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Community Initiatives in Water Quality Management in Simiyu Wetland in the Lake Victoria Basin, Tanzania

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Abstract

The quality of drinking water is critical for human health and well-being. Quality is assured by treatment, but also by the quality of the source. The lower the quality of the source, the higher the treatment costs. As natural ecosystems, wetlands provide social and economic benefits to human life. These benefits include, among others, irrigation agriculture, fishing, water supply, groundwater recharge and discharge. Discussions and Participatory Rapid Appraisal (PRA) activities were widened in scope to investigate community initiatives in water quality management in Simiyu wetlands of Lake Victoria basin, Tanzania. Key findings showed that community initiatives in water quality management include education programmes, monitoring of water hyacinth, catchment examination and evaluation, forestation, well fencing environmental management, prohibition of cutting down trees along the water basins, influencing drilling and using toilets, cleanliness, avoiding construction of wells in flooded lowlands, and buffering water courses for irrigation and for livestock. However, these initiatives are constrained by little awareness, less enforcement of laws, poor governance of local government, inadequate capital, poor capacity of institutions and negligence that reflect low sense of ownership.

Keywords: *wetland, water quality, community initiative, Lake Victoria basin*

Introduction

Freshwater is a basic natural resource, which sustains life and provides for various social and economic needs. In its natural state, water is an integral part of the environment whose quantity and quality determine how it can be used. Safe drinking water and good sanitation practices are basic considerations for human health. The use of contaminated sources poses health risks to the population as evidenced by the incidences of water-borne diseases such as diarrhoea and cholera. As natural ecosystems, wetlands

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are an essential part of the ecology, and like any other resources they provide social and economic benefits to human life, whether directly or indirectly. These benefits include, among others, irrigation agriculture, fishing, water supply, timber production, transport, recreation, tourism, papyrus, sediment/toxicant retention, flood control, groundwater recharge and discharge (Kakakuona, 2001; de Voogt *et al.*, 2000). Wetlands also serve as refuge for threatened indigenous fish species (Chapman *et al.*, 2003). There is currently a growing appreciation of the natural functions of wetlands, and the values and different forms of uses that humans attach to them. Wise use and special conservation strategies are, therefore, needed in order to sustain their productivity.

Wetlands are one of the most fruitful areas of archaeological research, and they are the ideal setting in which to study the interactions between physical processes and human actions that encapsulate and exemplify many of the themes of man's impact on his environment (Williams, 1990; 1991). Worldwide, wetlands are known for their ability to support a large human population. Many authors (Odum, 1971; Simmons, 1981; Maltby, 1986; Dugan, 1990; Kamukala, 1993; Mihayo, 1993; Stuart, 1990; Mwanuzi, 2003) stress that wetlands are, and will continue to be, essential to the health, welfare and safety of people who live in or near them. Simmons (1981) affirms that wetlands are among the most productive ecosystems and thus deserve special attention. But all these beneficial functions of wetlands seem to be in danger of being lost to draining and in-filling. The major causes to wetland degradation include competition for resources, especially water, conversion of wetlands for agricultural and urban purposes and sectoral responsibility for management (Howard, 1992; Chisara *et al.*, 1999 & Mwakalila, 2006).

The Simiyu wetlands in the Lake Victoria Basin (LVB) are not exceptional to these causes of degradation. The observed rapid population growth in the region is significantly reflected in the increased population pressure on wetland resources, and this leads to environmental degradation. History shows evidence that water quality in Lake Victoria is declining. Lake Victoria is surrounded by many industries and houses, and is, also, an area for many economic activities of the ever growing population. Human development has contributed to water quality deterioration. In Tanzania, population growth has caused expansion of agricultural activities, livestock keeping, deforestation, biomass burning, navigation, poison fishing,

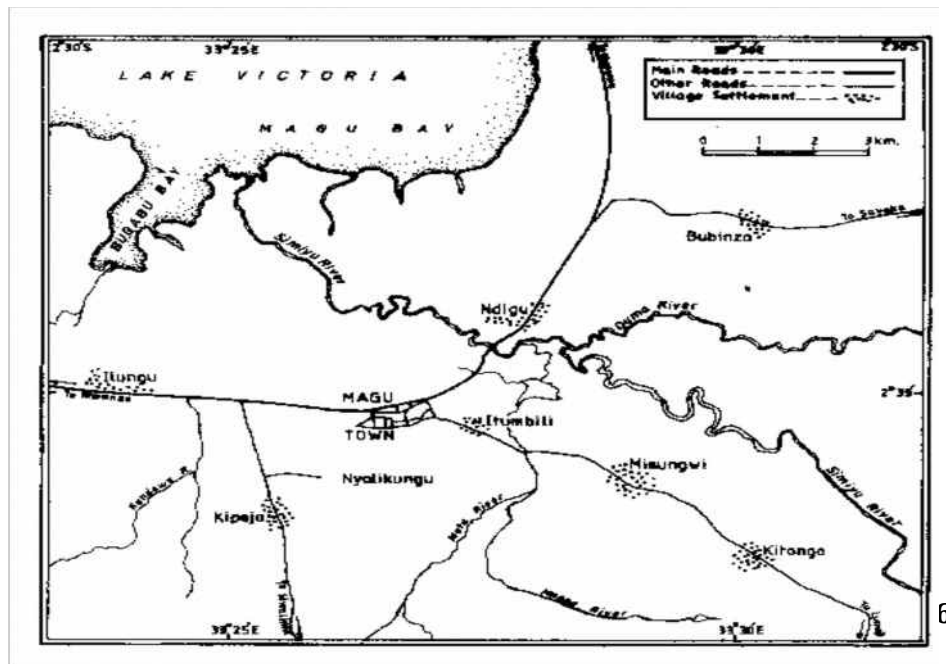
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untreated sewerage depositing and human settlements in the LVB. All these have exerted pressures within the basin, and increased levels of pollution from non-point sources and have led to land degradation.

This paper attempts to address community initiatives in water quality management in Simiyu wetlands in the Lake Victoria Basin, Tanzania. Water quality characteristics include physical characteristics such as colour, temperature, taste and odour, as well as chemical characteristics such as acidity, hardness and the concentrations of various constituents such as nitrates (NO₃), sulphates and dissolved oxygen and man-made pollutants, including pesticides and herbicides. Water quality in Lake Victoria has declined greatly in the past few decades, owing chiefly to eutrophication arising from increased inflows of nutrients in the lake; phosphorous has risen markedly in the deeper lake waters and nitrogen around the edges. Because of increased diseases, over 200 indigenous fish species are said to be facing possible extinction.

The study area

The study focuses on areas that are around the Simiyu wetland which is a sub-catchment of Lake Victoria basin (Figure 1). The study area is located in Magu district, Mwanza region. The Simiyu wetlands extend between 33°23'30" – 33°28'50"E and 2°30'30" – 2°35'00"S. The altitude of the wetland ranges from 1134 to 1137 metre above sea level.



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Figure 1: *The Location Map of the study area*

The wetland is fed mainly by Simuyu River whose tributaries (Simiyu and Duma) originate from of Shinyanga and Arusha regions. It is a sub-catchment of Lake Victoria Drainage Basin. The Simuyu wetland comprises of a diversity of habitats, including swampy area, rivers, ponds, seasonally inundated grassland, bushland, and rivers. The swampy area is dominated by *Cyperus papyrus*, and is associated with sedges, reeds, cattails and other plant species. The floodplains and drawdown are used for agricultural purposes.

The study was conducted in Magu District in four wards, namely: Urban, Lubugu, Sukuma and Kahangara. Six villages were studied, and in these a total of 122 households were administered by one questionnaire each. At every study area, probability sampling was used to acquire respondents. While the wards and institutions were selected through purposeful non-probability approach, villages and households were selected in simple random process. Prior to the study, non-probability technique was used to get the core unit. Validity and reliability were ensured through a selection of a true representative sample of the population with proper and relevant study questions that were used. Similarly, freedom from bias was ensured by giving each respondent an equal opportunity, thus enabled a significant score of the information that was disseminated.

Determining Water Quality

The knowledge, perception and understanding on good water quality and attached significance varied among factors of age, sex and education. Many people agreed the quality of water to be good although the determination of the same quality was a puzzle as it was based on belief, everybody's use, a mere naked eye observation and a lifetime use of the same source. A big gape of unawareness of the quality of water was discovered. Awareness and significance of good quality water influence water quality management, and are influenced by the same. Some institutions have education programmes of imparting awareness to the community on the significance of water quality. TASAF, **Fishing** and agriculture only deal with water quantity while the Magu Urban Water Authority, **Forest, Livestock, Health** and LVEMP impart education to the community through extension services, individual and group contacts, seminars, meetings, workshops, leaflets and radio programmes. Therefore, the community's awareness on the

Are these institutions?

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importance of water quality and dangers of water pollution through individuals is delivered on the bases of formal education, representative village leaders, gatherings and discussion, seminars, dissemination of pamphlets, posters, Beach Management Units (BMUs), Maji Week, **Committee Based and Extension services.**

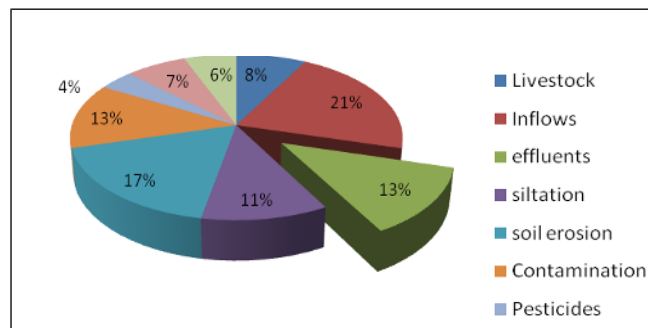
Proper Water Utilization and Importance of Good Water Quality

Water utilization is of big concerned as 89% of respondents perceived proper and wise use of water resource on the bases of socio-cultural grounds. However, 11% raised a concern on improper and mismanagement of human actions that reduce the quality of water. The community is aware of, and in need for, good water quality. The demands are anticipated to bring outputs of preventing water related diseases like typhoid, diarrhoea, cholera, schistomiasis, and skin diseases, promoting human social well-being health wise, and suitability of resource use for mankind. The experienced outcomes of good water quality like drilling wells in the social bases include education, health improvements, reduction of water related diseases and increased provision of water. Economically, availability of both sufficient and quality water increased time for production. On the environmental bases there have been reduction of pollution, land and water management through permanent livestock keeping influenced by LVEMP, forest and livestock sectors.

Causes of Water Pollution

From interviews and discussion with farmers and fishermen who have different settlement locations; upper and lower settlements along the shores of Lake Victoria and the delta of Simiyu river respectively. Both groups acknowledged water pollution to be caused by livestock keeping, Simiyu river inflows, effluents, siltation, soil erosion, contaminations and cotton pesticides. Duma and Matu rivers are tributaries of Simiyu River whose water inflows feed Lake Victoria.

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Figure 2: Awareness on Causes of Water Pollution

However, the contradiction was where each group perceives the external and /or colleagues' involvement and contribution in water quality deterioration. Whilst farmers in the upper land recognizes that fishermen are the worst water polluters as they do not have and do not use toilets during their activities and they wash everything in the lake, on their part fishermen understand the polluted Simiyu river in the upper land pollutes the lake when the river is flooded and contaminated with sediments, mud and pesticides. The knowledge gap on the causes of water pollution is obvious; and people who do not know the causes of water pollution can hardly know the overcoming techniques. Agricultural activities concentrated along the lake, such as farms of cotton and vegetable gardens, pollute the lake with pesticides, insecticides and chemical fertilizers.

On the point of awareness again, fishermen understand that their activities never pollute water; and that water pollution is an abnormal condition occurring when there is wind storm that blow big waves from one shore to another. Both farmers and fishermen emphasize that water pollution is an issue that has no limited area as Simiyu river flows as far as Arusha region, therefore pollution is not confined.

The Balanced Relationship between Human Activities and Water Pollution

Human populations survive through economic activities, which pollute water bodies when they are done carelessly within a veil of ignorance. The mismanagement and continuous waste disposal into the water bodies are both problematic and of great danger. Water is a solvent body, thus wastes directed into it should, and have to, be treated before. **Washing in water courses, bricks making closer to water source cause siltation and soil erosion that reduce the depth of the water body, a zero livestock drinking, domestic and industrial wastes disposal, and agriculture and horticulture activities pollute water sources.** The interrelation between human activities and pollution of water has to be checked. The local community failed to interlink between the two, this being the case, imparting awareness is significant, required, so ultimately should be taken into consideration. The gape of

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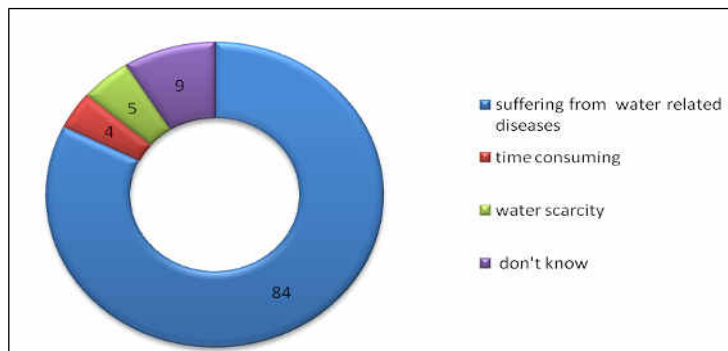
awareness of what when done deteriorate the quality of water is also an issue.

Impacts of Water Pollution

The impacts of water pollution are obvious. The community has been suffering for some time, and every now and then it has associated some of its problems, more especially health, with poor quality water. However, the cycle of pollution and suffering has momentous characteristic since no initiatives for measures have been taken to avoid—or at least reduce—human actions that are the causality. What seems to apply here is Leopold's (1968) adage: "Till taught by pain men really know not what good water's worth."

As what was discovered to be a traditional, but more of accustomed condition, water scarcity was perceived as a normal seasonal situation that has to come every summer and go away during the rainy season. So, the society is sorrowful and in difficulties during summer, and gets rid with all the lamentations when it begins raining. **Much time is lost, people walking down to the river for water at distant place and, that; however has low quality, buying from water vendors, and reduction of time for production. The case of inequality among different settlements also came in, how that people closer to water bodies like the lake have no water tapes for getting quality water while the same water are pumped very far to people in town.**

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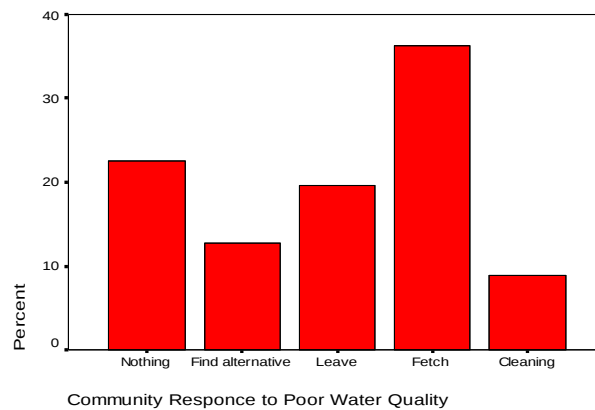
Figure 3: Effects of Poor Water Quality

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Little participation of the community, externalities behaviour, lack of individual's initiative and the common use regime have overcome and discouraged the willingness of managing water quality by few individuals. Only 8% opt for finding out at least an elementary technique of managing the quality of water through cleaning.



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Figure 4: Community's Response to Poor Water Quality

The majority finds a shortcut short-lived method of finding an alternative source and returning to the same after the next need, postponing fetching for a while, and when no alternative available one opts to fetch the anti-consciously accepted poor quality water.

Measures for managing water pollution include education programmes, monitoring of water hyacinth, catchment examination and evaluation, forestation, well fencing environmental management, prohibition of cutting down trees along the water basins, influencing drilling and using toilets, cleanliness, avoid constructing wells in flooded lowlands, and buffering water courses by 60metres for irrigation and 0metre for livestock. Response of the community to anti-pollution measures applied by the institutions range from positive, ill-participation, difficulty, egoism, to positive good response. Resistance challenges some measures such as a 60metres buffering zone is perceived to be a very long distance, thus a total disagreement.

The Health Sector Curative Department for example, when discovers water quality is poor informs the Preventive and Sanitary Department which in

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turn communicate with the Water Authority after laboratory examinations for further measures, however the Water Authority is poorly equipped. Other measures include imparting education, and influencing shifting livestock, Biological control, manual removal, water hyacinth, quarantine regulations involves and participates the local community. LVEMP monitors, evaluates and reports the water quality status to the Ministry of Water and Irrigation.

Community's Awareness and Participation in Water Quality Management

“Of all the substances that are necessary to life as we know it on earth, water is by far the most important, the familiar, and the most wonderful; yet most people know very little about it.” (Leopold, 1968). Lack of awareness on how, why and who to manage the water resource is of great concern. Some people have the will and aim to manage the water; however, they lack the means to accomplish their desire. This group is just small. Majority still wander if they should involve in managing water quality for every body, while receiving neither a cash appreciation nor a vote of thanks after, while they conceive that being none of their responsibility. This outlook is the result of a veil of ignorance of which sustainable solution is imparting education on the relevance between human life and the environment in general and water in particular. Environment and water management can be achieved through raising public awareness and understanding of the essential linkages between environment and development, and to promote individual and community participation in environmental action. (NAEPO,1997)

Influence and collaboration programmes of the role of the institutions in managing water resources indeed its quality is significant in water resources management and sustainable water utilization. Despite the justification of collaboration and integration, institutions such as Hospital, Water Authority, Fishing and Agriculture have neither water management programmes nor influence to the community. On the other part TASAF, Forest, Livestock, Health-Preventive Department and LVEMP influence the community in managing water quality through education, forestation, village representative leaders and capacity building involve directly and indirectly in influencing water quality management.

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Some collaboration programmes with the community in water quality management like manual removal, carrying out weevil rearing and release, meetings between District Medical Officer (DMO) and Ward Officers, bricks making for dam construction, food insecure projects, skilled labour, village executive officers, a top-down collaboration and management Monitoring and evaluation of water hyacinth situation, survey of ponds, aerial survey and research.

Responsibilities on Managing Water Quality

Community's perception on the role of the institutions which are related to water in water quality management varies from good, gradual, passive and negative response to the institutions. The positive responses encourage and support efforts of water quality management whilst stiff negative reactions demise the morality of the institutions and individuals in fulfilling their obligation in water resources management.

Good number of water users understands that maintaining quality of water is part of their duty, 66.7% think of being responsible. Though some do not consider that they should make effort for managing water quality, this then, is an outcome of lack of influence. The obligation is sometimes understood through leaders' and community's influence as one respondent says, "Unless the local leaders influence or even give an order, individuals have no mandate". Therefore, even if people consider being responsible, the implementation rests on continuous remind for people to fulfil their responsibility, from which outcomes they benefit. Participation is through doing cleanliness all together, a must attend village campaign and local leaders influence.

Those who do not participate directly in any water quality management activities have variety of views: lack of leaders strong influence, people at Bugabu village who draw water direct from the river and the lake never heard such an opinion ever given, the elongated Simiyu river and wider lake Victoria are unmanageable, the effect of externalities where one cleans another pollutes, some thought that it is not a one person activity, after all is not employed in the water sector. Moreover the factor of awareness is an issue where one sees no reason of perceiving water quality management being part of one's responsibilities.

An unique reason for not participating in cleaning the water source," a well" at the local unit was given by some women at Kisamba street in Bubinza

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village where Kisamba well is not cleaned by women. It is a local taboo that prohibits women from participation. It is rooted in a cultural perspective attached with a traditional taboo meaning that women are dirty in every month during menstruation period. The taboo is deeply rooted in cultural beliefs that Kisamba well has an un understood miracle; it is perennial that had never dried, it has fishes which are also strictly prohibited to be consumed.

This a gender concern point of reference. Women are the most water users who suffer much when water is scarce, if they are not integrated in managing the same it is a big mistake. While the motions for water quality management advocate a transformation from unit-sectoral management approach to the integrated multisectoral and multidisciplinary approach such traditions is no longer relevance.

Delegation of Responsibilities for Managing Water Quality

From the interviews to water users it was discovered that not everyone considers water quality management as one's responsibilities. 69.3% of respondents consider being obliged to manage water quality. Their reasons are so strong; because they are water users, being potential victims when quality of water is degraded , in order to get suitable quality water and peoples' well being health wise that has a significant contribution to economic growth, there is no way but to take an initiative in managing water quality. The understanding of a synergy between availability of quality water and socio-economic development both directly and indirectly is of great significance when it is timely implemented. This group implements the water quality management through participating in making cleanliness in the water catchment under a village campaign where every body has to be involved. Such a local water management of a small local well gives a general implication for initiatives that can be employed for managing the entire lake.

The leisure faire group 30.3% that practices externalities no matter how much influence have been made, delegate the responsibilities of managing water quality to any else. Negligence, an un used culture of managing water sources and unawareness prevail the problem. They strictly and highly delegate such responsibilities to water sector, local leaders, their member of parliament and the central government in general. It is perceived this way under the shadow of having no capital, inability, unmanageable elongated

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Simiyu river and wider lake Victoria, lack of equipment, low capacity and male's obligation in the case of Kisamba well.

Challenges to Water Quality Management

Although there is a will and initiative efforts employed for managing the water quality, there has been difficulties and hindrances to some measures undertaken. Among others is the problem of lack of capital and low capacity reported at Sayaka and Bugabu villages, people have will with no means. Equipment for drilling deeper wells and cleaning, poor and old water infrastructure reported at Magu urban and inadequate treating chemicals like chlorine.

Lack of awareness still play the worst role, ignorance hinders even the conscious of managing water quality, people at Bugabu village and Ndigu Street in Bubinza village sees no significance for such actions. Historically and traditionally water is not managed, and if at all it is, it is done at household level like filtering in single bucket or left for sometime for sediments to settle down. People have been using the same water from the same source for all life long and they are not affected, this signifies that water is clean and no doubt safe.

Dodging and ill-participation of some community members are again another constrains. People who withdraw themselves from this duty some are in the veil of ignorance and negligence while others wait for an external coercive to push them into a participatory process. This anti- participatory behaviour is common in all villages at all levels from a small well to a large lake management. Also, it was perceived as a solution to do away with disadvantageous activities that are not valued by some individuals whose deliberately activities like washing in the water body and livestock drinking pollute water.

Environmental externality is both a controversial and contradictory factor that limits the achievements in managing water quality. The opposing positive and negative forces of actions being stagnant and several times the negative forces overcome the efforts of managing water quality. Whilst the positive actions produce benefits of water quality the negative ones maximize costs of management. The fishermen at Bugabu village in a lower catchment area suffer from pollution externalities from people at the upper settlement.

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The initiative and process of managing water quality face multiple challenges and problems are constrained by little awareness, less enforcement of laws, poor governance of local government, egoism, inadequate capital, poor capacity of institutions and negligence that reflect low sense of ownership. Consequently the challenges turned into problems of theft of water pipes, low quantity of water supply, ill participation and lack of integration, lack alternative source of energy that has accelerated deforestation due to demand of fuel, resistance and risking life of attendants because of hostility of law breakers. Sometimes the governance and politics have caused power overlap and conflicts of interest between executives and politicians. The implementation of programmes of water supply and quality management suffers from destruction of water infrastructure, inadequate human resource and negative response.

The discussion with respondents came out with several significant solutions that will endure water quality management. Proper utilization of water resources has a great importance in water quality management. This includes avoiding mismanagement activities such washing body, utensils and clothes in water bodies, differentiating and buffering areas for human economic activities and water for domestic use, avoid human activities closer to and within water catchment that have been proved to cause siltation, soil erosion and pesticides percolation from agriculture.

A firm participation, collaboration and partnership among water users and all stakeholders has to be upheld. It is the relevant and direct solution to the problems of externalities, ill-participation and dodging. However, people's participation will be influenced and derived by understanding the potentials of water quality.

Education and capacity building are longer lasting solutions for overcoming the water inequality problem. Lack of awareness in the general community is big and perhaps a serious one. Unless people are acknowledged on the value of water for human life, significance of good water quality, dangers of water inequality and means for maintaining the quality of water; the battle against water pollution is very difficult. Water is life when well maintained the opposite means life is at risk.

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Enforcement of laws, by-laws, regulations and rules is another approach. This if practiced with justice helps to rule over on those who act astray, obligation dodgers and system resisters. The system includes punishments such as fines. In Sayaka village, for example, their by-law impose TZS 10000/= per head per each abscondment in water cleanliness campaign. At Itumbili, Kitongo and Bubinza a local polluter pay principle rule applies. The legal principles have to countercheck with economic principles such as taxation and license, moreover they have to substitute the weaknesses of economic principles such as the market failure of under pricing and the public good regime.

The water quality management has to be sustainable. The long lasting solutions include research and survey for adequate information, provision of adequate capital, increase the number of expertise, capacity building, participation of all water stakeholders, education and extension services, interdepartmental collaboration, project rehabilitation, a good network expansion, establishment of Village Water Committees, community sensitization, availability chemicals for water treatment such as chlorine, good governance, accountability and strong leadership commitment that facilitates integration in water quality management. Public awareness and dissemination of information through radio and television programmes,

Conclusion

Community Initiatives in water quality management include education programmes, monitoring of water hyacinth, catchment examination and evaluation, forestation, well fencing environmental management, prohibition of cutting down trees along the water basins, influencing drilling and using toilets, cleanliness, avoid constructing wells in flooded lowlands, and buffering water courses for irrigation and for livestock.

Good number of water users (more than 60%) understands that maintaining quality of water is part of their duty. However, the initiative and process of managing water quality face multiple challenges and problems. The measures are constrained by little awareness, less enforcement of laws, poor governance of local government, inadequate capital, poor capacity of institutions and negligence that reflect low sense of ownership.

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