

# Impact of Human Activities on Water Resources around Lake Victoria in Misungwi District, Tanzania

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## Abstract

Water is potential to the lives of the people and biodiversity. The objective of this study was to examine households' awareness on the contribution of their human activities in lowering the quality of water resources around Lake Victoria in Misungwi District, Tanzania. The expansion of human activities due to population increase possibly led to wetlands encroachment around the lake leading to contamination of water resources of Lake Victoria Basin. This study used qualitative approach to assess the impact of human activities on water resources using questionnaires to collect data from a random sample of 219 heads of households. Participant observation, FGDs and informants guided by checklists were employed in order to triangulate information obtained. The results showed that, human activities pressure exerted by population exodus from drought hit areas to wetlands around Lake Victoria in one way or the other affected the quality of water of the latter in the environment. Also, there was a direct relationship between education level, human activities and awareness status of respondents and water resources polluting effects and the general environmental degradation of Lake Victoria in the study area. The study concluded that; there was a great correlation between increased human activities propelled by population increase and low water quality in the environment around Lake Victoria. It recommended that; collective efforts guided by relevant policies should focus on building awareness on sustainable use of the Lake Victoria water resource for improvement of the local environment and community. It should be coupled with participatory decision-making processes with stakeholders in designing feasible policies pro-sustainable environment in the area.

**Keywords:** Population, Human Activities, Water resources, Polluting effects, Lake Victoria

## 1.0 INTRODUCTION

Water resource is one of the global highly treasured resources; it includes ponds, rivers, lakes and oceans. Population growth on a global scale is increasing and putting pressure on environmental resources such as water resources (IFIPPIA, 2014).

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Regional governments in East Africa (Tanzania, Kenya, Uganda, Burundi and Rwanda) spearhead water management in various ways. However, water resources are challenged by the rapid population pressure in the fast-growing cities such as Kisumu, Mwanza and Entebbe around Lake Victoria. The growth of these and other small and mid-size cities has significant diverse impacts on water resources in the coming decades (UN-HABITAT, 2010).

Of all the tropical lakes, Lake Victoria remains the greatest fresh water body in Africa (Awange and Ong'ang'a, 2006). It is bounded by Tanzania, Kenya, Uganda and although not riparian, Burundi and Rwanda are within the lake drainage basin (Kayombo and Jorgensen, 2005). Estimates suggest that the expansion of the fast-increasing population into the buffer zone and wetlands around the Lake Victoria is roughly 100 km per decade; an indication of high population dependency and pressure on its basin (UNEP, 2016). Tanzania is the major shareholder, controls 51% of the lake surface area; while 49% belongs to Kenya and Uganda (URT, 2009). Therefore, the lake region in Tanzania is prominent economically, demographically and politically; for example, Mwanza with the biggest both population and density is the second growing economic city after Dar- es- Salaam (SIDA, 2004). Misungwi is among the thirteen (13) districts in Tanzania bordering Lake Victoria experiencing the impact of human activities to the water resources of Lake Victoria.

## **2.0 LITERATURE REVIEW**

There is an increasing recognition of the linkage between rapid population increase and the quality of the environment. Population growth and the resultant human activities generate pressure to the natural and man-made environment (Maduhu, 2004). In this way, human settlement can influence the country's resources management also determine the quality of the environment through socio-economic activities.

Between 1960 and 2006, over 600,000 casualties of water-related disasters were recorded in the Asia Pacific region, accounting for over 80% of casualties of water-related disasters worldwide, in addition to US\$ 8 billion worth of economic damage during the same period. Rapid population growth in the Asia Pacific region over the past decade has forced more people to live in floodplains and other vulnerable areas and has led to ever-increasing demands for water supply, security and sanitation services, which require greater investment in water projects (WWDR3: WWAP, 2009a).

The Lake Victoria Basin (LVB) is experiencing the same changes in land use due to both anthropogenic and natural drivers which are critical to the sustainability of the resources and livelihoods of the community on the use of land (Albinus et al, 2008). Large group of people often migrate to a place that has resources they need or want and migrate away from the place that lacks the

resources they need this plus natural birth led to population booming and human settlement expansion.

Over 70% of the population in the catchment area of the three riparian countries (Tanzania, Kenya and Uganda) is engaged in agricultural production, mostly as small-scale farmers (Kayombo and Jorgensen, 2005). Other human activities practiced include fishing, livestock keeping, trading, quarrying and mining gold and others minerals.

Today's landscape result from many cause including variabilities in a biotic condition such as soils, climate and topography; biotic interaction that generate spatial patterning even under homogenous environmental condition past and present patterns of human settlement and land use; and dynamics of natural disturbance and succession (Turner et al, 2011).

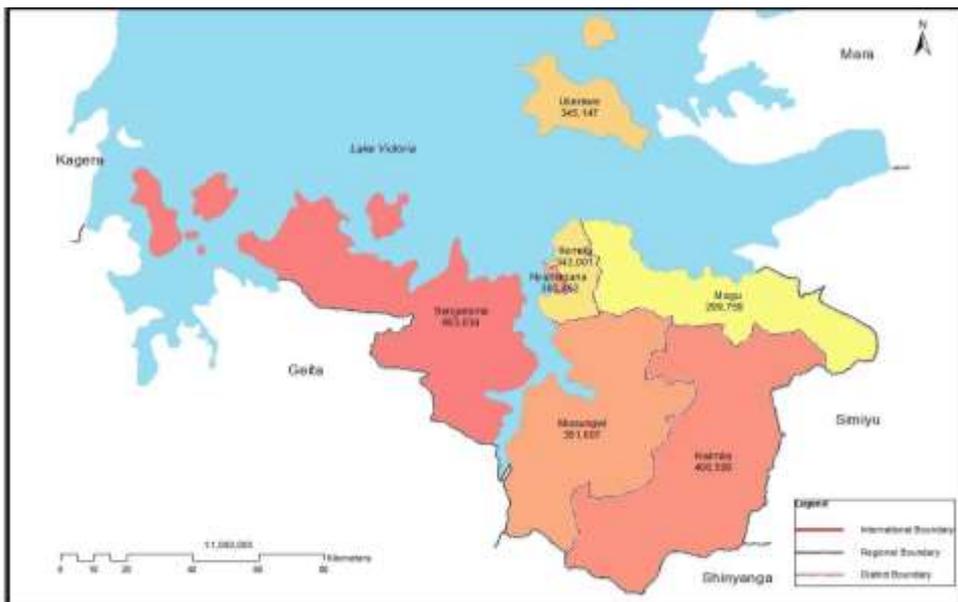
Environmental degradation is both a cause and consequences of migration, making it difficult for people to sustain their livelihoods of their communities of origin and exacerbating natural resources management at their destination (IISD, 2016). Over the years, Lake Victoria has suffered from increasing population as the result of development activities expansion (MWAUWASA, 2013). Misungwi district is among the fast-growing district in Mwanza region due to fast population growth by both natural birth and migration (MDCSEP, 2014). The high population growth rate is expected to have an impact on natural resources and ecosystem.

### **3.0 MATERIALS AND METHODS**

#### **3.1 Study Area**

The study was carried out in Misungwi District and geographically the district shares border with Sengerema and Nyang'hwale districts to the west, Shinyanga Rural on South, Mwanza city to the North, and Kwimba District to the Northeast. In terms of international identification, the district lies between latitude  $20^{\circ} 35'$  and  $3^{\circ} 15'$  South of the Equator and between Longitude  $32^{\circ} 45'$  and  $30^{\circ} 15'$  east of Greenwich. The district has the population of 351,607 (NBS, 2012) and it predicts to reach 401,700 in 2018.

The district is basically in semi-arid with the average rainfall between 700mm and 1000mm. The district has the area of 2,555 km<sup>2</sup> including around 175 km<sup>2</sup> of the Lake Victoria (MDCSCP, 2016)



**Figure 3.1: Mwanza Region Showing the Location of Misungwi District and Population**  
 Source: (NBS, 2013)



**Figure 3.2: Misungwi District Map Showing District, Division and Ward Boundaries where the Study was carried out**  
 (Source: Misungwi DC).

### **3.2 Data Collection Methods**

The study used qualitative approach to study the impact of human settlement on water resources around Lake Victoria in Misungwi District. However, both primary and secondary data were collected from different sources such as government offices from village level to national level. The study also used both published and unpublished being in form of hard and soft copy information.

Primary data was open-ended questionnaire in order to obtain qualitative data at all household level. Moreover, the information collected included the current human settlement around Lake Victoria, socio-economic activities that are major basis for Lake Victoria environmental strategies of the water resources at Misungwi District.

In total the study used 219 respondents form four wards in Misungwi District which were Mbarika, Ilijimate, Lubili and Idetemia.

### **3.3 Research Design and Sampling**

Purposive sampling was employed by identifying respondents who were directly or indirectly linked to study theme in this case the study used government officials, also snowball sampling was used to get information from other informants like fishermen, miners, pastoralists and agriculturalists.

### **3.4 Data Analysis and Procedure**

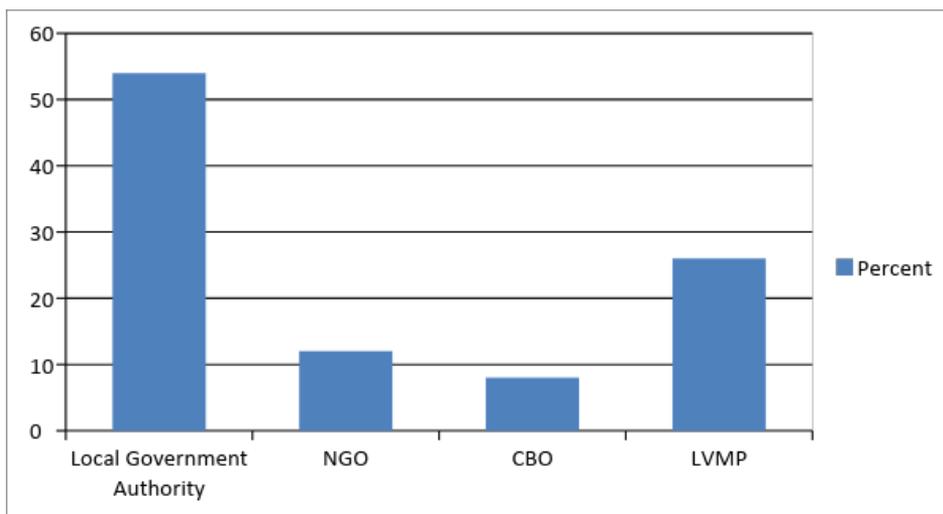
Information obtained from focused group discussions and written or taped records transcribed into written notes that could be read and understood easily. It tallies with Patton's (2002) advice that qualitative data obtained from various sources are easily transformed into finding process likewise, the information from various sources were categorized into themes as soon as were collected from the fields. Thereafter, the data were explorative analyzed and interpreted.

## **4.0 RESULTS AND DISCUSSION**

This section presents results obtained from respondents based on their different levels awareness, education and experiences on the impact of major human settlements in the study area over Lake Victoria water resources. Before conducting the survey, the study wanted to know the degree of the respondents' awareness or knowledge on environmental issues related to lake pollution and destruction of biodiversity through human activities.

### **4.1 The Status of Households' Awareness on Water Resources Pollution in the Environment**

Documentary review revealed that, there were institutions in place responsible for such awareness raising (Figure 4.1). The study used the information as a benchmark to assess respondents' awareness.



**Figure 4.1: Institutions responsible for environmental awareness in Misungwi district**

**Source:** Misungwi District Council, 2018

The different institutions involved in raising awareness and capacity building on environmental issues in various proportions included LGA (54%); NGOs (12%); CBOs (8%); and LVEMP (26%) as shown in Figure 4.1. The study crosschecked respondents' attendance to such environmental awareness campaigns waged by the institutions. It showed that 41% the respondents said they did not attend; 12% said they did not know the existence of such campaigns. These data suggested there was a reasonable segment of the households which had low awareness on environmental governance and bylaws on water resources. It was contrasted by 56% of the respondents who said they knew the rules and regulations related to mining activities, structural development, and agricultural activities, fishing activities, waste disposal and forest management. The rest, pleaded they were ignorant of roles and regulations related to environmental management in general. On the basis of this environmental awareness status; the study had the confidence to conduct the interviews to the respondents to assess their knowledge on the impact of their respective occupations as listed in Table 4.1 to the Lake Victoria water resources.

However, despite the efforts made by various awareness and capacity building stakeholders mentioned earlier; residents of Misungwi district were yet to abide by environmental waste minimization management laws and ethics particularly regarding the use of hazardous chemicals like Mercury and Cyanide in gold processing. These findings tally with Mvumi's (2002) observations that; awareness and capacity building done by agents of development would be ineffective if most people could not know or realize the importance of waste minimization and how easily it can be accomplished (Mvuma, *Ibid*).

#### 4.1.1 Level of education

Table 4.1 shows different levels of heads of households interviewed during the study. The education achievements of respondents were: primary education 159 (72.6%); secondary, advanced education and vocational training 40 (18%); diploma and above 3 (1.3%); and illiterate 17 (7.8%). These findings to a great extent show correlation between education achievement and awareness to environmental issues linked to Lake Victoria water resources. The fact that, the majority of the respondents (72.6%) and 7.8% illiterates confirmed the contention of low awareness in environmental management as testified in the previous section. Education limitations, to a great extent explained the experienced misuse of the water resources, cutting down forest in the catchment areas for building shelter or clearing land for cultivation on land resulting in poor soils and silting of the lake land compounded by the general laxity in the execution of environmental laws. Moreover, the study did not find evidence where formal education was combined with informal education to enhance environmental intervention measures in the study area. It concurs with other studies findings whereby conservation intervention becomes effective when formal and informal education are combined in order to develop positive attitude leading to environmentally responsible behavior (Dobson, 2007).

**Table 4.1: Level of Education of Respondents**

Education level	No of Respondents	Percent
No schooling	17	7.8
Primary	159	72.6
Secondary, Advanced secondary and vocational	40	18.2
Tertiary level	3	1.4
<b>TOTAL</b>	<b>219</b>	<b>100</b>

**Source:** Field work, 2018

#### 4.1.3 Major Occupations and their Impacts to the Environment

The identified major livelihoods activities practiced by the rapidly increasing population around Lake Victoria in Misungwi districts settled in four wards: Ilijimate, Mbarika, Lubili and Idetemya (Table 4.2). This section basically discusses the extent each of the listed occupations affect water resources of Lake Victoria based on environmental awareness indicated above.

**Table 4.2: Different main Occupations in the Study Area**

Occupation	No of Respondents	Percent
Agriculture	69	31.6
Livestock keeping	60	27.3%
Fishing	46	21
Mining	34	15.5
Brick making	8	3.6
Other	2	0.9

**Source:** Field work, 2018

The background for the experienced agricultural and pastoralist activities as the major human activities in the area dates back to late 1970s and early eighty's when agro-pastoralist communities from the neighboring societies migrated to wetland of Lake Victoria in Misungwi District in search for land for cultivation and pasture.

#### **(a) Agriculture**

Agriculture mainly smallholder farming was the leading human occupation practiced by many households in the study (31.6%). During the interview, many of the farmers said that, agricultural activities contributed highly to polluting effects of the wetlands and Lake Victoria from such agricultural inputs. The polluting effects mentioned included various impacts arising from usage of pesticides, industrial fertilizers and fumigation.



**Figure 4.1: Farming in Lake Victoria Wetland Zone**

**Source:** Field work, 2018

Specifically, 86.9% of the respondents categorically said that horticulture agriculture around Lake Victoria wetland in Misungwi district were the main contributors to the experienced lake pollution. Figure 4.1 shows in the foreground, one of the horticulture gardens in the wetland while a white strip of the lake water appears in the middle background of the photograph.

The numbers of respondents who stated other agricultural activities carried out various levels (subsistence or commercial) which also use inputs that pollute the Lake waters are provided as follows: 41 (22.3%) cotton, paddy and sunflowers; 20 (9.1%) maize, millet and cassava, etc. It should be noted that, these qualitative data though not quantified; yet they shed light on the extent environmental degradation has taken place in the study area calling for intensive future research.

#### **(b) Pastoralist activities**

Many studies have written extensively on the general negative impact of pastoralism as a way of life has on the physical environmental mainly due to erosion and denudation. The study observed that, cattle grazing were practiced in the areas. Specifically, 69% the cattle keepers said that they grazed their

livestock in the buffer zone or wetland and almost 99% of these livestock used Lake Victoria water for drinking polluting it with dung. The fact that, pastoralist activities which seconded agriculture by 27% of all the occupations; it almost adds one third to the physical environmental degradation in the study area (Figure 4.2).



**Figure 4.2: Animal keeping in Lake Victoria Wetland Zone. Traces of Overgrazing and Erosive Activities Caused by Keeping Large Herds of Cattle are Reflected in the Photograph**

**Source:** Field work, 2018

The foregoing results suggested agricultural and pastoralist polluting effects to Lake Victoria water resources and land degradation by uncontrolled overgrazing on the environment respectively. The exodus of farmers and pastoralists moving from the drought hit areas to wetlands around Lake Victoria led to change in land use, economic activities and impact biodiversity in the destination, consequently, polluting effects to the destination. Masanja (2013) similarly observed the rapid and excessive in-migration of agro-pastoralist from the drought hit neighboring areas had a more adverse effect on the carrying capacity sustainability of the wetland.

### **(c) Fishing Activities**

Fishing for both direct consumption and commercial purposes constituted 21% of the occupations. Regarding method of fishing, 72% of the respondents said they used local made boats and fishing gears (Figure 10), 15% unspecified methods. Secret surrounded on the fishing methods which were used by remained 13%. However, through secret enquiries with FGDs and informants under anonymity; it revealed that the figure represented cases of those who used poison and others outlawed methods such as the use of mosquito nets and dynamite fishing. Also, overfishing impact to biodiversity species was observed as Sato (Tilapia) and Nile Perch as well as silver cyprinid were reported to be highly fished by 97% of fishermen from the locality. Overfishing threaten depletion of fish if stiff measures would not be taken. Respondents gave a logical inference by saying: “It is evident that the aforementioned species of fish are in great demanded at household consumption and commercial levels every day and every season; therefore, soon or later such species is most likely to perish for extinction” one of the fishermen commented miserably.



**Figure 4.3: Fishing Activities on Lake Victoria. Lake Weeds Termed As “Magugu Maji” is Another Environmental Pollutant Which Cut Off Air and Food Supply to Living Fish Compound Problem**

Source: Author (Field work, 2018)

#### **(d) Mining Activities**

Table 4.1 shows that 34 (15%) of the respondents were involved in mining activities basically gold extraction; and few precious stones like diamond. It was observed that, both open cast and shaft mining methods were employed in small scale mining. The study established through interviews that 97% of the respondents said that mercury was widespread used in the extraction of minerals; only 3% used carbon ribbon, an environmentally friendly substance, but too expensive to afford as compared to mercury. It was sad to learn that, many of mining activities occurred near the wetland or buffer zone accompanied by the application of mercury in the mineral extraction processing ending in direct or indirect discharge of toxic materials to Lake Victoria because there were no water stabilization ponds to absorb such pollutants. Apart from polluting the environment with obnoxious chemicals used in processing mineral ore; but also mining degrade landscape as it leaves behind bad lands and endless pits no longer useful for human activities as shown in Figure 4.4.



**Figure 4.4: Mining activities in Misungwi District Near Lake Victoria Wetland Zone. Abandoned Mines Leave Permanent Damage to the Physical Environment Although Tree Regeneration Struggling to Recover the Lost Natural Forestry is Visible**

Source: Author (Field work, 2018)

Finally, as a matter of interest to environmental pollution; the study wanted to know basic ways of disposing of solid waste at households. Almost 56% of the respondents in the study sample said they deposited the wastes into the polythene bags at home premises; while the remaining 46% dumped the solid waste, they generated from households were disposed of to unspecified location implying that it was dumped haphazardly, consequently contaminated the environment.

#### **4.4 Impact on the biological and physical features as a result of human settlement around Lake Victoria in Misungwi District over fifty years**

Previous studies show that, from 1961-1964 the level of Lake Victoria rose up to around 2.5 m and in the 1977-1980 period it rose by 1.5 m (Kite, 2009). The lake area is about 68,000km<sup>2</sup> with a catchment area of 193,000km<sup>2</sup> (IOC, 2015). Observations and studies have shown that the wetland area of the Lake Victoria in Misungwi is continuing to be degraded due to human population settlement and human associated activities including bad agriculture practices and overstocking causing silting. From observation point of view; one respondent during the study explained: *“Water level was not reaching here [pointed at the shore line] it was near that small mountain and we used to fish there but as you can see today here we stand there is no water at all”*

In sum, infrastructure development, waste dumping, bad activities practiced especially on wetland, human pressure regarding water resources, the current mining activities and associated toxic chemicals in mineral processing emerging, as alternative economic activity for people’s livelihoods; all these are done with a little or no dual regard to proper environmental management. In aggregate, they account for the degradation of the Lake Victoria water resources and consequent negative effects to the physical environment and the local ecosystem. Perhaps, this prompted one the environmental officer in Misungwi to comment that:

*“Without Lake Victoria this community will face a crisis on water .... the Council [Misungwi District Council] has invested much on protecting other water sources draining to the lake to ensure sustainable uses of Lake Victoria for our existence”.*

#### **5.0 CONCLUSIONS AND RECOMMENDATIONS**

The study has attempted to assess the impact of human settlement on water resources and the environment in general around Lake Victoria in Misungwi District. It embarked on drawing relationship between socio-economic activities as a result of human settlement expansion and its impact on water resources management in Misungwi district and measures taken for improvement. It has established that, there was a great correlation between destruction of water quality and biodiversity in the environment around Lake Victoria and the rapid

expansion of human settlements. It was largely due to rapid increase of the urban population as reported by NBS (2013) for the past three decades. It stimulated fast growth of economic activities like agriculture, mining, animal keeping and bricks making which have direct relationship with use of water resources. Consequently, it negatively affected the quality lake water and the existed limited water supply and distribution plan of Misungwi district. There were all signs to show that, if this trend remained unchecked; most likely to continue in the unforeseeable future.

Although the study noted some efforts made by the government and some few stakeholders to contain the water quality and environmental problem through public awareness building campaigns on the importance of using water resources sustainably; these efforts are not adequate. This study recommends that, there is a great need for the local government to draw comprehensive policies and environmental laws to check such expansion of human settlement into the lake environment to safeguard the natural resources under threat. Further, more emphasis should be placed on continued awareness building on sustainable use of the water resources of Lake Victoria and its wetland at large lest the environment deteriorates at the expense of the inhabitants' livelihoods. It is important for the Misungwi authority to strengthen their human resources capacity with adequate skills and technical know-how to enforce laws which check mushrooming human settlements towards the lake water resources and catchment areas.

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