Communication for Change: Altering Die-hard Attitudes, Beliefs and Behaviour through Knowledge Sharing on Lake Victoria Pollution

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Abstract

This paper reports the findings of a study that set out to establish the attitudes, knowledge, beliefs and behaviour of local residents towards the environmental pollution on Lake Victoria in Tanzania. The study employed four methods in the collection of data, which were analysed both quantitatively and qualitatively using SPSS and NVIVO computer programmes respectively. The main findings are that: residents of Mwanza were aware that the lake was polluted mainly by their own activities, yet they hold the government responsible for its failure to control the devastation. They also recognised that an effective communication framework among the stakeholders to avert the devastation does not exist. It is, therefore, concluded that, there was a need to initiate a strategic partnership between the government and the mass media to curb the increasing pollution on Lake Victoria.

Keywords: environmental pollution, attitudes, knowledge, beliefs and behaviour

Introduction

The significance of environmental knowledge and awareness in people's lives does not need to be over-emphasized. The environment is an integral part of people's existence. The principal elements of the environment such as air, land and water are so crucial to human life that they can only be ignored at human peril. As they carry out a number of activities for their lives, people need to understand the ecosystem so as to give it fair treatment. Environmental knowledge and awareness are concerned with an individual's self-understanding of the co-inhabitants of the earth and inter-relationships with among biological diversity of animals and plants. The major goal of environmental knowledge is to encourage an individual to develop the ability to make thoughtful decisions. Such environmental awareness will create an environment that allows people to lead quality lives. Environmental knowledge and awareness are concerned about

developing a citizenry with: Knowledge about the biophysical and socio-cultural environments of which mankind is a part of; Awareness of environmental problems and management alternatives for solving those problems; and Motivation to act responsibly in developing diverse environments that are optimum for living quality life (Southgate & Disinger, 1987:177).

Increased pollution in water bodies in general, and in Lake Victoria in particular, exacerbates the death of animals and fish that live in water. Regrettably, this water pollution considerably comes from pesticides, cleaning agents, inorganic materials, and chemicals from manufacturing industries. Land pollution, on the other hand, results in soil erosion that causes siltation in lakes. Keating (1993) aptly describes land pollution as a source for damage to and loss of forests that consequently causes soil erosion, reduces biological diversity and wildlife habitats, degrades watersheds, and reduces the amount of fuel wood, timber and other products available for human development (Mgaywa, 2002:19).

One major environmental resource in East Africa is Lake Victoria, the second largest lake in the world and Africa's largest. It is bordered by three East African countries, namely Uganda, Tanzania, and Kenya. The Lake serves as the principal headwater reservoir for the mighty River Nile, and the most important water source for Egypt and the two Sudans (Sudan and South Sudan). Lake Victoria also provides food and fresh water for domestic, livestock, agricultural, and industrial use, besides transport, recreation, tourism and biodiversity. According to Ong'ong'a et al. (2001), more than 30 million people in the region depended on the Lake for their livelihoods. The lake is a major source of fish protein for people in East Africa as well as the European Union (EU) countries, Israel and Australia (ibid.).

On the Tanzania side, Mwanza is a lakeside city that not only straddles the Lake, but more so, depends on it for livelihoods. However, it is also a culprit in occasioning human-induced pollution on the lake. According to a report by the Mwanza City Council Capacity Building Environmental Management (CBEM, 1998), the City covers an area of 1,325 km^2 of which 425 km^2 is dry land area, and 900 km^2 is covered by water. About 90 km^2 of this area is urbanised. The remaining areas consist of forested land, the valley and cultivated plains, glassy undulating and rocky as well as hilly areas. Mwanza city was founded in 1892 as a regional administrative and commercial centre to control

mainly export production of the surrounding cotton growing areas of the lake zone. In 1978, Mwanza obtained the status of municipality in line with the previous local government structure established in 1972, and was promoted to city status in 1999.

With an estimated population of 706,453, Mwanza is the second largest city in Tanzania, after Dar es Salaam. The other cities are Arusha, Dodoma, Mbeya, and Tanga. Its accessibility to national and international means of transportation such as air, water, roads and railways contributes to its high population density. The City has several large industries, such as fish processing industries, breweries, soft-drinks manufacturing plants, bakeries, timber industries, ginneries, foam and plastics industries, tanneries, soap factories and animal feeds industries (CBEM, 1998), many of which contribute to the lake's pollution.

It is argued that the human population is the main culprit of the Lake Victoria pollution problem. The reasons behind this often irresponsible pollution of the Lake upon which many lake side dwellers depend for their livelihoods include ignorance, negative attitudes, misleading beliefs and negative behaviour towards the lake. These are likely to be related to lack of, or inadequate communication that would otherwise help Mwanza city residents develop knowledge, attitudes and behaviour which could lead to the effective conservation of Lake Victoria. The contribution of human activity to Lake Victoria cannot be underestimated. According to Mpanda (2005, March 16), economic and human activities generate substantial quantities of both solid and liquid wastes. Presently, the estimated rate of solid waste generation in Mwanza city stands a little more than 1.0kg per capita per day. Thus, the amount of solid waste from domestic, institutional and commercial activities is estimated at about 1,000 tons/per day. Industrial solid waste, largely from factories and industries, is similarly estimated. On a daily basis, therefore, about 2,000 tons of solid waste is generated in the city daily (Mpanda, 2005, March 16).

Lake Victoria is an important natural resource benefiting nearly 30 millions of people in Kenya, Uganda, and Tanzania. The increasing pollution of Lake Victoria is, therefore, a major source of concern to large number of people including the residents of the city of Mwanza who are 706,453 (2012 Population and Housing Census, Tanzania). According to Ong'onga et al. (2001), population of Lake Victoria can be looked at in two areas: point source of pollution and non-point source of pollution. Point source of pollution refers to major pollutants and their municipalities such as oils and grease from garages, petrol stations, oil companies, ships and

train engines; breweries effluent and sludge from Tanzania Breweries (TBL) Mwanza depot; sewage overflows due to blocked sewers, manholes, septic tanks and simple pit latrines; blood and fats, fish particles and waters from slaughter houses and fish processor and filleting factories, and more pollutants of similar kind. Non-point source pollution, on the other hand, refers to agriculture which injects evidently poisonous chemical fertilisers and pesticides into the open water systems. The application of fertilisers causes nutrient intrusion into river systems and affects both the river and lake ecosystems. However, the increased inflow of nutrients into the lake undergoes limited eutrophication.

Phosphorus and nitrogen concentrations have risen and algal growth has increased five-fold since 1960s. A shift of algal flora composition towards blue- green algae is causing de-oxygenation drawing water from the lake, clogging of water intake filters and increased treatment costs for urban centres. The report goes on showing that deep water species have sharply declined, and periodic upwelling of hypoxic water has caused massive fish kills (CBEM, 1998:2-5).

Intensification of agriculture to meet the fast-growing population's demand has created many environmental problems such as large-scale clearance of forests, drainage of land, and destruction of flood plains. These human excesses have resulted in increased soil erosion and high loads of silt and nutrients transported through rivers into the lake. The pollution of Lake Victoria has such far-reaching repercussions as nearly 30 million people in East Africa Uganda, Kenya, and Tanzania depend on the Lake for their livelihood. In fact, the rapid increase in population and industrial activities in the major lakeside cities of Kisumu, Mwanza, and Kampala have cumulatively and significantly contributed to the pollution of Lake Victoria. Indeed, in the course of carrying out their socio-economic activities people have caused serious environmental degradation of the lake.

This exacerbation in agricultural terms, for example, through the clearance of natural vegetation for cultivation of land and swamp drainage, and increased irrigation also affect the lake water level. In addition, the urbanisation process has resulted in the discharge of untreated industrial effluents, sewage and other types of pollution that are incessantly off-loaded into the lake. The Department of Natural Resources and the Environment (1997) provides a preliminary assessment of the extent of the impact of all these changes in the lake. It is predicted that there will be a significant decline in level of the lake up to about 300mm over the next 20 years.

The fishing industry is a leading environmental degrading sector in the city. In the beginning of the 1980s the sector was commercialised, and there was a great incentive for more people to engage in fishing. The enactment of the Environmental Species Conservation Act reduced the number of small-scale artisanal fishermen. This Act regulated the mesh size and prohibited beach seining. In consequence, the number of small-scale fishermen dropped from 2,500 to 1,000 in 1998. Up to 1998, there were eight fish fillet processing industries, and a number of local people working as fish processors (smokers, friers, sundriers and salters). The eight large fish industries employ 1,000 workers (Fish processing association, annual report, 1998). The framework survey (1998) indicates that 98 percent of the fishing takes place on Lake Victoria; the rest is river fishing, which is done during the rainy season to catch anadromous fish.

The ICLEI (1997) report claims that some fishermen apply chemicals in fishing. A cotton pesticide is estimated to be the most widely used poison. These pesticides are used together with coffee pesticides. The major motive behind this fishing technique is to get quick catches and cash. Apart from the health hazards of these fishing techniques, breeding grounds get completely wiped out in the process. Chemical fishing is primarily used on tilapia fish which breed in shallow waters along the lake shore, particularly in areas where there is water grass, need and papyrus.

The fishing methods that are detrimental to the regeneration of the fishing stock are illegal, but are still widely practiced. According to the report by DANIDA (1996), beach seining, which is done in shallow water, remains a common practice in most fishing villages, although conducted clandestinely. Although this practice is extremely wasteful of juvenile stock in addition to the destruction of breeding and rearing areas, many fishermen treat it as the lifeline for fishing communities. Fishing nets with tiny apertures are also in wide application. Often times mosquito nets are also used as fishing gear. Though the government introduced new regulations in 1994 to prohibit the use of such gear, the laws are not effectively enforced. Many fishermen complain about declining incomes and, hence, agitate for the use of using small mesh nets year- after-year. The consequence of this fishing practice is that juvenile fish stock are caught and depleted, hence leading to degeneration of fish species.

The industrial sector in Mwanza city is important in that it employs a large number of people; nevertheless, this sector pollutes Lake Victoria. According to the DANIDA (1996) report, industries represented in Mwanza are for processing industries: fish processing (8) cotton seed oil industries

(6) breweries, soft drink factories, bakeries, biscuits, and over 100 medium and small milling machineries, timber industries, tanneries, soap factories, quarry sites and animal feed industries. The largest industry in the area therefore, is the food processing industry. The report states that many industries discharge a tremendous amount of effluents. Other working places that discharge effluents harmful to the lake environment are garages. Many motor vehicle garages do not have oil and grease traps either. Consequently, the resulting waste oil and greases end up being washed by the rain, to feed Lake Victoria.

The DANIDA (1996) asserts that effluents discharged into the lake are either raw or semi-treated. Although some fish processing industries have installed treatment ponds, they are too small to handle the amount of waste water discharged; hence the retention period in those ponds is too short with some of them holding waste water for merely three days. The implication of this short duration treatment is that raw and semi-treated waste water ends up being released into the lake, where it contaminates the water content and harms fish breeding sites because the biological oxygen demand is too high.

Another environmental consequence of the agricultural activities is the pollution of the lake water by liquid-waste from livestock. The vast number of dairy cattle in the city is mainly cared for under intensive conditions (i.e., zero grazing). Some of the cattle owners are situated quite close to the lake shore and wash all the liquid wastes directly into the lake without any form of treatment. Other cattle keepers have enormous piles of manure that is washed into the Lake (ICLEI, 1997).

The destruction of forest cover is another factor that exposes Lake Victoria to pollution. According to Msambichaka (1995), forest and trees cover about 9.93 percent of the land area of Mwanza city, which totals 42,300 hectares. Of this lot, planted trees cover about 1.976 hectares (4.7%). There are no gazetted forest reserves, which suggests that nearly all the natural forests have been depleted. He concludes that because there is not much tree cover left in the city, the risk of surface run-off is increasing, leading to the siltation of the lake. Furthermore, the city is becoming more prone to environment hazards such as landslides, soil erosion and flooding. Out of the 5,000 residents participating in trade, about 4,000 are engaged in formal business establishments. The remaining more than 1,000 are mainly involved in petty trades located haphazardly around the urban centre (Msambichaka, 1995).

Furthermore, the sanitation system in Mwanza City leaves much to

be desired. According to the CBEM (1998) report, systems of sanitation in Mwanza City comprise sewage systems, septic tank system and pit-latrines. In most of the surveyed plots, people use the septic tank system and pit-latrines. In most of the surveyed plots, people are using septic tanks and soak pits for their faecal disposal. There is no official service for the emptying of pit latrines, and so some of those in the hilly areas, release their faecal waste during heavy rainfall, which flow downhill into the lake. In addition, lack of proper sanitation management and proper sanitary facilities seriously add to the pollution of the lake water and the spread of diseases such as cholera, typhoid, diarrhoea and other disease. The CBEM (1998:29) report further says, "The sanitation situation is especially appalling in the squatter areas. Absence of toilets, or the presence of very shallow toilets (self-flushing during the rains), is an effective breeding ground for the spread of infectious diseases."

Theoretically, Littlejohn (1983) contends that theories interrelate, overlap, and fall into patterns. It is often hard to know where a theory ends, and another one begins. Severin and Tankard (1997) discuss the newer process models of persuasion processing theory, Anderson's information integration theory and Petty and Cacotopia's elaboration likelihood model. The Anderson's *Information Integration Theory* seems more appropriate for this study. The theory shows new information is integrated with the old information in the process of changing people's attitude, knowledge, belief and behaviours.

Moreover, Anderson (1981:208) contends, "Information integration theory is a general theory developed to explain how human beings bring together different pieces of information. He explains that the information integration theory describes attitude change as a process for integrating new information with the old information. The old information consists of the present attitudes, and the new information contributed—a scale value (represented by S) and a weight (represented by W). The scale refers to the favourability rating assigned by the receiver to the piece of information. The weight refers to the importance or relevance of the piece of information.

Methods

The study employed an exploratory research design study because little was known at the time of conducting the study about the people's attitudes, knowledge, belief and behaviour towards the pollution of Lake Victoria. In this regard, Kreps (2000:239) contends that, "the qualitative paradigm, is preferred because it identifies the centrality of natural occurring behaviour in natural setting." Therefore, the exploratory research was considered effective in the sense that it helped the researcher to find out what was happening, particularly in little understood situation of attitudes, knowledge and behaviour.

This study was conducted in Mwanza City, the second largest city in Tanzania, founded in 1892, shortly after the country became part of the German East Africa colony. The City is located in the northern fringes of Tanzania, on the shores of Lake Victoria, and is surrounded by vast, rocky hills. It is the capital of the Mwanza Region, with 706,453 people (2012 Population and Housing Census, Tanzania). This suggests a three-fold increase in 25 years since 1992 when the population stood at only 223,000 with most of them resident in poor neighbourhoods with inadequate sewerage infrastructure. It is near-impossible to sink standard pit-latrines.

This study used a combination of qualitative and quantitative techniques of data collection. These were documentation, observation, questionnaire, and semi-structured interviews. The researcher used both probability and non-probability sampling techniques. The sample involved 61 subjects composed of 39 questionnaire respondents and 22 interviewees as detailed in Table 1.

Table 1: Sample size and methods of data collection

Population Category	**Selected Units from each category**	**Methods of data collection (*questionnaire respondents and interviewees*)**	**No. of people involved in each unit**	**Total no. of respondents and interviewees**
Policy makers	District Commissioner's Office (DC's Office)	Questionnaire respondents	13	
		Interviewee	1	14
Policy implementers	Mwanza Primary Court	Questionnaire respondents	**7**	
	Mwanza District Natural Resources Officer	Interviewee	1	
	Mwanza District Health Officer	Interviewee	1	
	Mwanza District Fisheries Officer	Interviewee	1	10
Facilitators (NGOs, CBOs, FBOs)	Lake Victoria Environmental Management Project (LVEMP)	Interviewee	1	1
Media	Print media (Majira and Daily newspapers)	Interviewees	3	3
Beneficiaries of Lake Victoria	Village (Mhonze village)	Questionnaire respondents	11	
	Farmers casual fishermen	Interviewees	6	
	Slum area (i.e. Bugarika 'A')	Interviewees	3	
	Tanzania Fish Processor (TFP)	Interviewee	1	
	Tanzania Fisheries Union (TAFU)	Interviewees	4	
		Questionnaire respondents	8	33
TOTAL				**61**

Source: Field data (2005).

With regard to the documentation method, the study consulted several offices in Mwanza City to access documents with relevant information such as: Lake Victoria environment management project (LVEMP), Mwanza Press Club (MPC), Water quality and ecosystem management component, Regional Education Officer (REO), and Mwanza City Council (the local government – Urban Authorities).

The observation method was employed in this study so as to complement the data from interviews and questionnaire. In this regard, this method was used simultaneously with other data collection methods particularly semi - structured interviews and documentation. It allowed the researcher to use a participant-as-observer approach to observe effluents from fish processing industries and to observe other ways of pollution on the other parts of Lake Victoria shoreline. During this observation the researcher was asking questions, conducting interviews and searching for documents.

In all, 87 percent of the respondents agreed that the lake was polluted. In addition, all the 22 interviewees agreed that the lake was polluted. One of the subjects indicated that pollution was obvious even at a glance. “You don’t need to ask me if Lake Victoria is polluted; it is obvious. Even if you go there now you will see that it is polluted”, he said.

When asked to explain what could be contributing to the pollution of Lake Victoria, more than half, i.e. 61 percent of the respondents agreed that the rapid increase of population in Mwanza City is the main source of pollution of the lake. Only 24 percent disagreed whereas another 16 percent were not sure as indicated below in Figure 1.

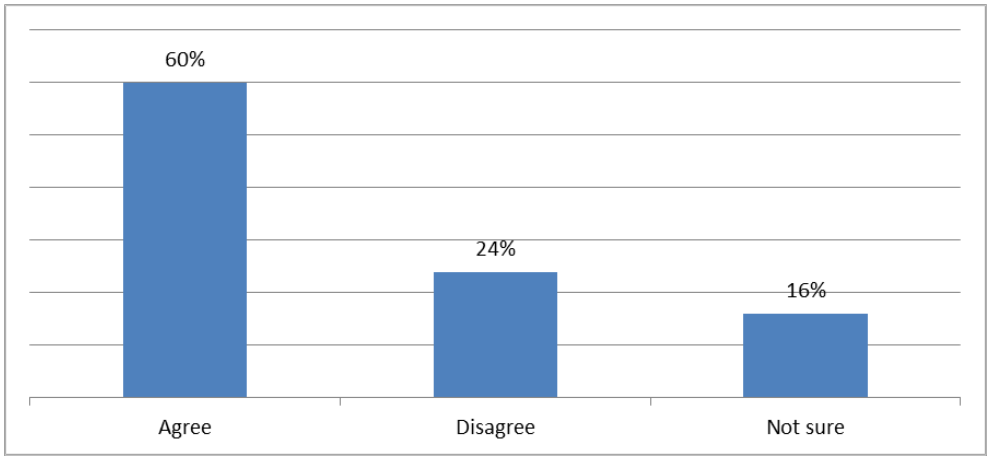

Fig. 1: Rapid population increase in Mwanza City as the main source of pollution in Lake Victoria (Field data, 2005).

Eighty-nine percent of the questionnaire respondents said that economic/human activities generate substantial quantities of both solid and liquid wastes. They identified such waste as plastic materials including plastic paper bags, which pollute the lake and destroy fish breeding places. The only three interviewees from Bugalika 'A' reported that during the rainy seasons the run-off water washes away waste into the lake. Such waste includes faeces, especially from the hilltop houses that have sub-standard pit-latrines. In addition, four out of six interviewees from Mhonze village agreed that most of the families in their village, which is alongside the lake, had no pit-latrines and so they defecated in the nearby bushes. The Mwanza District Health Officer said that, "Liquid waste, which mainly contains industrial effluent, is estimated at 65 million litres of industrial effluents that are discharged into the lake daily either as raw or semi-treated effluent and Mirongo River alone discharges about 3.5 million litres of waste water daily".

Furthermore, the main sewer in which waste water in which the three industries discharged was blocked. As a result, the waste water from the industries of Nile Perch, Mwanza Textile, and Coca-Cola plant was spilling out. As it spills out, the waste water drains into the nearby steam that leads into the Lake Victoria. Eight-seven percent of the respondents charged that the fish processing industries are the main sources of pollution of Lake Victoria (see Figure 2).

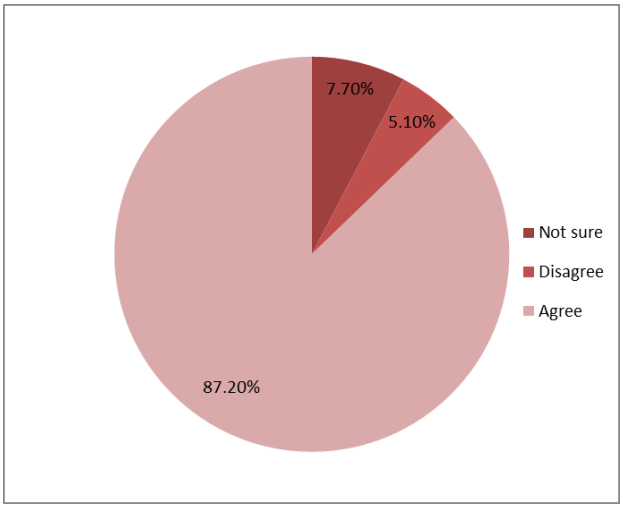

Fig. 2: Fish processing industries are to blame for the pollution of Lake Victoria (Field data, 2005).

On the best communication media that the government, political leaders and experts can use to educate residents on the Lake Victoria pollution, 53.8 percent of the respondents suggested the print and electronic, 35.9 percent thought leaders and public meetings were ideal, 20.5 percent indicated the formation of environmental forum, 17.9 percent seminars, 10.3 percent political will and involvement of NGOs, CBOs and FBOs 10 percent (see Figure 3). On whether the media educated the public, 62 percent agreed whereas 31 percent disagreed. Eight percent others did not know whether or not the media educated them.

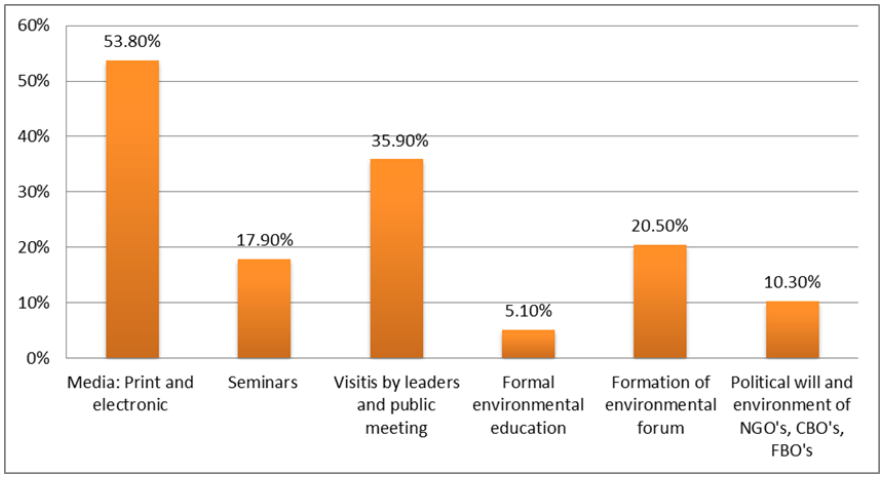

Fig. 3: Ways for communication suggested by respondents (Field data, 2005).

Although this research reveals that most of the respondents concurred that the media is the best way to communicate to them about Lake Victoria issues, three journalists interviewed noted a number of challenges that befall the coverage of environmental issues. They deliberately refuse to cover environmental news because environmental news items do not generally sell; they are not easy to cover and cost a lot more money than other ordinary news items. Moreover, environmental news coverage required skilled environmental journalists who remained few in number. They also contended that the media that cover environmental news need financial support from either governmental or non-governmental organisations or from both. The media normally sell space in the print media, and airtime in electronic media. As a result, these media find it hard to substitute the programmes that earn them money with non-paid for environmental programmes.

The interviewees also noted that the burning of illegal fishing nets does not necessarily help much in that similar nets are sold in shops in the vast city. The interviewees also bemoaned double standards that allowed some residents of Mwanza city to use such nets while others in the same city were forbidden to do so. In fact, these irregularities made the interviewees and respondents believe that the owner of the lake was the government and not the residents of Mwanza City. In this regard, two-thirds of the subjects reported that the Tanzania government owned Lake Victoria, 17.9 percent disagreed, and 15.4 percent were not sure.

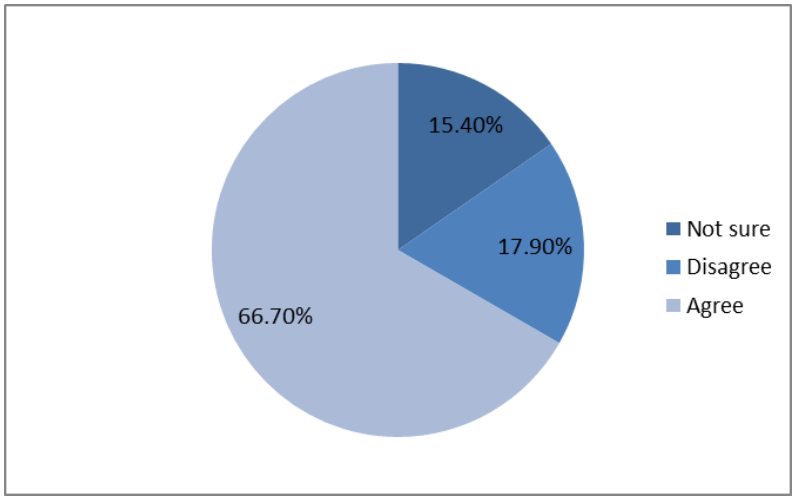

Fig. 4: The perception that the government owns Lake Victoria but not citizens (Field data, 2005).

Three out of six interviewees, who were casual fishermen from Mhonze Village, said that, although the government prohibits the use of fishing nets with holes of less than 2mm, common fisherman used these nets to catch small species of fish such as *furu*. They claimed that the widespread poverty among most of the common residents of Mwanza City made it increasingly hard for them to obey government orders prohibiting them from fishing using unauthorised nets. These interviewees also said that there were fewer catches on Lake Victoria than before the 1980s when the fish processing industries started. Other three interviewees from Bugalika 'A' said government leaders at district and/or regional level had shied away from sitting with them and discussing issues pertaining to pollution in Lake Victoria. Seventy-nine percent agreed that despite its pollution, Lake Victoria benefits them by supplying them with plenty of water and fish for relish in addition to boosting their income. Only 7.7 percent did not agree whereas another 12.8 were uncertain about the issue.

One interviewee, a public officer, said that rice farmers' cultivation along the Lake Victoria shoreline made them clear off wetlands and natural vegetation. Moreover, the officer charged that the traditional practice of cutting down trees for various reasons robbed catchments of vegetation cover, hence remaining bare. Another interviewee accused the youthful anglers of flouting fishing ethics, including indiscriminate use of trees for roasting and drying fish, and building their huts.

The respondents and interviewees also revealed several beliefs concerning Lake Victoria, that is, superstitious, practical and divine beliefs among the dominant Sukuma ethnic group, which inhabits the area. In fact, 39 percent of the respondents were from this ethnic group with others coming from other ethnicities as follows: the Haya (11%), the Zinza (8%), the Kerewe (8%), the Kurya (5%), the Kwaya (3%) and the other groups (26%) (see Figure 5 below). In all, Tanzania has some 120 ethnic groups. This implies that the beliefs of the Sukuma have greater influence than any other ethnic group dwelling around the lake (http://nbs.go.tz/nbstz/index.php/).

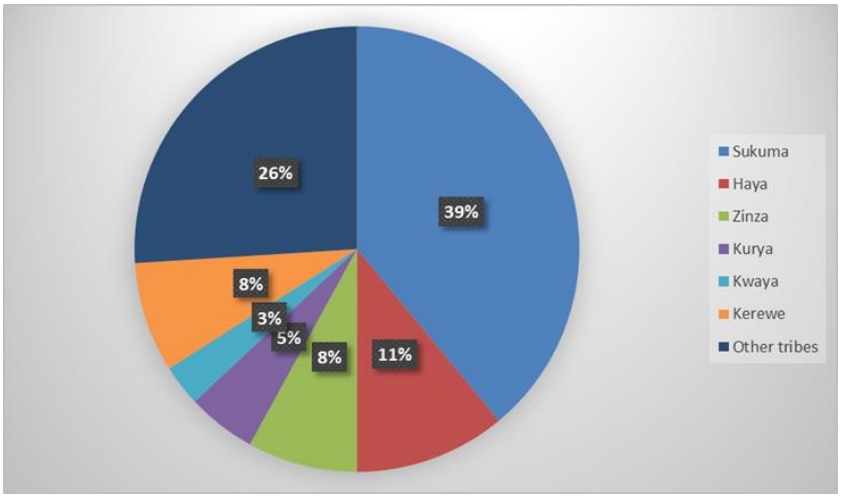

Fig. 5: Ethnic groups in the City of Mwanza whose beliefs cause pollution on Lake Victoria (Field data, 2005).

The village chairman for Mhonze village said that in the past the Sukuma used to live far from the shoreline of Lake Victoria because they believed that their ancestral spirits lived in the lake. However, the more educated the Sukuma people became, the more immigrants began to live in the city near the shoreline of the lake, a practice that contributes to its pollution. On the other hand, the Haya women believe that it is taboo to cultivate the land and make contours across it. They, therefore, cultivate by aligning ridges along the catchments for fear of making their husbands' genitals fail to function as they could experience an erectile dysfunction. This practice is bad because it greatly contributes to siltation in the lake.

Another subject said some Sukuma people believe that drinking water that is not boiled does not matter because it is not retained in one's stomach. They believe that such water quickly passes out as urine. This is a dangerous belief and practice because it exposes them to drinking untreated, unsafe and potentially contaminated water. Both the Sukuma and the Kerewe elderly people have believed that Lake Victoria water will never be contaminated because the water body is –too large to get polluted and is capable of purifying itself automatically. The Sukuma also believe that trees attract birds, which destroy their crops. Therefore, they ensure that they have few or no trees around their homes. Besides, for the Kurya and Luo, it is taboo to share a toilet or a pit-latrine with a father-in-law. This encourages them to defecate openly or in bushes near their homes instead of pit-latrines.

Attitudes, knowledge, beliefs and behaviour

The findings are briefly discussed under their main topics of knowledge, attitudes, behaviour, beliefs, and communication. Some 79 percent of the respondents agreed when asked if they knew Lake Victoria was polluted. In addition, 90 percent of these respondents also concurred that pollution is on the increase. In fact, the World Bank (1996) also backs their *knowledge*. The World Bank report indicates that the pollution impact attributable to the municipal and industrial discharges is visible in some of the rivers feeding the lake and along the shoreline in Kisumu, Kampala and Mwanza.

Also the rapid increase of population was reported as the main source of pollution in Lake Victoria. In this regard, dirt from people's daily body and clothing washes, peelings from food stuffs, and other domestic wastes, contribute to the pollution of the lake. The Urban Strategy Report (2003) shows that over 70 percent of the residents of Mwanza City live in slums, or squatter settlements on the rocky hills that surround the city. Most hilltop houses in Mwanza have substandard soak pits because physical features of the lake shore city is characterised by large and undulating tableland and, sometimes, rocky hills and ridges that rise up to about 6,000 feet above sea level. During rainy season, most of the latrines and their excrements are washed away into the lake. As such, despite having knowledge about pollution, the residents of Mwanza City were unable to stop it.

The implication is that the residents of Mwanza City need effective communication to help them change their behaviour. The communicators need to understand what people already know and what they do not know about the pollution of Lake Victoria. Anderson's theory addresses the integration of the new with the old information. This suggests that the leaders in the City of Mwanza should create understanding between them and the residents by imparting truthful and reliable information on pollution from scholars, researchers and other experts. After all, the residents will not simply rely on the old information to speculate about the causes of pollution. Instead, they will integrate their old knowledge about pollution with the new truthful and reliable information and knowledge about pollution. People need to be empowered with truthful and reliable information about the pollution of Lake Victoria. Such information will change their attitude and their behaviour as well.

The study established that the fish processing industries sector was reported as the second main source of pollution. Eight-seven percent of the questionnaire respondents and the three quarters of all interviewees blamed the big fish processing industries for polluting the lake deliberately. Also,

the Department of Natural Resource and Environment (1997) report shows that the urbanisation process has led to discharge of so much industrial effluents, sewage and different sorts of pollutants pumped into Lake Victoria largely untreated. Some respondents claim that it was government corruption that allowed such industrial pollution to continue unabated. With such a belief and attitude, many Mwanza City residents end up not caring much about the conservation of the lake on the pretext that it was a futile endeavour when the big time polluters had a free reign. In this regard, communication theories suggest the adoption and application of appropriate approaches in this situation so that the residents of Mwanza City can change their attitudes towards the lake and its conservation. Specifically, Cutlip et al. (2012) suggest that messages are more readily accepted as believable when presented by credible sources. High profile people in Tanzania, such as the president, cabinet ministers, religious leaders and other opinion leaders should, thus, clearly address the issues of pollution occasioned by the fish processing industries.

Agricultural activities also emerged as another source of pollution of Lake Victoria. Farming practices have resulted in the clearance of wetlands, along the catchment of the shoreline. The receding wetlands (which act as a filter) result in siltation of the lake. In addition, illegal fishing using poisonous chemicals and poverty were reported as other sources of pollution of Lake Victoria. The DANIDA (1996) report shows that in 1994 the government introduced regulations prohibiting certain activities such as fishing through beach seining and using tiny aperture-nets which catch juvenile fish stock and jeopardising re-generation of fish species. In this regard, the environmental policy-makers, policy implementers and the facilitators, such as NGOs, need to equip the residents of Mwanza with new information on better methods of fishing and cultivating. An effective communication approach, in this regard, is needed to bring about positive change among the residents in terms of their agricultural and fishing practices. As Wahlstrom (1992) contends, communication can cause people to change, particularly when targeted and appropriate to the given situation. In addition, Littlejohn (1983) holds that the essential feature of all messages is information, and people use that information in the message to reduce uncertainty and thereby adapt to the environment.

Furthermore, the study findings demonstrate that many people in Mwanza City have negative *attitudes* towards the government. A major reason for such attitudes is that they see the government as the putative owner of Lake Victoria and, therefore, tend to ignore its litany of directives

and orders to conserve the lake. Generally, the government imposes and enforces regulations without necessarily involving them. With such an approach the government fails to provide the principal stakeholders such as fishermen and farmers with a forum where they can express their views about conservation of the lake. The interviewees also alleged that the government collaborated with the giant fish processing industries to exploit the lake at the expense of the local people. In this regard, the residents dismissed the giant fish processing industries in Mwanza as economic saboteurs.

With regard to *communication*, the study found that the policy-makers hardly avail themselves to talk to various stakeholders of the lake. Likewise, the policy implementers do not ensure that laws and by-laws concerning Lake Victoria are understood by the people. The media were seen as important educator. For example, 62 percent of the respondents indicated that they considered the media as the appropriate way of educating them on the conservation of Lake Victoria. The media would enhance communication between the policy-makers and policy implementers, on the one hand, and the public (the beneficiaries of the lake), on the other. This mass media partnership should be extended to non-governmental organisations (NGOs), community-based organisations (CBOs) and faith-based organisations (FBOs). Appreciation and effective communication among these groups could make efforts aimed to change the public's attitudes succeed.

In a bid to change the people's attitudes, a proper communication approach is inevitable and crucial. Littlejohn (1983) says that people's lives are strongly affected by their own communication with others as well as by messages from distant and unknown persons. People who are responsible for the lake need to know the importance of communication among them. An effective communication approach among the various groups of people around Lake Victoria, that is, the Government and the beneficiaries, should be a two-way process for varied stakeholders to own the process. Indeed, a communication concept requires a two-way process in which the sender and receiver operate within the context of their respective frames of reference, that is, their relationship, and the social system. This means that policy-makers and policy implementers need to interact with people, listen to them, empower them to decide, and work with them towards issues concerning conservation of Lake Victoria. In reality, there appears a disconnect between the communicators and the target audience in the Lake Victoria area, which has made efforts geared towards fostering conservation by changing people's mind-sets and attitudes largely

ineffective. Coupled with the people's belief in the government owning the lake and turning a blind eye to the perceived big time fish processing pollution, the pollution efforts in the area remain largely unsuccessful.

Conclusion

Report by CBEM (1998) indicates that for centuries residents of Mwanza City have depended on the lake for their livelihoods. However, their disenchantment and dissenting views of who should be accountable for events taking place on the lake constitute a major concern between the authorities and themselves. In addition, lack of effective communication by the government has left the public disillusioned. Among the residents, ownership of Lake Victoria is the crucial issue, with many of them distrusting the government and largely paying lip-service to the many directives, orders and legislation aimed to curb Lake Victoria pollution. Against this backdrop, the Government should set up forums for various stakeholders to meet and deliberate on the issues of Lake Victoria pollution. In addition, there was a need to initiated and actuate partnership among the various stakeholders the government, NGOs, the media and the beneficiaries aimed ensuring that there is a continuous dialogue and communication that could eventually bring about the much needed but seemingly elusive environmental conservation Lake Victoria. Furthermore, mechanisms should be put in place to ensure that law and by-laws intended for the conservation of Lake Victoria are enforced. Thus, concerted efforts should be made to involve all the owners of the giant fish processing industries and residents of Mwanza City as they own a stake in the lake, not just the Government.

References

Capacity Building Environmental Management (CBEM). (1998). Report on Environmental Awareness Assessment in Mwanza Municipality, Mwanza.

Cutlip, S. M., Center, A. H. & Bloom, G. M. (2012). *Effective Public Relations* (11th Ed.). New York: Prentice Hall.

Danish International Development Agency (DANIDA) (1996). Report on Environmental Impact of Oil Spills on Lake Victoria, Mwanza.

Frey, L. R., Adelman, M. B., Flint, L. J., & Query J. L. (2000). *Investigating Communication and Introduction to Research Methods.* New York: Ally & Bacon.

Gleitman, H. (1991). *Psychology*. New York: Norton Co.

Grunlan, S. A. & Mayers, M. K. (1988). *Cultural Anthropology: A Christian Perspective.* Michigan: Zondervan.

ICLEI. (1997). Report on Environmental Assessment of Lake Victoria

Pollution.

Karembu, M. & Kiai, W. (1999). *Understanding Environmental Communication*. Nairobi: A.C.C.E Kenya Chapter.

Littlejohn, S. W. (1983). *Theories of Human Communication*. California: Wadsworth.

Lake Victoria Environmental Management Project (LVEMP). (2003). Proceeding of the LVEMP-Tanzania 2001 Scientific Conference.

Mgaywa, B. M. (2002). *General Studies for Advanced Level*. Dar-es-Salaam: TA Publishers.

Msambichaka, L. A. (1995). Report on Lake Victoria Management Programme Review.

Muheleji, P. K. (2004). Ripoti ya Halmashauri ya Jiji la Mwanza, Idara ya Elimu (July-September).

Mwanza Municipality. (1994). *Mwanza Master Plan*.

Mwamba, B. E. & Mpendazoe, F. M. T. (2002). Water Quality and Ecosystem Management Component (LVEMP Report June, 2000).

Mpanda, M. (2005, March 16). Environment Becomes Degraded as Population Increases. *Mwanza Environmental Newspaper*, pp. 11-12.

NEMA & FES. (1998). *Caring for Our Environment: A Research Handbook for Local Leader Operations*. New York: Congress C.P.D

Ong'ong'a, O., Ntiba, M. J., Mukasa, T. C., & Kudoja, W. M. (2001). *Lake Victoria 2000 and Beyond: Challenges and Opportunities*. Kisumu: Osienala.

Oppenheim, A. N. (1992). *Interviewing and Attitude Measurement.* London: London Publishers.

Oywa, J. (2005, January 21). Why Fisherman are not Rejoicing. *The Daily Nation.* p.11.

Scar, S. & Zanden, J. V. (1987). *Understanding Psychology*. New York: McGraw-Hill.

Severin, W. J. & Tankard, J. W. (2000). *Communication Theories: Origins, Methods, and Uses in Mass Media*. Wesley: Longman.

United Republic of Tanzania (URT). (2003): *The Fisheries Act.*

United Republic of Tanzania (URT). (2012). Population and Housing Census, General Report.

Wahlstrom, B. J. (1992). *Perspective on Human Communication*. New York: Brown Publishers.

Wimmer, R. D. & Dominick, J. R. (1983). *Mass Media Research: An Introduction*. Belmont: Wadsworth.

World Bank. (1996). Staff Appraisal Report for the Lake Victoria Environmental Management.

http://nbs.go.tz/nbstz/index.php/

www.fao.org/ag/AGL/AGL/webpub/lakevic/LLAKEVIC4.htm