development processes. Every stakeholder have a role to play. Intergrating stakeholders through participation ensures that all aspects of project planning, development and management are identified and dealt with appropriately by their respective stakeholders.

Starting from the early 1990's, upon the realisation by the Zimbabwean Government that there were several challenges in the water sector, an Inter-Ministerial Steering Committee was appointed to look into the issues affecting the water sector. The process saw the country reforming its water sector. The need for stakeholder participation was found to be one of the lacking links in the development and management of the country's water resources. Other areas to be reformed were to have decentralisation of water resources planning, development, implementation and management to the smallest possible unit – the sub-catchment level, to regulate water use by issuing monitored water storage and abstraction permits for purposes other than primary purposes, to treat water as an economic good and to avoid pollution of water sources. Following the water reform process, Zimbabwe has been said to be now leading the rest of Southern Africa in implementing Integrated Water Resources Management (IWRM), particularly the aspect of stakeholder participation (Manzungu, 2002).

Efficient water resources development, utilisation and management require active participation by all stakeholders. Several stakeholders exist in the field of water resources management in Zimbabwe. These include; the Government through its various departments (Department of Water Resources, Environment, Agriculture, Mines and Minerals, Natural Resources, Tourism e.t.c) that are directly or indirectly involved in water resource use and management through policy formulation, implementation and funding of water resources development projects; parastatals; non-governmental organisations(NGO^S) and private sector through planning, development and funding of water resources projects; research institutions and universities through environmental education and research; health sector; manufacturing industry; mining sector; farmers and the ordinary community members.

The management of water resources at the lowest level- in which those using the water play an active role in the planning and implementation of water resources projects- is vital for it produces a number of benefits. Participation generates a sense of ownership and stewardship for water development projects which helps to construct the social and political cohesion that is necessary for project sustainability and long term development planning and implementation. Serageldin (1995) indicates that participation has helped to incorporate local knowledge systems and circumstances leading to better designs and lower costs as demonstrated in Orangi scheme in Karachi, Pakistan. In Orangi, the communities took a center stage in the development of their sanitation facilities through provision of labour and management. Where users are involved in the development of their water resources, there is considerable reduction in financial and management burden on the Government, promoting sustainability. The World Bank (1993), asserts that as communities increase their participation in managing water resources, project selection, service delivery and cost recovery will likely to improve. Serageldin (1995) further postulates that participation by locals encourage greater cost sharing and better maintenance, promote equity, build local capacity, enhance transparency, accountability and institutional performance.

The participation of women has also been found to be especially important because women are the majority of the populations living in the rural areas of Zimbabwe and they are the principal managers of domestic water. Chenje, et al., (1996) indicates that in Southern Africa, women are the main managers of environmental resources. Women fetch and supply drinking water for their families and are heavily dependent on rain-fed agriculture and in some parts of the region, fisheries, hence special attention should be given to the participation by women in water resources development projects because they always want to ensure sustainability of their water resources.

This study sought to assess the contribution of stakeholder participation in water resources development with particular attention to Mutasa Dam in Buhera District of Manicaland province of Zimbabwe.

METHODOLOGY

The research made use of both primary and secondary data sources of information. Interviews, questionnaires and direct observations were employed to collect primary data. Information about the participation process during the planning and development of Mutasa Dam as well as the measures that had been put in place to protect the dam and its catchment from degradation, was gathered using interviews and questionnaires. The interviews targeted some key informants such as the coordinators of the dam project who included the Ward Councillor and Village Development Committee (VIDCO) chairpersons during the period when Mutasa Dam was constructed, Africare officers and some village heads. Questionnaires targeted the general community members who were drawn from the total population by means of a stratified random sampling procedure that separated the population into those who volunteered to participate in the construction of the dam and those who did not. Physical or direct observations were carried out to assess the state of the catchment. Information about the climate, population characteristics and distribution was obtained from published reports of the Central Statistical Office of Zimbabwe and through an interview with the then Councillor. Catchment area delineation and catchment characteristics were derived from satellite imagery (SPOT IMAGE) as well as direct observations during fieldwork.

STUDY AREA

Ward 6 of Buhera District lies in the country's Natural Region 4 which receives an annual precipitation of about 450mm to 600mm. The bulky of this precipitation is received during the wet summer season that usually stretches from mid-November to April. Central Statistical Office, (2001) indicates that these main rains are associated with the Inter-Tropical Convergence Zone (ITCZ). June is the coldest month with minimum temperatures hitting below zero degrees Celsius (0°C) and October is the hottest month with maximum temperatures averaging thirty three degrees Celsius (33°C).

The population distribution and household characteristics of the ward are illustrated in Table 1. Females constitute fifty four percent (54%) of the total population. This translates to 85 men per every 100 women.

POPULATION ATTRIBUTE	VALUE
Total population of the ward	8041
Population of males	3705
Population of females	4336
Sex ratio	85.4
Total number of household in the ward	1784
Average size of households	4.51
Rate of natural increase (percent)	1.6

Table 1: Population characteristics of Ward 6, Buhera District, Manicaland Province, Zimbabwe. Source of information: (CSO, 2004)

Rain-fed subsistence agriculture in the form of crop and livestock production is the mainstay of the people of this ward. Maize crop, rapoko, groundnuts and roundnuts are the main crops grown. Millet was once a widely cultivated crop; however, due to invasions by the *Quelea-quelea* bird species, production is now limited to very few households. Livestock production is mainly concerned with cattle and goat rearing. Cattle ownership ranges from some households having none at all to some households having up to close to fifty cattle, translating to an average of 6 cattle and 4 goats per household. There are mainly four categories of land uses in the area which are; cultivation land, green gardens, pastures and homesteads or built up areas. Captured in Figure 1, are the fields and wetlands of Ward 6.

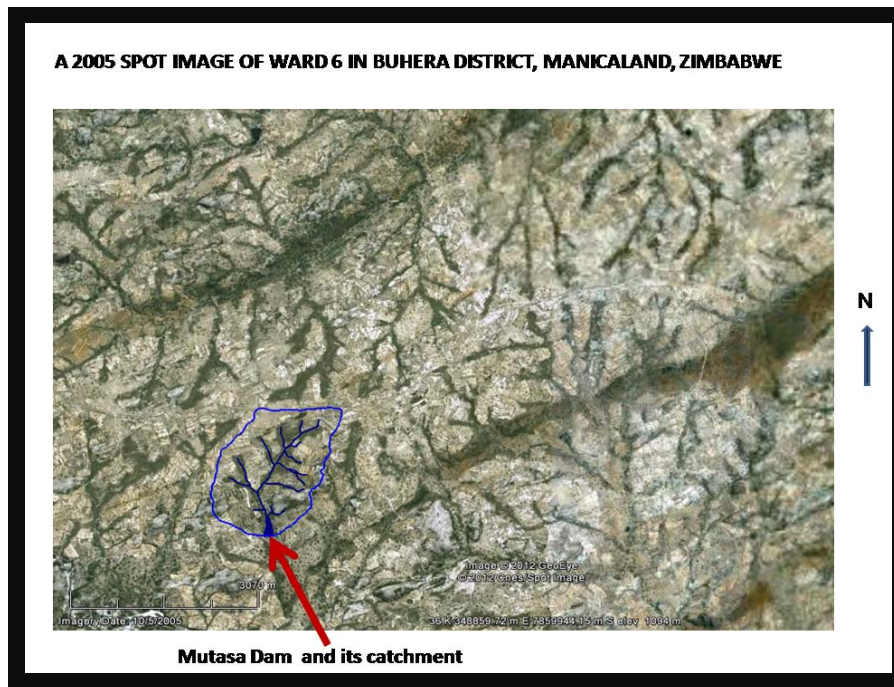


Figure 1: An image showing the overview of Ward 6, Buhera District.

Almost every homestead in the area has a well from which they draw water for both domestic water supply and for irrigation of small nutrition gardens that are situated close to the water sources. Homesteads without wells are mostly those situated on rock outcrops or dwallas. The well depths range from less than a meter to slightly above ten meters. Some gardens are situated in plains, closer to pools and along streams and rivers. Horticultural crops, at a very small scale, are grown in these gardens. These include green vegetables (rape, covo and sweet cabbage), onions, tomatoes, winter maize and wheat.

Cultivation in the fields is done using cattle drawn ploughs and weeding is done manually using hoes and cattle drawn cultivators. Nutrients are added in the agricultural fields as cattle manure and inorganic fertilizers in the form of Compound D and Ammonium Nitrate. After harvesting, crop residues are either kept on elevated structures locally referred to as *mutanho* for livestock supplementary feeds during the dry season of the year or retained in the fields to maintain soil fertility. Feeding of the cattle is done within their kraals so as to increase the production of cattle manure which is beneficial to the restoration and improvement of the agricultural soil structure and fertility.

RESULTS AND DISCUSSION

Since the 1981/82 drought the whole district of Buhera begun to intensively experience the adverse effects of climate change through increased incidences of droughts leading to the shrinking of water resources in the area. The dwindling water resources were also not spared by population growth that worsened the situation as more pressure was exerted on the limited resource through increased demand for both domestic and agricultural water requirements. More and more wells were dug, more virgin and forested land being opened up to pave way for new homesteads and for agricultural use. More livestock units were introduced into the grazing system worsening the predicament. Water started to disappear from the Ward's river systems during the dry periods of every year turning what were once perennial rivers into seasonal

rivers e.g. Mahwengwa River. The wells started to dry up during dry months especially during the month of October. This had an adverse impact on domestic water supply, nutritional gardens and livestock production. The community had to deepen their wells further until they could no longer dig deeper due to an inhibiting hard parent rock that exists beneath the catchment area's surface. Some tried blasting the rock using dynamite but this method proved to be too weak to overcome the resistance of the underlying granite rock.

Community members had then to walk for very long distances to fetch water for meeting their daily domestic needs from other catchments. For example, residents from Munetsi Village had to travel to Nyazvidzi River, which is about 4 kilometers away, for watering their livestock, wash and bath, maintain nutritional gardens and fetch water for domestic uses. Due to the long distance, their livestock could not visit the water points frequently and were no longer getting enough water to maintain their health needs and hence most livestock units were lost to malnutrition and water scarcity related diseases. Most nutritional gardens were abandoned. This compromised the nutritional needs of the communities and their sources of livelihoods as some depended on selling horticultural produce to meet other needs such as funds for acquiring basic commodities. Their main source of energy in the agricultural field is drought power, therefore, there was need to maintain a healthy and powerful herd to ensure food security. Manure is the main source of fertilizer in their agricultural land and nutritional gardens, hence, less livestock units meant less manure production and hence reduced yields.

These and other problems such as conflicts surrounding access to limited available resources, mainly land closer to Nyazvidzi River and drinking water from community boreholes that are deeper than individual wells, led to the realization by the communities that they needed a more secure source of water.

To alleviate the ward's water crisis, the community through their Councillor and traditional leadership, came up with an initiative for assuring themselves of adequate supplies of water for at least meeting the needs of their livestock and gardens all year round as well as for domestic water supply especially for the hard hit villages namely; Mutasa, Munetsi, Mapanzure, Masvosva, Mutaramuswa and Dhigi Villages through damming of water. The community sought for assistance and they got help from several institutions which included the Government and Non-Governmental Organizations.

The Government through District Development Fund (DDF) provided the technical support including carrying out a topographic survey of the area to determine the suitable dam site, carrying out the dam designs, preparing the bill of quantities and costing of the project. Financial resources predominantly came from Africare. It also provided construction equipment such as a Dozer D6, front end loader and a water bowser. The Provincial Administration office, with coordination from the Provincial Administrator, provided equipment that included a tipper. Agricultural Research and Extension Services (AGRITEX) helped with technical advice, disc ploughs and 8 tonne lorries to ferry construction materials. Construction labour was wholly provided by the Ward 6 community members.

A section along Mahwengwa River was identified as the most suitable place to construct an embankment. Given the fact that the area is not endowed with larger rivers whose mean annual runoff can yield significant water that can accumulate at any one place and create a huge lake, the dam was however going to be a small earth dam. Mutasa Dam with a

capacity of 65 000 m³ and a catchment area of 3.5km² (which is shown in Figure 2), was constructed at a section along Mahwengwa River at 19°22'29 S and 31°31'17 E with an elevation of 1082m (height above mean sea level). The construction of Mutasa dam started in 1991 and ended in 1992.

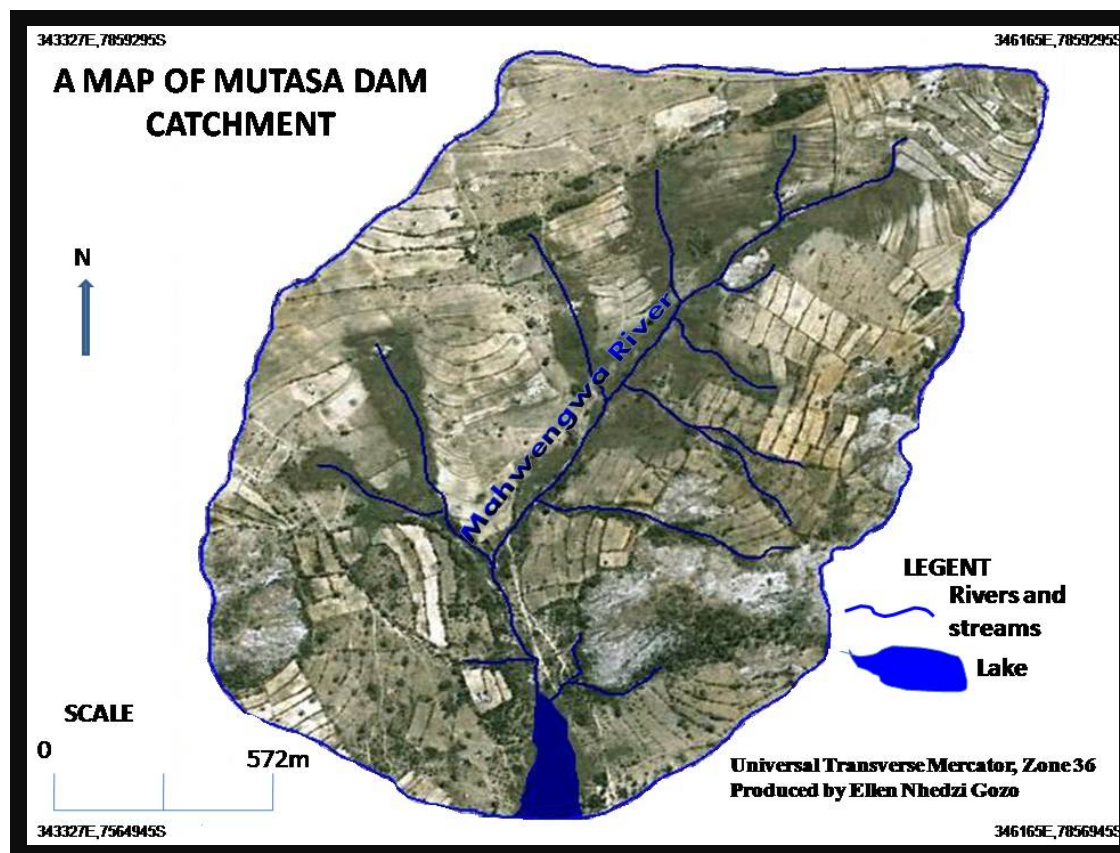


Figure 2 : A map overlay showing the catchment outline and a SPOT image of Mutasa dam drainage basin

Participation by the community members

The community was involved in all the stages of the project cycle that is, from project identification, site selection, setting up, construction and commissioning of the project. They are still actively involved in the maintenance of their dam and management of the dam catchment area as well as other water resources of the area. The community voluntarily provided labour in all the civil work of the dam project. The main construction materials –rocks and earth fill - were obtained from Gandanga Mountain and the nearby anthills respectively. People ferried the construction materials using hands and wheelbarrows to collection points where they were loaded into tippers and lorries and then transported to the dam site. They also provided labour in the clearing of land using hand axes, hoes and machetes; excavation using hand digging tools – hoes, picks and shovels; core filling using earth fill and rocks and compaction using hand compactors known as rammers. It was very hard and exhaustive work but the community members persevered for the development of their rural area. As a way of physically and emotionally encouraging themselves, the project was termed *Majapata* – implying hard work that needs to be persevered. They worked very hard towards the successful completion of their project because they were aware of the benefits the project could bring. They also considered the project as theirs because they were part of every development stage and above all, they were challenged by a much worse situation of water scarcity.

At completion, like all other dams constructed in Zimbabwe, Mutasa dam was fenced and gated. Some fish species were introduced into the dam. These included the *Oreochromis macrochir*, *Oreochromis mossambicus*, and the *Tilapia rendalli*.

Mutasa Dam water resource utilisation

The dam is the main source of water for watering livestock from several villages of the ward. These include Munetsi, Mapanzure, Masvosva, Mutaramuswa, Mutasa and Dhigi Villages. The water is also directly used for maintaining horticultural gardens situated just outside the fence of the dam mainly for the Mapanzure Villagers. The dam again supports the protein requirements of the community members through subsistence fishing. Fishing is mainly done using hooks. The community has however been faced with a new challenge of poachers who come to fish at night using nets. The lake also acts as an entertainment centre for the youths in the area where they converge to socialise, fish and swim. Families come to wash and bath at the lake. The dam also provides water for other domestic needs, other than drinking, through direct abstraction from the lake. Two shallow wells have been dug close by to provide drinking water when most household wells are dry during the dry seasons.

The dam also supports flora and fauna of the area. Other than fish, the lake does support a variety of marine creatures such as frogs, crabs, turtles, snails, snakes, water birds and ducks. The trees, shrubs and grasses surrounding the lake are quiet healthy as they have their water and nutrient needs adequately met by the lake. Several indigenous wildlife species such as hares, hyenas, duikers, jackals etc, have their water needs met by the dam.

Catchment management for the sustainability of Mutasa Dam

Several strategies have been put in place in the dam catchment and the whole ward at large to ensure that the water resources of the area are protected against degradation by the Department of Natural Resources (DNR), DDF, DWR, AGRITEX, NGO's and the local community members.

The DNR and the DWR, through the Acts of Parliament, the Natural Resources Act [Chapter 20:13] and the Water Act [Chapter 20:22] respectively, had provisions for the management of natural resources such as land and water resources from the project planning phase, implementation and operation up to the year 2000. After 2000, these resources were now regulated through the Water Act [Chapter 20:24] and the Environmental Management Act [Chapter 20:27]. These Acts advocate for sustainable management through regulating use and pollution of natural resources.

There is a very powerful local structure that protects the catchment from deforestation. Trees play a very important role in the hydrological regime of an area. Amongst several functions, forests reduce the erosive force of water thereby encouraging infiltration and reducing soil loss. This is important for maintaining the capacity of the dam and recharge of groundwater sources leading to the rising of the water table that leads to long term recharge of the lake and the river systems through base flow. Trees are not allowed to be cut for the purposes of fuel wood. Trees are only allowed to be cleared for homestead setting up and for construction materials and it should be done with the approval by the village

head. Cutting down of trees is also not allowed in certain reserved forests such as Kudhibha and no trees are allowed to be cut within the fenced area of the dam. Anyone caught on the wrong side of the law is prosecuted.

Cultivation is not allowed within a radius of thirty meters from water sources. This is done to provide a buffer zone between loosened soils and the water sources and to allow plant growth that reduces the velocity of flowing water thereby reducing its erosive power and also providing frictional force that allows the settling of sediments before reaching the water source.

Cultivation is also done across slopes to encourage water to accumulate in ridges thereby increasing infiltration and hence reducing the effects of runoff. Refer to Figure 1 and Figure 2 for illustration.

The use of sleighs to transport ploughs has also been banned. Sleighs loosen soils as they crush the top soil making it prone to erosion leading to the creation of gullies. All fields have been protected from erosion by the construction of contour ridges at an average interval of about (thirty) 30 meters as shown in Figure 2. Contour ridging also function as a water harvesting technique whereby runoff is reduced and infiltration increased thereby increasing soil moisture and groundwater recharge. The contour ridges are vegetated with grass, trees and shrubs. They collect excess water and drain it into designed waterways that feed into the river systems of the area. The waterways are also vegetated thereby reducing the amount of silt that can be carried into rivers.

Grazing lands are designated in flood plains and mountains because these have grass species that are suitable for grazing as they are capable of rejuvenating in response to grazing. The dominant grass species in the area are; the *chloridion cameroni* (*tsangadzi*), *erogratia raceme*, *erogratia chapelieri* and *chloris pycnothrix*. Within the fenced area of the dam, grazing is also prohibited. Livestock are driven directly to the lake and driven out as soon as they finish watering. Veld fires are strictly prohibited and there are very few incidences of veld fires in the area. The few incidences are accidental; however, thorough investigations are conducted to ascertain the causes of each veld fire incidence. These are usually restricted to dry months when vegetation is dry.

Mixed cropping is very much practiced. The communities mainly mix leguminous crops with grain crops. The main form of mixed cropping involves planting groundnuts, sweet cane, cowpeas and maize; roundnuts, cowpeas, sweet cane and maize; or simply maize and cowpeas. The advantage of this method is that, apart from nitrogen fixing by legumes, groundcover is kept at optimum making the agricultural lands less susceptible to erosion.

There are gully reclamation programmes that are always performed in the area to reclaim gully areas. This is done by filling the gullies with rocky materials and soil. Some gully reclamation are carried out under the auspices of the Food-for-Work programme, whilst some are strictly voluntary.

Afforestation has been practiced under several community gum-tree (*Eucalyptus*) plantation projects in the area where community members come together and convert some barren lands into gum tree plantations that are run by community members. When gum trees are mature, they harvest some poles leaving enough stumps to encourage rejuvenation, sell and share the proceeds. Examples are the Zininga and Munetsi Gum-tree Projects. At homesteads, the community

members have adopted a habit of planting fruit trees such as guava, mango, peach and avocado trees either scattered in the fields or in designated orchards.

The majority of Ward 6 community members are very much concerned with the management of their water resource. They actively participate in the maintenance of the dam itself and the catchment area because they consider that they initiated this development and have gone through a lot of hard work to implement this development project. Some members of the community still have visible physical scars they acquired during the construction stage when they were crushing stones in Gandanga Mountain. The area has been experiencing frequent dry years and the dam has been an invaluable source for livestock watering. It is also the main support system of the green gardens of most families in the dam catchment. Since the construction of the dam, most wells closer to the dam have not been experiencing acute water shortages as the water table of the area has been partially raised.

In some instances, there are however some cases of environmental degradation activities such as cutting down of trees for different purposes, setting up gardens closer to river systems and fishing using small sized nets by some of the community members. Local institutions are at play to protect the environment against individuals who engage in these unlawful activities. It is the role of the village heads, the headmen and chiefs to deal with such cases with the powers vested in them through the Traditional Leaders Act, [Chapter 29:17]. The general community members are very cooperative and active in the implementation of their bye- laws. Anyone who finds a fellow member of the community on the wrong side of the law reports the member to the village head who handles the case. When the case is too severe for him to handle, he refers it to the headman whom when confronted with challenging issues refers to the Chief. The Chief also has some watchmen who are always moving around their areas of jurisdiction making sure that the community members abide by several laws of the area. At traditional courts, a fine of a beast (cattle) is often charged for environmental crimes. Cattle are a valued form of wealth in Buhera district and indeed across the country and as a result, many people do not risk losing their cattle to fines. If the case is beyond the Chief, he refers the matter to the civil court at Murambinda Growth Point where it then follows the country's ladder of the judicial system until it gets to the highest courts. Environmental crimes are also dealt with through the provisions of the Environmental Management Act [Chapter 20:27] and the Water Act [Chapter 20:24].

Water quantity

Mahwengwa River is not gauged and hence the amount of river flow that accumulates into the dam is not known. No lake level measurements are available as well. According to the local communities, the dam has been receiving enough runoff to feed the dam to its full supply level on several years since its construction as evidenced by yearly spilling of excess water except for the 2001/2002 rainy season. Due to frantic efforts by all those living in the catchment to conserve both the soil and water, the dam has not lost much of its capacity to siltation. A silt survey that was conducted to determine the levels of sedimentation in the dam indicated that since commissioning in 1992, the dam has only lost less than approximately 2% of its capacity to siltation. This is contrary to the situation with most dams that were constructed almost at the same time. A study carried out on Chesa Causeway Dam by Mavhima, et al.(2011) indicates that the dam had lost 66% of its capacity to siltation from 1991 when it became functional to 2011.

Water quality

Sources of water pollution are nutrients from agricultural fields, forests and pastures together with detergents from washing of clothes and bathing in the lake. Ninety eight percent of the households in the dam catchment have pit latrines therefore incidences of open defecation are minimal. Domestic wastes are disposed off in pits located at homesteads. These are usually sanitized through burning of flammable inorganic wastes and burying of decomposing wastes as composites to form manure which is then later returned into the fields to improve soil fertility. There is however little evidence of nutrient pollution as there are few colonies of algae visible on rock surfaces submerged in water. No vegetative growth at all was observed in the lake. The water is not clear indicating the presence of suspended and dissolved solids. No negative impacts on the irrigation of horticultural gardens, fish production and livestock have been recorded so far since the development of the dam.

CONCLUSION

As prescribed in the Dublin principles, community participation is a prerequisite to the success of many water resources development programmes (Chenje, 2000). Zimbabwe has heeded this call and is seriously considering stakeholder participation in its water resources planning and development. The Government, Africare, AGRITEX, and Ward 6 community members came together to bring a water development project in the form of Mutasa Dam. The project saw a very high degree of community participation in all phases of the project, an attribute which often lacks in many development projects. This boosted the morale of the community members and encouraged them to voluntarily provide labour during all the phases of Mutasa dam planning and development as well as developing some catchment management strategies to ensure sustainability of their hard won development. Mutasa dam which was constructed through the effective involvement of different stakeholders, is one of the success stories of sustainable development in this era where natural resource use always lead to the degradation of the environment.

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REFERENCES

- Chenje, M., P, J., & (eds). (1996). *Water in Southern Africa*. Maseru/Harare: SADC/IUCN/SARDC.
- CSO. (2004). *Census 2002, Provincial Profile, Manicaland*. Harare: Central Statistical Office.
- CSO. (2001). *Compendium of Statistics 2000*. Harare: Central Statistical Office.
- DWAF. (2004). *Guidelines for Stakeholder Participation in Integrated Water Resources Management in Water Management Areas in South Africa: Summary*. Pretoria: Department of Water Affairs and Forestry (DWAF), RSA.
- Fellmann, J., Getis, A., & Getis, J. (2004). *Human Geography: A landscape of human activities*. New York: John Wiley and Sons.
- GOZ (1998). *The Water Act; Chapter 20:24*. Harare: Government Printers.
- GOZ (2000). *Towards Integrated Water Resources Management; Water Resources Management Strategy for Zimbabwe*. Harare: Government Printers.
- Ingram, H. (1971). Patterns of Politics in Water Resources Development. *Natural Resources Journal, Volume II, Number 1*, 102-118.

Manzungu, E. (2002). *The Processes and Dynamics of Catchment Management in Zimbabwe*. Harare: Save Africa Trust Publications.

Mavhima, G., Soropa, G., Makurira, H., & Dzvairo, W. (2011). Sedimentation Impacts on Reservoir as a Result of Landuse on a Selected Catchment in Zimbabwe. *International Journal of Engineering Science and Technology*, Vol 3 , No. 8 .

Serageldin, I. (1995). *Toward Sustainable Management of Water Resources*. Wasgington D.C.: The World Bank.

World Bank. (1993). *Water Resources Management: A World Bank Policy Paper*. Washington D.C.: The World Bank.

ABOUT THE AUTHOR:

Ellen Nhedzi Gozo is a lecturer in the Department of Rural Development at Great Zimbabwe University, Masvingo, Zimbabwe.