

Full Length Research Paper

Livelihood diversification and implications on poverty and environment in the Lake Victoria Basin

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This paper on livelihood diversification is based on an ongoing study under VicRes programme being undertaken in the Lake Victoria Basin, in Tanzania, Kenya and Uganda. We examine how changing socio-economic and environmental conditions contribute to livelihood diversification, land-use changes, poverty reduction strategies and environmental conservation in the Lake Victoria Basin. The study was undertaken using both qualitative and quantitative methods. The qualitative methods included focused group discussions, key informant interviews and direct observations. Quantitative data were collected using a structured household questionnaire. Qualitative were analysed with the villagers by triangulation, while quantitative data were analysed using standard statistical methods. Findings from the study indicate that while agricultural production is prominent in the highland areas, the major activity in the lowland villages is fishing. Factors such as population increase, drought, and changes in macro and micro socio-economic conditions have resulted into livelihood diversification and land use changes in the Lake Victoria basin. Some of the livelihood activities influence the socio-economic dynamics, natural resource management, and the environment, leading to increased land degradation, low agricultural productivity, water pollution, food insecurity and poverty. The study also established decreasing trends in land availability over time attributed mainly to increasing population pressure and livelihood diversification.

Key words: Livelihood diversification, land use changes, poverty alleviation, environment, population dynamics, Lake Victoria Basin.

INTRODUCTION

The Lake Victoria Basin is endowed with various natural resources that are threatened with degradation. The major environmental problems emanating from various livelihood activities in the basin include, land degradation, deforestation and soil erosion. This leads to the hypothesis that livelihood diversification in the Lake Victoria Basin has a negative impact on the environment. Related consequences include loss of biodiversity and land productivity, soil and water pollution associated with excessive use of chemicals and fertilisers, and poor waste management (IRA, 2001). The consequence may be increased vulnerability of local communities to socio-

economic and environmental disasters. The changing environment and levels of resource endowment in the Lake Victoria region have necessitated livelihood diversification in an attempt to reduce poverty and ensure food security. It can thus be hypothesized that poverty is the major driving force behind resources degradation in the Lake Victoria Basin. The resultant environmental impacts on resources in the Lake Victoria Basin are considered to be a function of population, affluence and technology in use.

Land use changes and development activities have had significant impacts on the natural resource base and the livelihoods of the populations in the Lake Victoria region. The factors with considerable impacts on the natural resources and the environment of the lake Victoria region include intensified and booming fishing industry, influx of refugees and in-migrants from various parts of respective

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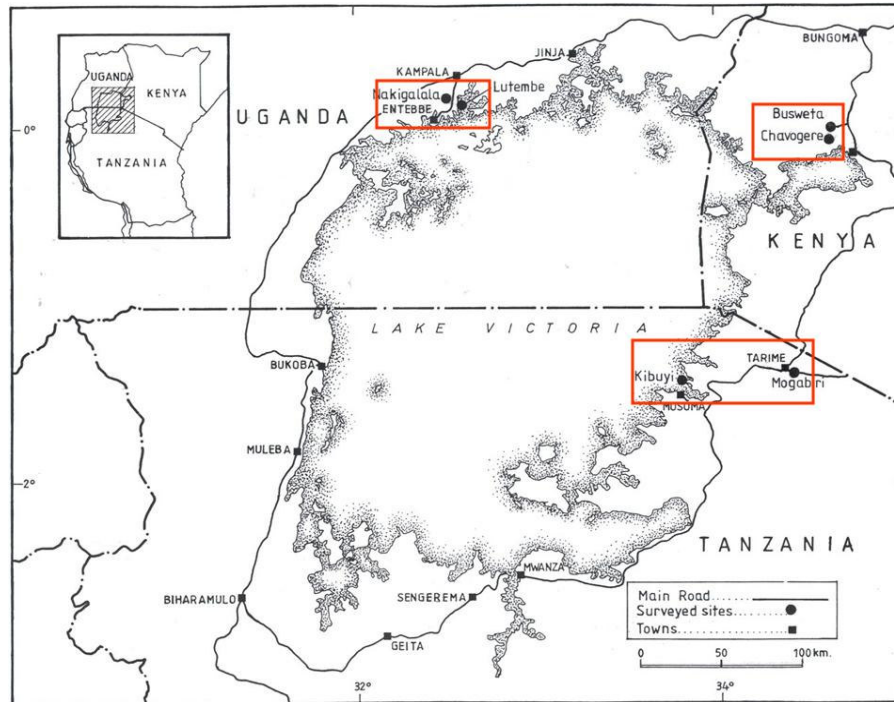


Figure 1. Map showing the location of study villages in the Lake Victoria Basin.

countries, particularly in the 1990s (Madulu, 1998), and increased livestock population (Hongo and Masikini, 2003). All these have influenced both socio-economic dynamics and the natural resource base. Similarly, the study by Yanda and Madulu (2003) demonstrated that there are strong linkages and dependencies in natural resource use and livelihood strategies between highlands and lowlands communities.

The main objective of the study reported in this paper was to examine the extent to which livelihood diversification impact on the welfare of local communities, land use patterns and the environment in both the lowlands and highlands in the Lake Victoria basin. Its major focus was to establish causes for livelihood diversification in the Lake Victoria Basin; assess the impact of population pressure on land use changes, food security, and the environment; identify and examine different livelihood strategies and their socio-economic and environmental implications; and suggest sustainable measures that could harmonize livelihood strategies and natural resource management, while taking poverty reduction strategies on board.

STUDY METHODOLOGY

This study has been undertaken using a variety of methods, including qualitative and quantitative methods. The qualitative methods included participatory rural appraisal (PRA) approaches, such as focused group discussions, key informant interviews and direct observations. Details about the use and advantages of

participatory approaches are described in Chambers (1992), Pratt and Lozois (1992) and Mikkelsen (1995). Discussion groups were representative of economic/livelihood activities, gender and age. The participatory approaches were used to capture the problems and opportunities in the study areas with a local perspective.

The quantitative data was collected using a structured household questionnaire. The questionnaire was designed to be applicable to all three countries involved in the study. The questionnaire was first pre-tested in Uganda and then revised and finalised for use. A total of 342 households were interviewed during the study, with equal proportions between the highlands and lowland areas, the sample size being 57 households per village. Qualitative data was analysed with the villages involved in participatory assessments by triangulation. They were later compiled, tallied and categorised into the different themes of the study. The quantitative data was analysed using SPSS. Cross country comparisons were performed for different variables of the study, and conclusions were drawn regarding the interactions between poverty, livelihood diversification and environment.

The study areas

The study is being conducted in highland villages (above 1,500 m above sea level) and lowland villages (below 1,500m above sea level) found in the Lake Victoria basin in each of the participating countries. Each of the study districts had one study village in the highlands and one study village in the lowlands. In Tanzania the villages involved are Mogabiri Village (highlands) and Kibuyi Village (lowlands) in Tarime District. In Kenya the study is being undertaken in Busweta village (highlands) and Chavogere village (lowlands) in Vihiga District, while in Uganda the villages involved are Nakigalala (highlands) and Lutembe (lowlands), both in Wakiso district. The study sites are shown in Figure 1. Some of the characteristics of the study districts in each country are summarised in Table 1.

Table 1. Characteristics of study districts by country.

Characteristics	District		
	Tarime (Tanzania)	Vihiga (Kenya)	Wakiso (Uganda)
Total population	492,798	588,378	907,988
Population density	127	1045	333
Population growth rate	2.8	2.8	4.1
Sex ratio	90	93	94
Total district area (km ²)	11,137	563	2,722

Sources URT (2003), Uganda Bureau of Statistics (2005), Vihiga District Council (2002).

Table 2. Economic activities in study villages.

Economic Activities	Highland Village			Lowland Village		
	Mogabiri	Busweta	Nakigalala	Kibuyi	Chavogere	Lutembe
Food Crop cultivation	Banana, maize, beans, cassava, potato	Potato, maize, beans	Cassava, potatoes, maize, beans	Cassava, potatoes	Potato, maize, beans	Cassava, potatoes
Cash crop cultivation:	Tea	Tea	Tea (large scale)	None	None	Mango, flowers
Livestock keeping	Local and improved cattle	Local and improved cattle	Very little	Very little	None	Very little
Fishing	None	None	None	Fishing mainly sardines	None	Fishing mainly tilapia
Mining	Small scale gold mining	None	None	None	Small scale gold mining	Sand and clay for brick-making
Quarrying	Little	None	None	None	None	Stone
Business	Small scale trade, market vending, charcoal selling, timber & shops	Small scale trade, market vending, charcoal selling, etc	Small scale trade, market vending, charcoal selling, etc	Small scale trade, market vending, charcoal selling, etc	Small scale trade, market vending, charcoal selling, etc	Small scale trade, market vending, charcoal selling, etc
Employment	Those in public and private institutions	Tea estates	Tea estate, flower farm, brick factory	Those in public and private institutions	None	Flower farms

RESULTS AND DISCUSSION

Livelihood Activities

To a large extent the activities are similar for villages located in the same zones (Table 2), dominated by crop cultivation and livestock keeping in the highland zone and fishing in the lowland zone. The livestock include cattle, sheep, goats and chicken. More crops are grown in the highland compared with the lowland zone particularly on the Tanzanian side, the major factors being drought conditions. Other factors include the availability of other livelihood options such as fishing in Tanzania and Ugan-

da and dairy farming in Kenya. In all the three highland villages the main cash crop is tea, grown on a large scale in Nakigalala and on small-holdings in Mogabiri and Busweta. In Busweta village there is an increasing shift from subsistence farming to tea and Napier grass farming for sale, which were reported to be quite profitable. In the lowland villages the major activity is fishing, except for the Chavogere village where dairy farming is popular. Chavogere village, which is not located at the lakeshore, offers conditions suitable for dairy farming. Different fish species were reported, but there were variations between villages. In Kibuyi village, for example, sardines are common (Figure 2). However, there were reports of declining



Figure 2. Sardines being sun-dried at Mwambani area in Kibuyi Village, Tanzania.

Table 3. Percentage responses on main occupation by poverty groups in the Lake Victoria basin.

Main Occupation	Poverty Groups			Total
	Poorest	Less Poor	Least Poor	
Crop husbandry	26.8	52.0	21.2	100
Animal husband	7.7	38.5	53.8	100
Fishing	33.3	61.1	5.6	100
Extractive/mining activities	0	100	0	100
Commerce - buy and sell	26.7	56.6	16.7	100
Employment	6.3	43.7	50.0	100
Others Professional services	0	0	100	100
Semi-skilled services	42.9	14.2	42.9	100
Casual labour	50.0	50.0	.0	100

fish catch due to over-fishing.

In order to better understand the dynamics and diversification of livelihood activities in the Lake Victoria basin, such activities are categorised based on wealth status of the respondents. Findings from this study show that there are notable differences between the poverty groups regarding their livelihood activities. Some of the activities in the study areas are more peculiar to specific poverty categories. The differences are manifested in main occupation of the respondents. For example, the least poor are less disposed to report fishing activities as their main occupation. However, the group of rich households are the owners of fishing gears that they rent out to the poor and the less poor; hence indirectly they are involved in fishing. Casual labour and extractive mining activities are the other areas not mentioned by the least poor as their main occupations. These are mainly the reserve of the less poor or the poorest. The least poor reported a higher tendency towards animal husbandry,

employment or other professional services as main occupations (Table 3). It is surprising to note however that the least poor seemed to be less involved with crop husbandry, as reflected by the small proportion (21.2%) reporting it as their main occupation. It would have been expected that since they own livestock which produce manure, more could mention crop husbandry as a major activity. The similarity (42.9%) of poorest and least poor respondents reporting being involved in semi-skilled services is striking. It appears that the involvement in semi-skilled services is undertaken irrespective of the wealth category of the household.

The respondents face many constraints in implementing their livelihood activities, especially those in agriculture and animal husbandry. Table 4 presents the main constraints associated with various livelihood activities in the study areas. The major ones include pests and diseases (83.7%), lack of capital for inputs (82.4%), changes in seasonality (70%) and theft of products (69.

Table 4. Constraints in implementing livelihood activities.

Constraints	Percent of Respondents
Pests and diseases	83.7
Lack of capital for inputs	82.4
Changes in seasonality	70.0
Theft of products	69.8
Lack of markets for products	66.9
Poor transport for products	65.6
Drought	64.2
Poor soils	63.4
Price fluctuations	63.3
Inadequate/Lack of advisory services	62.0
High taxes	61.1
Lack of labour	58.9
Diminishing natural resources	57.5
Unreliable rains	54.0
Inadequate land	53.0
Poor storage	52.6
Old age	52.2
Corruption	49.5
Floods	47.3

(69.8%). Addressing these constraints would perhaps improve the wellbeing of the communities surrounding Lake Victoria. The increased incidences of pests and disease and seasonality are in some places associated with climate change (Liwenga et al., 2008).

Despite the existence of a variety of livelihood activities, the constraints described in Table 4 have continued to render the activities ineffective in getting the people out of poverty. Most people practice agriculture and other activities for both subsistence and commercial purposes but are often not able to produce a sufficient surplus to earn an income to meet their other needs. However, some of the constraints to the livelihood activities are both a cause and effect of poverty, which makes it very difficult for these rural communities to get out of the poverty cycle. Findings from the study also show that some of the constraints such as pests and diseases, lack of capital for inputs, theft of products are more commonly cited by the poorest than by the least poor. Poverty inhibits the individual and household to afford the necessary resources to deal with the pests or diseases, to buy pesticides, or to ensure the security of their produce. The least poor households are able to afford these resources and are therefore less likely to be inhibited by these problems.

Issues of diminishing natural resource, droughts and unreliable rains were equally raised by all groups, indicating that they are all impacted by these constraints. Diminishing natural resources was largely associated with increasing population pressure, while droughts and unreliable rains were associated with climate change. Many of the people claimed to have inadequate land of optimal

acreage to undertake viable agricultural production. Field data showed that the poorest category also has the lowest land average acreage. In addition, there was a complaint among many of the respondents regarding poor and/or declining soil fertility. The latter was attributed to the fact that their fields have been over-cultivated and deprived of their natural fertility, and they were not able to use inputs like fertilisers to replenish the declining fertility.

Also, the poor households could not afford the inputs, and they also have relatively small pieces of land that are hardly enough to allow natural land and soil management practices such as fallowing. Soil erosion has been one of the effects of such inadequate management practices, with subsequent decrease in farm productivity (Figure 3).

The poor households were also the least likely to have experienced an increase in the use of fertilizers or manure in the last ten years. Other important concerns were lack of markets for products (66.9%) and poor transport for products (65.6%). The lack of markets for their products means that even in years with good harvests, they are unable to sell their products at competitive prices and get reasonable incomes. This is exacerbated by the poor transport infrastructure which makes it difficult for the villagers themselves to access distant markets and traders to reach the villages to buy the various products. Addressing these issues may facilitate these rural communities to get out of poverty. This should go hand in hand with the improvement of farmer advisory (extension) services, which are currently regarded to be inadequate as expressed by 62% of respondents (Table 4).

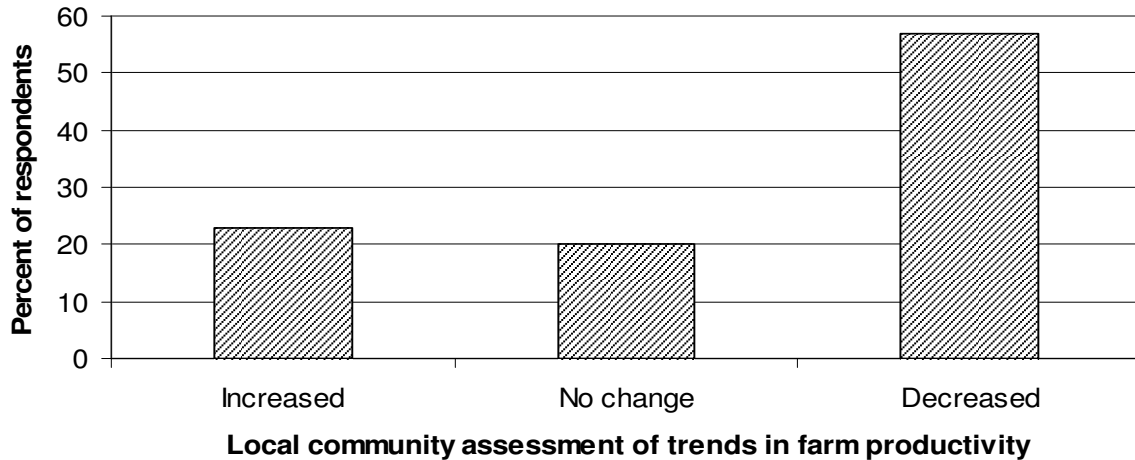


Figure 3. Patterns in land productivity as perceived by the studied communities. The relatively small pieces of land owned by many households hardly allow land/soil management practices such as fallowing. With the limited use of agricultural inputs, land productivity has been persistently decreasing over the years. Soil erosion has been among the effects of such inadequate management practices, which further diminishes land productivity.

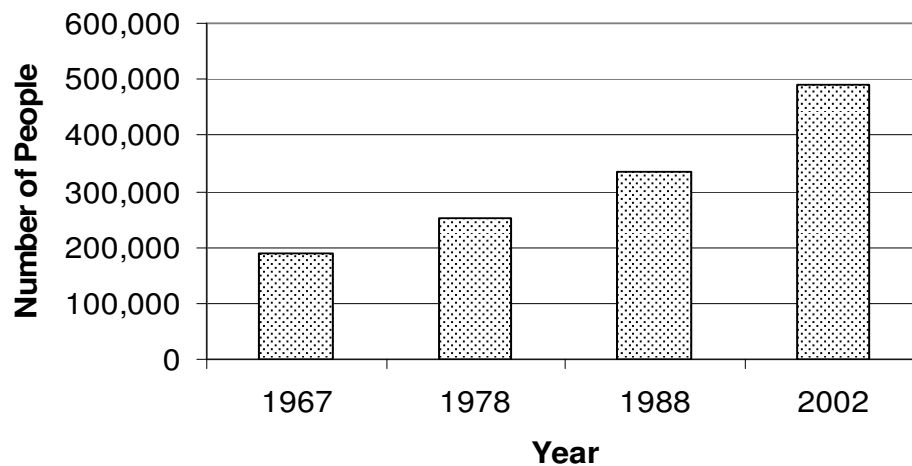


Figure 4. Population trends in Tarime District, Tanzania, 1967-2002. The population of Tarime almost tripled during the reference period. Similar increases are reported for other districts in the study areas. Source: URT (1998, 2003).

Causes of Livelihood Diversification

Findings from this study indicate that livelihoods are highly diversified in all three Districts. Although there are variations in patterns and causes of livelihood diversification in the study sites, there are also broad similarities. Such patterns have also been confirmed during household surveys. The following analysis shows the common factors or events that have contributed to land use change and livelihood diversification in agriculture and other sectoral activities.

Population increase

Increase in population is among the major influencing

factors in all the study villages. Summaries of population distribution and dynamics in the study villages are provided in Table 1. In the past the land was sufficient for all people; mainly, because they were fewer in numbers. With population increase (cf. Figure 4), due to internal growth and in-migration, the land available per capita has decreased considerably, and this has been a cause for land fragmentation and land use conflicts. As a result there has been an increased and continued use of the same land. Consequently the land has progressively become exhausted. Population increase has also affected the fishing industry through increased demand for fish, which results in over-fishing. Some fish species are disappearing as a result of over-fishing. Illegal fishing methods were also reported by villagers in the fishing villages of Kibuyi and Lutembe,

although the exact figures could not be obtained. The use of illegal fishing methods is also common in other parts of Lake Victoria (Nyega, 2008).

Increase in drought incidences

Inquires during participatory assessments revealed that there has been a change in the composition of traditional food crops in all the three districts because of the increasing incidences of drought. As such villagers in all three villages reported that currently they increasingly emphasise on growing of drought resistant crops such as cassava and sweet potatoes. In addition, there is also increasing cultivation of wetlands and lakeshores by farmers to take advantage of the water available in those areas. This has led to loss in services and functions offered by these ecosystems, including pollution and decline in biodiversity. Droughts were also reported to have prompted many people to diversify their livelihood activities instead of depending only on agriculture that could be risky especially in years with severe droughts.

Changes in agricultural marketing conditions

In most of the study villages, cash crops such as coffee, cotton, and sisal were grown extensively in the 1960s. Lack of good markets for agricultural produce compelled communities to seek alternative livelihoods especially since the early 1970s due to economic stagnation, and political and economic instability. The most affected villages were those in Uganda, especially during the Idd Amin period. After abandoning the cash crops, most people shifted to other activities. For the lowland areas close to the lake, many people turned to fishing, while those in the highland areas shifted to other non-agricultural activities as shown in Table 2 and Table 3.

Establishment of large-scale enterprises

The establishment of large-scale labour intensive commercial enterprises in or near the study areas has given alternative sources of livelihood through paid employment. Tea estates in the highland study areas of Uganda and Kenya, flower farms in Uganda, fish factories and Clays Factory also in Uganda, for example, have brought about changes in both land use and livelihoods. Land is now divided between domestic purposes such as cultivation and grazing, with the commercial enterprises like tea estates and flower farming. Commercial farming has brought some negative consequences to land use and people's livelihoods. It has created land shortage for the people in the area and threatens existence of wetland and forest ecosystems. In addition, it is suspected that the chemicals used to spray the tea estate and flower farms, for instance, in Ugandan study sites are poisoning the bees that are useful in pollinating the fruit trees such

as mangoes. The Uganda Clays factory creates badlands while excavating soil. The mining of clay and excessive use of wood fuel also brings about deforestation.

Commercialisation of land

The commercialisation of land has accelerated the cost of acquiring land in many parts of the Lake Victoria basin, and has also led to land speculation. This is making it difficult for poor people to access land, given that they cannot pay the high prices. It has also led to conflicts on land, and therefore affecting land use. Such experiences are more pronounced in Uganda and Kenya, and less so in Tanzania, reflecting lesser land use pressure in the latter country.

Villagisation programme

The Villagisation Programme implemented in Tanzania in 1974 greatly contributed to changes in agricultural activities. This was associated with creation of common villages, re-location of settlements and ownership of agricultural fields. During the implementation of this programme many people had to move from the distant and/or scattered settlement areas and were allocated small plots for building houses and for crop cultivation in the newly established villages. It was difficult for some people to manage their former distant agricultural fields. Some of these distant fields suffered from attack by wild animals such as monkeys and some were abandoned completely and regenerated into forests and/or woodlands. It was reported by villagers during this study that with the current population increase in the core villages, some villagers have started moving back to their old settlements in order to cultivate their old plots. In many places the programme resulted in the decrease in cultivation areas for those people where new settlements were established as a result of the villagisation programme of the 1970s. This was reported to have been the case since most of their land was built up and they did not have fields in other areas. As such livelihood diversification has become a necessity.

Environmental Implications of livelihood diversification

Findings from this study show variations in the use of the natural resources. There was generally an increase in the use of natural resources associated with increasing population and the subsequent increase in the demand for these resources. A decrease in use was only reported where natural resources have been depleted and/or degraded. An example of such situation, which has compelled some people to go into diversification in livelihood activities, is Kibuyi Village on the lowlands of Tarime District, Tanzania. It was reported in this village that deforestation was rampant. People from this village nor-

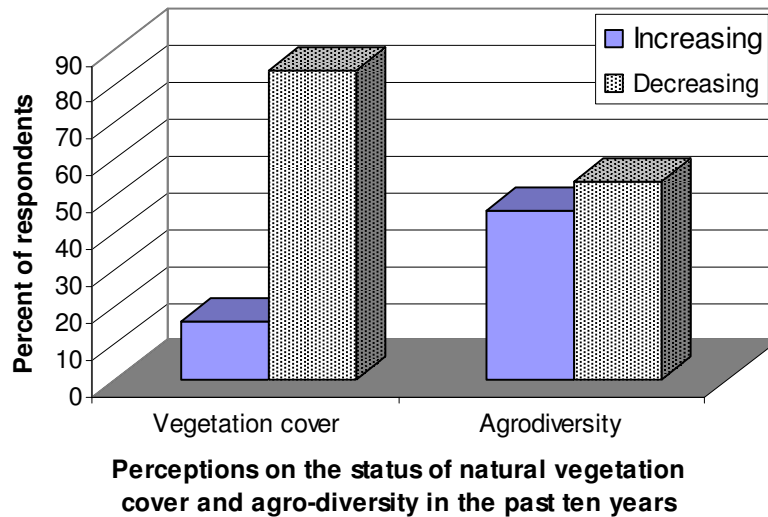


Figure 5. Local perceptions on the status of natural vegetation cover and agrodiversity in the Lake Victoria basin. Findings from the study indicate that both vegetation cover and agrodiversity have deteriorated during the last ten years mainly associated with expansion of farmlands and production of fewer crops that have ready markets unlike some traditional crops of the area.

normally cut trees and sell them as firewood or prepare charcoal and sell it to the nearby towns e.g. in Musoma. As a result most areas do not have trees at present, and even those involved in the charcoal/fuelwood business were reported to find it difficult to continue with the business, because they are forced to travel for long distances to where they could make the charcoal/fuelwood.

The impacts of intensive use of some of the resources include limited availability especially of forest products, limited availability of certain fish types, diminishing land for grazing and for arable agriculture. The characteristics of natural resource use, and the underlying factors that account for the perceived patterns in resource use were also established. New types of demand and new technology have led to the intensification of the use of natural resources. For example, the mining of sand, stones and clay have all intensified because of the increasing affluence of society.

A quantitative assessment of the status of vegetation cover and agrodiversity in the study areas revealed that both have deteriorated considerably in the last ten years (Figure 5). This is a clear indication that even the resources users themselves understand the local trends regarding vegetation cover and biodiversity in agroecosystems. While the decrease in vegetation cover was reported to be associated with expansion of farmlands and settlements, the decrease in agrodiversity was attributed to the need to produce crops that have ready markets, and those that can somewhat withstand the decreasing soil fertility.

In addition when asked about their perception of the effect of the increasing resource use on the environment

in their respective areas, the respondents were also concerned about increasing water scarcity, water pollution, deforestation, wetland depletion, soil erosion, soil degradation, reduced crop yields, erratic rainfall, reduced vegetation cover, reduced fish stocks in the lake, increased crop diseases and pests, decreased pasture availability, land fragmentation, and resource use conflicts.

Livelihood diversification and poverty

There is no doubt that livelihood diversification is a strategy for poverty alleviation. It is a people's response to the changing macro-economic and social environment. Society needs more goods and services, and so economic and livelihood activities must emerge to satisfy these needs. There is tremendous pressure on the traditional resources, so additional resources have to be brought into the livelihood framework. Alternatives have to be found. New and innovative strategies have to be found to help people get out of poverty and deprivation, hence the need for livelihood diversification.

However, poverty itself can be a hindrance to livelihood diversification. Poverty can be a barrier to the people's innovativeness and opportunity to exploit available resources. It is a barrier to the actualisation of the people's own potential, and damages their self esteem and confidence in themselves. The qualitative assessment part of this study showed that the poorest have a narrower range of livelihood activities, while the least poor had a broader range because they have access to various types of resources. The nature of livelihood activity that a household adopts is also partly influenced by the

household socio-economic characteristics, including its poverty and affluence levels.

Opportunities for alternative livelihoods

One of the objectives of this study was to identify opportunities for alternative livelihoods. This was considered critical because alternative livelihoods are necessary for the sustainability of the environment. The alternative livelihoods that we suggest are those which can be implemented without compromising environmental integrity. It is based on the understanding that many of the present livelihood activities may be injurious to the environment, or are implemented in an unsustainable manner. Agriculture for instance is practiced using poor technologies without due regard for environmental and natural resource conservation. An alternative livelihood strategy would enable households and communities to reduce or eliminate unsustainable practices, and at the same time contribute to sustainable poverty alleviation and national development.

Alternative livelihoods would be those which balance the need to meet economic objectives with the need to maintain environmental integrity. This environmental integrity would only be achieved if there is marked and sustained reduction in the environmental effects of household poverty alleviation strategies. That is, reducing deforestation, soil erosion, wetland depletion, reduced fish stocks, land fragmentation, to mention but a few. There is a dire need to work with communities to identify and adopt lawful alternative means of subsistence, and to encourage them to share in the responsibility of sustainable resource and environmental management. This study is an initiative towards that direction of understanding the linkage between community livelihood activities and the environment, and to identify alternative strategies.

Conclusions

The analysis of the linkage between livelihood diversification, land use, poverty and environment has shown a normal distribution of the respondents into various levels of wellbeing, with fewer members at the lowest and topmost ends of the spectrum. The majority of the members are in the middle strata, which is comparable for all the three countries of Kenya Tanzania and Uganda forming the Lake Victoria basin. However, there are considerable differences between the poverty groups regarding their livelihood activities, and some activities appeared to be more peculiar to specific poverty categories. For example, the least poor appeared to practice less fishing, casual labour or extractive mining activities as main occupations, while the less poor or the poorest are more engaged into those activities.

Despite the existence of a variety of livelihood activities, several constraints render some of the livelihood activities ineffective in getting the people out of poverty.

For instance, most people practice agriculture and other activities for both subsistence and commercial purposes but are not able to produce a sufficient surplus to earn reasonable incomes to meet other needs. The poor households who cannot afford the inputs also have relatively small pieces of land that are hardly enough to allow natural fertility regeneration. The least poor households have more resources, more incomes and therefore less likely to be involved in the poverty trap.

Generally, however, livelihoods are highly diversified in all three countries although there are variations in patterns and causes of livelihood diversification in the different study sites. To a large extent the livelihood activities have been found to be similar for villages located in the same zones. In all the three countries the highland zones are dominated by crop cultivation, livestock keeping while the fishing is the predominant activity in the lowland zones. It has been demonstrated that livelihood diversification is a strategy for poverty alleviation. It is a people's response to the changing natural and socio-economic environments. However, the poorest groups have a narrower range of livelihood activities, while the least poor have a broader range because they have access to resources, and can thus respond better to innovative livelihood ventures.

To ensure environmental and livelihood sustainability there is need to address issues of alternative livelihoods, that would balance between economic and environmental objectives while contributing to sustainable poverty alleviation. Thus there is need to encourage shared responsibility for sustainable resource and environmental management among various stakeholders.

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REFERENCES

- Chambers R (1992). Rural appraisal: rapid, relaxed and participatory. Discussion Paper No. 311, Institute of Development Studies, Sussex
- Hongo H, Masikini M (2003). Impact of immigrant pastoral herds to fringing wetlands of Lake Victoria in Magu District Mwanza Region, Tanzania. *Physics and Chemistry of the Earth* 28: 1001-1007.
- Institute of Resource Assessment – IRA (2001). Survey and mapping of land-use/cover and erosion hazards in Lake Victoria Environmental Management Project (LVEMP). Consultancy report submitted to LVEMP, Dar es Salaam, Tanzania.
- Liwenga ET, Kangalawe RYM, Kabumbuli R, Walingo MK (2008). Livelihood diversification and its implication on land use patterns, poverty and environment in the Lake Victoria basin. Progress Research Report Submitted to VICRES. Inter-University Council of East Africa.
- Madulu NF (1998). Changing lifestyle in farming societies of Sukuma-

- land, Kwimba District, Tanzania. De-Agrarianisation and Rural Employment Network, Working Paper Vol. 27, Afrika-Studiecentrum, Leiden, Netherlands and Institute of Resource Assessment, University of Dar es Salaam, Tanzania.
- Mikkelsen B (1995). *Methods for development work and research: A guide for practitioners*. Sage Publications, New Delhi, India.
- Nyega N (2008). *Assessment of the beach management units strategy on the Lake Victoria fisheries resources in Ilemela district, Tanzania*. MSc Dissertation, University of Dar es Salaam, Dar es Salaam, Tanzania.
- Pratt B, Lozois P (1992). *Choosing research methods: data collection for development workers*. Development Guidelines No. 7, Oxfam, Oxford, UK.
- Uganda Bureau of Statistics (2005). *2002 Uganda population and housing census – Main Report*. Uganda Bureau of Statistics, Kampala, Uganda.
- United Republic of Tanzania - URT (1998). *Mara Regional Socio-Economic Profile. Planning and Parastatal Sector Reform*. Dar es Salaam.
- United Republic of Tanzania - URT (2003). *Tanzania population and housing census: Age and Sex Distribution, Census Reports Vol. II*, Government Printers, Dar es Salaam, Tanzania.
- Vihiga District Council (2002). *Vihiga District Development Plan 2000-2008*. Vihiga District Council, Kenya.
- Yanda PZ, Madulu NF (2003). *Highland-lowland interactions in natural resource use and effects on poverty levels: The case of Karatu and Monduli Districts, Northern Tanzania*. REPOA Research Report No. 03.3.