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Full Length Research Paper

Perceived impact of land use changes and livelihood diversification strategies of communities in the Lake Victoria Basin of Kenya

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The changing environment and levels of resource endowment in the Lake Victoria Basin have necessitated increased human activities as a survival technique, in an attempt to reduce poverty levels and ensure food security at the household level. This study examined the dynamics in human activities of the local communities of the Lake Victoria Basin of Kenya. Participatory Research techniques were used to gather information from the respondents in the community on selected variables. It is apparent that the major constraints that have encouraged changes in the land use patterns and livelihood diversification were low education, poor agricultural technology and knowledge, environmental, economic, cultural and social factors. There were constraints such as decreased food crop yields [maize, beans, sweet potatoes] and low production levels, decreased food crop variety and diversity, reduced food and nutrient diversity, unsustainable changes in food consumption patterns, reduced sources of water and decreased water volume. There is a strong link between the traditional systems in natural resource management, besides re-afforestation, education on wetland use and management.

Key Words: Livelihood diversification, land use patterns, food security.

INTRODUCTION

Ecological and environmental influence due to human developmental activities has been steadily increasing and causing unprecedented magnitude and rate of global ecosystem change (Xu et al., 2007). For example about one third of the earth's land surface has been transformed by man (Vitousek et al., 1997). This has resulted into land use and land cover change that has been recognized as one of the most important aspects of global change (Xu et al., 2007). Human activities are believed to have altered climate patterns and trends by increasing climate variability and extreme weather events (Intergovernmental Panel on Climate Change; IPCC, 2001). Such environmental change has had many negative impacts on human activities (DaCosta and Turner, 2007).

Among the most important impacts include devastating droughts and floods, increased salinity in agricultural soils and water resources coupled with changing seasonal climatic patterns (DaCosta and Turner, 2007). The Lake Victoria Basin with its endowed natural resources and inhabited by fauna and flora, people of diverse cultures and diverse micro-climates of livelihood security value is threatened by environmental degradation due to increased diversification of livelihood activities.

The major environmental problems emanating from these diverse livelihood activities in the Lake basin include land degradation, deforestation, soil erosion, soil and water pollution associated with excessive use of chemicals and fertilizers and poor waste management. The changing environment and levels of resource endowment have necessitated increased human activities in an attempt to reduce poverty levels and ensure food security at the household level. These changes have various socio-economic and environmental implications that may affect the wellbeing of the local population. The changes in land use in Mt Kilimanjaro in Tanzania, for example,

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has been reported to include expansion of cultivation to more marginal land down the slopes, the disappearance and extreme fragmentation of bush land and appearance and expansion of settlements (Soini, 2005). In the same environments the home gardens have also changed to patches as new homesteads emerge on the sub-divided farms.

Population pressure and the ensuing expansion of agriculture to more marginal land, intensification of the home garden system and climate change has caused changes in farmers' livelihoods (Soini, 2005). The farm size has decreased, natural resources have become scarce as farmers intensify and diversify their farm production and adopt non-agricultural activities (Thanh et al., 2005). The relationship between agricultural intensification and population density is often mediated through availability of land, level of adoption of technology and non-farm livelihood options. Warren (2002) has shown that higher stocking rates and intensification are possible where there is enough land, such that land degradation becomes contextual.

Farmers' responses to changing conditions could be through agricultural intensification, diversification or migration as reported by Scoones (1998). Agricultural intensification implies increased reliance on agriculture as a strategy either by intensifying resource use within a given land area or by bringing new agricultural and grazing land into use. On the other hand, small-scale farming lacks capacity to cope with the problems of environmental protection, food security and sustainable livelihood production. Household practices have simultaneously had varying impacts on a range of livelihood strategies is affected by the policy and institutional environmental process.

Households adopt survival strategies depending upon resource endowments, and in the context of the policy and institutional framework. Agricultural intensification has been adopted as a key livelihood strategy that rural households pursue in order to achieve livelihood security (Ellis, 2000; Scoones, 1998). However, intensification may result in the unfavorable outcome of innovation and diminution of economic and social well-being or threaten sustainability through environmental deterioration (Kates et al., 1993; Stone, 1994). When intensification occurs with already high densities and or with fast population growth, it is accompanied by poverty (Cuffaro, 1997).

Apparently farmers who diversify their income sources clear less forest while the diversification of agricultural cash crops was negatively correlated with forest clearing (Caviglia-Harris and Erin, 2005). This leads to a diversity of sources of food and income as one of the major ways that households adopt to develop food security against agrarian environments (Liwenga, 2003). Such diversification may imply a matter of survival and can be caused by vulnerability or involve pro-active strategies to improve living standards (Ellis, 1998).

Associations between heterogeneities in livelihood strategies with resource management technologies have been reported. The effects of agro-ecological factors, such as livelihood diversification strategies, population and market conditions across regions have also been studied. Results revealed that natural, physical and social capital assets are key factors that determine livelihood options available to households (Staal et al., 2002; Pender et al., 2004; Kristjanson et al., 2005; Kruseman et al., 2006; Iiyama et al., 2008). In livelihood heterogeneities, diversification strategies among households sharing similar biophysical conditions and their implications for sustainable natural resource management have rarely been empirically investigated. This study examined the dynamics in livelihood activities and strategies for communities in the Lake Victoria Basin of Kenya, with a view of finding out a linkage between livelihood heterogeneities, diversification strategies and traditional systems in natural resource management.

MATERIALS AND METHODS

Study site

The study was conducted in Busweta and Chavogere villages in the Lake Victoria Basin in Vihiga District, Kenya located on the Eastern fringes of the Rift Valley in the Lake Victoria Basin (Figure 1). The district lies between 13000 – 15000 m above sea level and slopes gently from West to the East. The topography is generally undulating hills and valleys with streams flowing from Northwest to Southwest and draining into Lake Victoria. Geologically the district is composed of Kavirondian and Nyanzian rock system with the Nyang'ori and Maragoli being the notable hills. These rocks have high potential for exploitation as building stones and ballast.

The two main agro-ecological zones that dictate land use patterns and population distribution are the upper midland and the lower midland zones. The upper midland zone with well drained fertile soils has a high potential for crops like tea, maize and beans. The lower midland zone is dominated by red loamy soils derived from sediments and basement rocks. These soils support the growing of crops like sugarcane, maize [*Zea mays*], beans [*Eleusine coracana, Pennisetum americanum*], millets [*Phaseolus vulgaris*] and sorghum [*Sorghum bicolor*]. There are two major rivers, Idzava and Yala. The district experiences high river-line erosion. Consequently, the eroded soils are swept to Kisumu District where they are deposited and largely used as building sand. The district has an equatorial type of climate with fairly well distributed rainfall throughout the year. It receives an average precipitation of 19000 mm per annum. The temperatures range between 14 and 32˚C with a mean temperature of 23˚C.

The 1999 Population and Housing census recorded a total population of Vihiga District as 498, 883 persons comprising of 232, 720 males and 266, 163 females (Vihiga District Development Plan, 2000 - 2008). Based on the population growth rate of 3.3%, the total population was projected to grow to 550, 800 persons in 2002 and to 671, 404 persons in 2008. The District's population growth rate of 3.3% was above the national average of 2.4% (Vihiga District Development Plan, 2000 - 2008). This high population growth rate contributed to high population density in the district of 997 persons per km^2. The labor force (age group 15 - 64) is expected to rise from 266, 523 persons in 2002 to 324, 881 persons in 2008, 22% increase, creating pressure on small land parcels and increasing the need for non-farm employment opportunities.

According to the Second Report on Poverty in Kenya, June 2000,

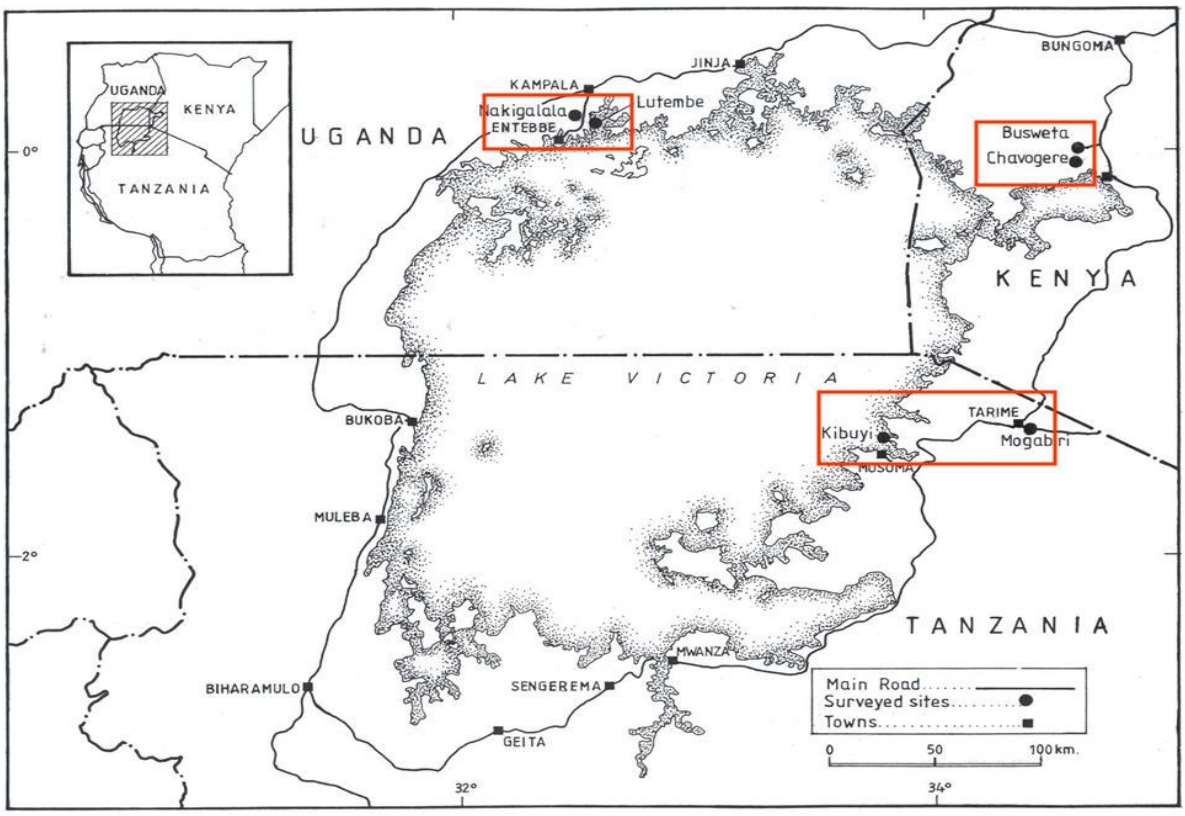


Figure 1. The Lake Victoria Basin.

about 62% of the district's population live in absolute poverty and about 60% of the population suffer food insecurity (Vihiga District Development Plan, 2000 - 2008). The major causes of poverty cited include: lack of capital to invest, high population, uneconomical land units, high dependency syndrome, HIV/AIDS, idleness, laziness and alcoholism (Vihiga District Development Plan, 2000 - 2008). Other issues are inadequate agricultural extension services, high cost of education, poor infrastructure, lack of markets for farm produce, theft of farm produce. The district's contribution to national poverty is 3% (Vihiga District Development Plan, 2000 - 2008).

Study population

The study population was composed of community leaders, youth groups and women groups engaged in poverty alleviation activities within the study area. Elderly individuals above 65 years of age, who were believed to be an important resource for the historical changes in the community comprised the Focus Group and provided valuable information on perceived environmental, agricultural and livelihood strategies changes over time. In addition to the above groups, a team of Government Officers (that is, the administration, social workers and agricultural extension workers) also provided relevant information in their areas of jurisdiction.

Study design and data analysis

The study was conducted in three phases and only results of the first phase that were mainly qualitative are reported here. Participatory Rural Appraisal (PRA) approaches as described by Chamber (1992), Pratt and Lozois (1992) and Mikkelsen (1995) were used to collect primary data and included focus group discussions, key informant interviews and direct observations. These techniques were suitable for involvement of the stakeholders in the generation of data sets and in capturing the problems and opportunities in the study areas with a local perspective. Discussion groups were representative of economic and livelihood activities, gender and age. Secondary data sources included records from village, divisional and district offices. Direct observations were also used to verify and complement information from participatory approaches.

Qualitative data was analyzed by compiling, tallying and categorizing the responses into common groups. The categories were formulated on the basis of the different themes of the study. Effort was made to identify community solutions to the identified problems. Data were entered and analyzed by the Statistical Package for Social Sciences [SPSS] program [Windows version 9.0, Chicago, IL, USA]. Frequencies and percentages were generated and chi-square statistic was run between selected variables and was set at a probability value of 0.05 and a confidence interval of 95%.

RESULTS AND DISCUSSION

Cultural ecology of the study area

There existed social institutions in the villages set to cater for individual welfare such as schools, religious institutions, social groups and microfinance institutions. Microfinance

institutions played a significant role in empowering women socially and economically through provisions of soft loan. The seminars provided forum for interaction and exchange of ideas with the larger community. Social groups, for example women groups and development committees formed allowed for exchange of ideas and also provided a forum for dissemination of any development information. The population structure presented a youthful group with fewer individuals in the elderly group and with more girls than boys. The average household size was about 10 members. Social services in the community were electricity supply, transport and communication, market centres that is, shops/milling centres and water springs, extension services. There was no health centre within the villages studied.

Villages still bore functional names that implied the rich cultural value of the past generations, even with the observed land use and cultural changes of modern times. Some of the revealing names of cultural value of the ecosystem were; *Kiguyenze* a playground for recreational purposes: *Mukunzulu* is a name of a tree under which important decisions were made: *Ikobero* was a forest separated from other activities for circumcision: *Ekerongo* was a place where decorative soil for housing and circumcision rites were obtained: *Elunyu* was a place where traditional salt was made from papyrus reeds and *Elugaga* was a forest strip or fence divided between the Tiriki and Maragoli. These important sites of natural resource conservation value were not in existent at the time of the study having been destroyed due to increased demand for land for settlement and unsustainable or eco-unfriendly livelihood activities.

Land use activities and perceived changes in land use

Land use and agricultural activities

The main land use types include livestock and crop farming, settlements. The major food crops grown were maize, beans, sweet potatoes and millets. The main cash crop grown was tea while the major fodder crop was Nappier grass (*Nissetum purpureum*). Other land use activities were soil mining (brick making, pot making and house construction), sand and stone harvesting, livestock keeping, tree harvesting (protected areas like water catchments areas) cash crop farming (tea and coffee farming) and settlement purposes. Land was owned by the man who was the head of the household and use for household food production [Table 1]. Women had security to own land though they form the majority of the agricultural labour force. The increase in settlement areas reduced available arable land for livelihood activities. There was also a perceived increase in the soil mining activities and the keeping of improved cattle breeds.

A list of agricultural activities and the corresponding time of the year when they are undertaken was identified. Since the village livelihoods are largely dependent on farming, a focus was put on activities related to crop management and food availability. Farm activities are spread out almost throughout the year and include land preparation, planting, weeding and harvesting. Food shortages were reported by the local people to occur during the months of December to February. These are periods when existing household food stocks are depleted on the one hand and there is increased demand of household resources for land preparation and planting of the new crop.

Perceived trends in intensity of resource use over the selected historical periods

Details of changing trends in resource use indicate general intensive utilisation of the land resources, associated with increased population growth and expansion of crop fields and cultivation to meet the requirements of the growing population (Table 2). The greatest decrease was witnessed in the period after 1979 and was associated with increased population, settlements and policies that account for the environmental protection.

It was observed that there were no agricultural or human activities along river valleys and in water catchments areas in the pre-independence era compared to the period after 1979 when farmers started farming in the riperian areas. Between the 1960s and 1970s a large part of the resources were either owned by the government or controlled by the community elders in each of the clans. The wetland areas were not usually considered a useful resource and were open access areas. However there was an increased use of wetlands prompted by droughts, food insecurity, population pressure and the increased food need.

Perceived trends in ease of availability of resource use over the selected historical periods

Effort was made to examine the relative ease of the availability of land for various activities undertaken in the village [Table 2]. The purpose was to bring to reflection on whether land availability had been easy, difficult or whether there were no locally perceived changes over the last forty years. Results revealed an increasing reduction in the acreage of land available to households for various uses, particularly since the 1980s due to high population growth that has resulted in fragmentation of the existing small farms.

The difficulty in the availability of land in the valley bottoms (wetlands) was associated with people realising the value of the agricultural potential for these areas particularly for maize, horticultural crops and crop farming. This was also true for the adoption of tea production. However the use of valley bottoms for crop

Table 1. Type of land ownership and level of land use in the Lake Basin.

Land Ownership (acres)	Frequency	Percentage
Private registered/ownership	72	58.1
Customary land ownership	52	41.9
Use of land	Frequency	Percentage
Cultivation	93	75.0
Brick mining	4	3.2
Cultivation/Livestock grazing	27	21.8
Land in use at present(acres)	Frequency	Percentage
All land in use	86	69.4
Three quarters of land in use	13	10.5
Half land in use	17	13.7
Quarter or less	08	5.6

farming could have contributed to the drying up of water sources in the area. There is no land available for recreational purposes in the study area due to increased settlements and increased population.

Soil erosion

Increased pressure on land, the subsequent continuous cultivation and decline of soil fertility conditions could have prompted farmers to adopt more intensive farming practices, such as intercropping or mixed cropping and the use of chemical fertilizers and pesticides especially since the 1980s. The more traditional practices of soil fertility management that controlled both soil erosion and soil fertility like rotational farming and fallowing had gradually declined. Soil erosion was significantly associated with the status of vegetation cover, use of manure, use of fertilizers and adequacy of home-grown food for the last ten years ($p < 0.05$). The status of agro-diversity in the past ten years, fallowing periods, use of wetlands and income from agriculture did not show any associations with soil erosion.

Soil fertility

Perceived improvements in soil fertility included use of fertilizers, use of organic manure, fallowing and use of irrigation [Table 3]. Soil fertility was significantly associated with the use of fertilizers for the last ten years, use of organic manure, adoption of irrigation, type of food crops, food crop yields, adequacy of home grown foods, incidences of food shortages, income from agriculture, status of vegetation cover and agro-diversity. Use of organic manure significantly reduced incidences of food shortages, increased adequacy of home grown foods in status of agro-diversity and reduced the effects of cash crop farming.

This was also true for the adoption of fallowing except that fallowing was not associated with the status of agro-diversity. There was a negative association between cash crop farming and food crop yields. Land allocated to cash crops was not available for food crop farming. Irrigation of agricultural lands was associated with improved cash crop farming, status of vegetation cover, agro-diversity and increased crop yield.

Perceived effect of human activities on wetlands

Table 4 details the perceived effect of human activities on the wetlands. While 45.2% stated that the agro-biodiversity had deteriorated and 9.6% did not see any change, 45.2 maintained an increase in agro-biodiversity. It is possible that most of the population did not know the extent of agro-biodiversity in the previous years. However the level of agro-biodiversity in the area reveals a declining trend as was indicated by 45.2% and by 52.7% of the respondents who indicated deterioration in vegetation cover. The concept of wetlands management and its use was not understood by 80.7% of the respondents underscoring the importance of natural resource management.

Factors influencing land use and livelihood diversification

Perceived constraints to productive use of land by farmers

The major constraints that occurred and contributed to changes in the land use patterns and livelihood diversification were high level of illiteracy, poor agricultural technology and knowledge of proper farming technologies, economic factors such as increasing levels of poverty due to unemployment, social and health factors that interferes with the people's productive capacity, decreased availability per capita of arable land due to overpopulation and soil degradation due to overuse and lack of fallow periods.

Perceived reduction in food production

There was deterioration of food production levels as evidenced by low yields even when the acreage under food crops is increased. Pattern of food production in the past ten years is detailed in Table 5. There was an increase in tea farming [32.3%] and food crop farming [38.7%]. However, 54% of the respondents did not practice farming due to unavailability of land and also ownership of uneconomical units of land. The number of food crop variety and diversity cultivated was on the decline thereby triggering the process of loss of crop, food and nutrient diversity, and soil degradation. There was a decline in agro-biodiversity in the area. Much food crops that were planted in the 1960's mentioned by the Focus Group remained unknown to the present generation and so were many of the food preparation methods methods. Subsistence crops were being replaced by

Table 2. Changing trends in resource use over selected historical periods in Vihiga District.

Type of Resource use	Historical periods			
	1960 - 1979: Ease of availability	1980-1999: Ease of availability	2000-2004: Ease of availability	Reasons for the reported changing trend
Crop cultivation	Easy	Difficult	More Difficult	Because of Increased number of people
Livestock grazing	Easy	Difficult	More Difficult	Expansion of farms
Settlements	Easy	Relatively easy	Difficult	Increased number of people
Forests	Easy	Difficult	Difficult	Expansion of farms
Valley bottoms (wetlands)	Easy (were open, that is, not used)	Difficult	Difficult	In the past they were open areas, but now they are owned by some people, where they grown mainly vegetables.
Water areas	Difficult (due to distance)	Relatively easy (after digging wells)	Relatively easy (after digging wells)	Increased number of constructed wells
Mining areas	Easy	Easy	Easy	Not so many people involved
Ritual sites	Easy	No change	No big change	No big change - not often touched for other uses
Protected areas	Easy	No change	No change	-
Recreational sites	Easy	Difficult	Not available today	Increased number of people and settlements, more intensified land use

Table 3. Perceived improvements that have led to soil fertility in the past 10 years.

Characteristics	Number of people reporting	Percent of people reporting
Use of fertilizers		
Increased fertilizer application	38	30.6
Decreased fertilizer application	51	41.1
No change in fertilizer application	12	9.7
Never used fertilizer	23	18.5
Use of organic manure		
Increased use of organic manure	74	59.7
Decreased use of organic manure	24	19.4
No change in use of organic manure	10	8.1
Never used organic manure	16	12.9
Practiced fallowing		
Increased fallowing	23	18.5
Decreased fallowing	38	30.6
Not change practiced	18	14.3
Never heard of fallowing	47	36.3
Used irrigation (Bucket irrigation)		
Increased irrigation	11	8.9
Decreased irrigation	33	26.6
Not practiced irrigation	05	4.0
Never heard of irrigation	75	60.5

cash crops such as coffee, tea and Napier grass. Further pressure on productive land occasioned by a rapid increase in population and settlements was observed. Land degradation enhanced infestation of productive landby the '*striga*' weed. A change in consumption patterns affected the quality of agricultural production, and both food and nutrient availability and quality in households. There was over reliance by households on maize as the basic staple that was observed to have encouraged mono cropping.

Table 4. Perceived effect of human activities on wetlands and land use over the past 10 years.

	Number reporting incident	Percentage
Use of Wetlands		
Increased	10	8.1
Decreased	8	6.5
No change	6	4.8
Not understood	100	80.7
Status of vegetation cover		
Improved	24	19.4
Deteriorated	71	58.3
No Change	28	22.5
Status of agro-biodiversity		
Improved	56	45.2
Deteriorated	56	45.2
No change	12	9.6

Increase in population

The interplay of over population, overstocking and soil degradation resulted in loss of grazing lands to food production, increased settlements and soil erosion. As such the increase in demand for fodder by animals in the area catalyzed the loss of natural fodder species [nappier grass, natural grazing lands] and the introduction of exotic varieties, such as Nappier grass, as households change from traditional methods of animal husbandry such as communal grazing to both tethered and zero grazing feeding.

The community changed from community village settlements to individual homesteads and commercialized rented houses or structures. Increased subdivision of family lands and subsequent establishment of fresh homesteads reduced arable lands and increased settlements. An increase in commercial activities also such as the Kapsabet-Chavakali road and Mago-Chamakanga road. Natural forest lands changed to artificial patches of exotic trees and increased settlements due to increased human developmental activities. Some of the forest lands had been turned into subsistence and cash crop farms because of increased human activity and government policies that encouraged cultivation of tea and coffee. Overpopulation coupled with political and economic factors and pressure on arable land together with political and economic factors led to the expansion of settlements into reserve and forest lands, resulting into deforestation with a loss of species biodiversity.

ROLE OF SOCIAL SYSTEMS IN NATURAL RESOURCE MANAGEMENT

A crumbling social system that was instrumental to natural resource conservation may have contributed to the loss of traditional sites and biodiversity. Large trees that were synonymous with traditions and customs of the community were notably destroyed due to perceived increase in population pressure on the land and increased livelihood activities. Impression of modern culture at the expense of traditional rites was observed to be the cause of the near extinction of important traditional trees of value. Traditional trees that were of cultural control value to the community in terms of religious gatherings, cursing of wrong doers, reconciliation of warring parties and circumcision ceremonies, were observed to be rapidly diminishing. Some of the traditional sites were located at *Busali* encouraged clusters of market centers along major roads (circumcision ceremonies), *Itegero* (church meeting), *Chavogere* (reconciliation meetings) and *Kedoli* (to curse wrong doers).

However with changing culture and social systems these sites were no longer in existence. Protected areas such as cattle dips, schools, road reserves and play grounds had been encroached upon. A rapid increase in population and demand for settlements encouraged human encroachment on reserve land and enhanced the culture of land grabbing of public utility plots. Recreational grounds had been converted into markets, administration centers such as chief posts and institutions such as schools. Demand for land continues to increase this regrettable loss.

Decline in livestock herds

The traditional emphasis on livestock by all generations was reported by the local people to have changed as a result of land fragmentation resulting in reduction or non-existence of grazing fields. Livestock was now grazed on individual small plots and shared the same shelter with the homeowner because of insecurity, especially the rampant livestock theft. Socially, the previous role of

Table 5. Perceived trends food production, adequacy of food in households in the past 10 years.

Cash crop farming (tea)	Frequency	Percentage
Increased tea farming	40	32.3
Decreased tea farming	17	13.7
Not practice farming	67	54.0
Food crops farming		
Increased food crop farming	48	38.7
Decreased food crop farming	45	36.3
Did not change food crop farming	31	26.7
Pattern of crop yield		
Increased crop yield	48	38.7
Decreased crop yield	47	37.9
No change in yield	29	23.4
Adequacy of food grown		
Increased food in household	49	39.5
Decreased food in household	48	38.7
No change in food in household	27	21.7
Incidences of food shortages in		
Increased incidence of food shortage	39	31.5
Decreased incidence of food shortage	61	49.2
No change in pattern of food shortage	24	19.3
Rearing of livestock	No	%
Increased livestock herd	32	25.8
Decreased Livestock herd	48	22.6
No change livestock herd	31	25.0
Never kept livestock	33	26.6

livestock for paying dowry during marriage had also decreased, with currently less numbers of livestock demanded for dowry than in the past. There was a general decline in the number of cattle that were kept by most of the households in the area. Land shortage was the most felt land use problem followed by high input prices for agricultural inputs and uncertain markets respectively. There were other land use constraints felt by the population at the village level that affected their livelihoods options.

Populations' environmental concerns

The major environmental concerns perceived by the villagers were land resource degradation associated with use of pesticides in Soya fields, the *el nino* rains and lack of knowledge on proper agricultural technologies, pollution due to use of conventional fertilizers and pesticides, environmental changes with the area experiencing more dry spells that interfere with the soil and crop productivity and natural disasters like hailstorms had become a common feature during the rain periods and they do interfere with crop production. The key natural resources were land, trees, natural water springs and livestock. Land and natural resources were fast shrinking due to increased population pressure, human activities and high birth rates observed in the area.

Wetlands were fast diminishing in size due to deforestation, siltation as a result of soil erosion, human livelihood activities including increased settlements. The growing of the eucalyptus trees close to water sources was perceived as a great threat to the sustainability of the water sources. These trees are believed to be heavy feeders, siphon rivers and dry up swamps increasing rate of desertification. Sources of water such as rivers, springs, dawns and wells suffer reduced sizes and low water volumes, with obvious pollution from car wash refuse, raw sewage and garbage from homes, roads and plants.

Problems associated with land use and poverty alleviation issues

Problems associated with land use and poverty alleviation issues were attributed to diverse set of causes, trade liberalisation, high population density, declining cultural norms among youths and stringent conditions for loans that are imposed by money lending institutions.

Land shortage was locally perceived as the most critical problem in the village. The local people require diversification of livelihood activities including the non-farm activities for improved life styles. Provision of relevant education to the community as well as establishing cooperative societies and groups is needed to address issues such as price inputs, marketing of agricultural produce and project management for efficient loan servicing. For improved lifestyles the community and the government need to work together for efficient and sustainable management of resources.

Insecurity

Generally insecurity affected agricultural productivity associated with inequality in resource distribution and use, joblessness and inefficiency in law enforcement. The challenges facing villagers also included low income, low productivity of land resources: high cost of inputs and operational costs such. taxes, transport cost, warehousing amongst others: gnorance associated with lack of initiative among the population and illiteracy: laziness mostly because of lack of initiative and lack of parental guidance and example: lack of cooperation, lack of trust among the community, small and unproductive landholdings and poor exhausted soils: overpopulation and pressure on available land: over settlements: over cultivation and overstocking: poor infrastructure: poor road maintenance; change/erratic weather: HIV/Aids and other diseases: and lack of extension services-poor contract between the extension officers and formers.

ROLE OF WEALTH GROUPS IN LIVELIHOOD DIVERSIFICATION

Perception of wealth and poverty in the community

The villages defined poverty based on ownership of certain resources such as the nature of house, amount of land owned, types of crops grown (cash crops) ownership of dairy cows, a car, farm implements and ability to take children to school or college. Different wealth groups were identified through a wealth ranking exercise that included their descriptive characteristics and approximate proportions of households in the village in each group. A wealthy person owned all of these assets, a medium rich person lacked a few of these while a poor family lacked almost all of these assets.

Majority of the people were in the moderately wealthy category and only about 10% of households in the wealthy category. The “poor” group had a limited number of strategies employed in poverty alleviation. This was associated mainly with the limited resources that this group owns. The diversity of livelihood strategies seemed to increase with increasing wealth status, mainly because the wealthy have more flexibility in terms of resources available and how such resources can be utilized.

Livelihood activities and social groupings

There was evidence of intergeneration differences in terms of livelihood strategies. The youths in this village were reported to be having more diverse strategies than both the middle aged and the elderly people. Reportedly this was because the youths were perceived to be more energetic and more daring (more risk takers) compared to the other two groups and also that the youths were more exposed in terms of possible livelihood opportunities due to their high mobility and ability to diversify their abilities in agriculture, businesses as well as investting in livestock when they get good money.

There were three socio-economic groups in the village such as women, youth and men groups. Women groups were active in merry-go-round activities which involved pulling resources together to supply or support each other in specified terms and turns. These groups were also involved in small scale entrepreneurial activities. Women participated in development projects involving transfer of technology in the agricultural and other informal sectors. Though men groups were not common, the majority of men are farmers who were often pulled together in cooperatives in the tea and coffee sector and presided over dairy farming. Youth groups were active in horticulture, aquaculture, small scale businesses and mining (brick making) and participated in the informal sector as artisans, plumbers, carpenters, touts etc.

Gender issues in livelihood activities

Gender differences in household activities have been observed in Africa, with women performing most of the activities. There have been major efforts directed at balancing activities among household members and also to determine gender-based activities in these communities. All the farm work was performed by all members of the households in the community. Activities conducted by men were lumbering, house construction excluding putting the mud for traditional and semi-permanent structures, mining, digging wells, stone quarrying, cleaning homesteads and specific small businesses like *boda boda*, (use of bicycles for transport as a source of household income) hawking.

Activities conducted by women include fetching water, food preparation, house construction, that is, plastering houses with mud, cleaning the homesteads, small businesses like selling ripe banana/vegetables/hawking, tailoring/hair dressing, stall-feeding of livestock, stone quarrying, acquisition of fuel wood, household farming, casual labour like tea picking, domestic helps and child care. There was observed need for gender mainstreaming in domestic and agricultural work. Women’s participation in agricultural work was considered their responsibility in household provisioning and was not accorded any economic value.

Conclusion and recommendations

There have been tremendous changes in the natural environment due to increased unsustainable human livelihood activities with extensive destruction of important traditional and recreational sites. These changes have been associated with illiteracy, lack of knowledge on proper farming technologies, improper timing of planting, weeding and harvesting seasons, high levels of poverty, high levels of alcoholism, decreased availability per capita arable land due to overpopulation and soil degra-dation. There has been a resultant de-crease in levels of food production and yields, decrease in the number of food crop diversity leading to loss of crop, food and nutrient diversity.

Overpopulation and pressure on arable land degenerated to expansion of settlements into forest lands causing extensive deforestation of environmental value. Wet lands are fast diminishing due to deforestation, siltation as a result of soil erosion, human livelihood activities including increased settlements. Sources of water such as rivers, springs, dawns and wells are showing signs of reduction in water volume. Now there are changes in the weather conditions in the area that have influenced food security and stability of supply.

However, stability of food supply can be achieved with good planning, proper agricultural education on use of appropriate land management technologies, improved transport network and infrastructure. The effect of commercialisation of agriculture has increased food insecurity and created a shift in livelihoods pattern as more people now seek casual labour and engage in diverse livelihood strategies for sustainability.

This is further causing a negative impact on the environment. Provision of relevant environmental and resource management education, agricultural education and introduction of Information and Communication Technologies in the community has tremendous chance of improving people's sustainable use of natural resources for posterity. Both the community and the government need to work together for efficient and sustainable management of resources.

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