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*Full Length Research Paper*

# Implications of ecological and social characteristics to community livelihoods in the coastal areas of Tanzania

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**This study explored the implications of both ecological and social economic characteristics on community livelihoods and environment in distinct villages namely Mwanambaya and Kwala in Mkuranga and Kibaha districts respectively. Both districts located in coastal areas of Tanzania experienced pressure on natural resources appearing in different ecological settings. Data were collected using different tools and the analysis employed SPSS package. Results showed that agriculture production is the main source of livelihoods by 78 and 74% of respondents in Mwanambaya and Kwala respectively. Fertile soils, available water, more and suitable pasture, more vegetation with large trees attracted pastoralist in particular Wasukuma and Maasai tribes to Kwala area. Exploitation of different natural resources including cutting trees for charcoal and building, overgrazing contributed to land degradation mostly in Kwala by 40 and 20% of respondents in Mwanambaya. This study has established that community livelihoods in both urban and rural areas of Tanzania depend on natural resources organized in a form of an ecological gradient. This organization allows for different livelihood systems to interact and thus creating impacts on ecosystems and social economic undertakings. In order to sustain ecosystems productivity, establishment and implementation of village land use plans is a necessity. This will further address conflicts over resource uses that may arise due to livelihood systems interactions.**

**Key words:** Agriculture, coastal region, ecological gradient, livelihoods, Ruvu river, Tanzania.

## INTRODUCTION

In Sub-Sahara Africa, the majority of community obtains their livelihoods through exploitation of natural resources and their products (Liwenga, 2005; Majule et al., 2009). Different natural resources found in the region including Tanzania are widely distributed depending of ecological settings which are also diverse in nature (De Pauw, 1984). The United Republic of Tanzania (URT) is located in Eastern Africa between longitude 29° and 41° East, Latitude 1° and 12° south and it is boarded with Uganda, Burundi, Rwanda, Kenya, Malawi, Zambia and Mozambique. Tanzania has a spectacular landscape of mainly three physiographic regions namely the Islands and the coastal plains to the east; the inland saucer-shaped plateau; and the highlands. The Great Rift Valley that runs from north east of Africa through central Tanzania is another landmark that adds to the scenic view of the country (De Pauw, 1984). It also has pristine sandy beaches and Africa's highest and snow-capped mountain, Mountain Kilimanjaro. Tanzania is home to the world famous national parks and game reserves which attracts tourism activities. Physiographic feature and landforms allows for different social economic undertakings allowing for significant interactions to take place among different communities across well defined ecological gradients (Maitima et al., 2009; Majule et al., 2009). It is generally accepted that in Tanzania agriculture plays a very important role in providing food and income for the majority of the population (Shao, 1999). Over 70% of the population depends on subsistence agriculture which is entirely rain fed. Agriculture accounts for an average of 50% of gross national product (GNP) and about 66% of total export earnings.

Land suitability studies in Tanzania have indicated that there are seven major farming system zones suitable for different agricultural crops and livestock farming activities

(De Pauw, 1984). Of interest to this paper is the eastern and southern coast zone which is a cashew and cassava based farming system. This zone exhibit different forms of gradients where different livelihood activities interact across societies (Majule et al., 2009). The interactions across gradients may occur within land-use or livelihood systems being influenced by both ecological and social economical factors. For examples availability of livestock feeds and water in wetter parts of Tanzania in particular the Kilombero and Ruaha Sub catchments has attracted a number of livestock keepers from drier central parts of Tanzania (Majule and Mwalyosi, 2005; Majule and Kalonga, 2008). On the other hand presence of conducive social economic activities and social infrastructures are clearly known to bring about in migration of people from different areas within the country. Such kind of relationship is also very common in many other parts of Africa and has been documented by a number of scholars including Bernard et al. (1989) Campbel et al. (2003) and Majule et al. (2009). Finding from such studies have indicated that communities and ecosystems tends to interact in a number of ways depending on a particular service required. Recently, the impacts of climate change have been reported among others to accelerate the rate of human movements from low to high potential areas (Majule et al., 2008; Lema and Majule, 2009).

Studies conducted by Madulu (1996); Rosenzweig et al. (2002); Kangalawe and Liwenga (2005); Mongi et al. (2009) revealed that changes in rainfall patterns and amounts have led to loss of crops and reduced livestock production due lack of pasture and water availability. A common tendency has been for agro pastoralist to move with their livestock to potential areas that receives significant amount of rainfall exceeding 1,000 mm per season (Maitima et al., 2009). In this case climate change is likely to intensify drought and increase potential vulnerability of the communities to future climate change (Hillel and Rosenzweig, 1989), where crop production and livestock keeping are critically important to food security and rural livelihoods. On the other hand linkages between rural and urban centers in terms of livelihoods can not be avoided because this acts as a copping or adaptation measure in response a multifactor effects on community livelihoods and ecosystems productivity. The present research explored the implications of both ecological and social characteristics of two distinct areas on community livelihoods. The study also established driving forces for immigrants in study areas.

## METHODOLOGY

### Description of the study area

The study was carried out in two districts of the coast region namely Mkuranga and Kibaha in Tanzania (Figure 1). In Mkuranga, the study was conducted in Mwanambaya village where by in Kibaha it was conducted in Kwala village. The two district were selected due to their variations in terms of ecology, Mkuranga being located along the coastal shores of Indian Ocean dominated by dry sand soils namely Arenosals and also by having two distinct rain seasons namely short (*vuli*) and long ones (*masika*) where as Kibaha is located in the inner parts of the coastal region with variable soil types ranging from sand soils, mbugas and fluvisols (De Pauw, 1984) influenced by flooding of Ruvu river. On the other hand ariation in social economic and livelihood activities between the two districts was assumed to have impacts on natural resource use and human settlement patterns.

Two villages, namely Mwanambaya and Kwala located in Mkuranga and Kibaha districts respectively (Figure 1) were selected with an assistance of respective district natural resource officers because the villages were found to be the most representative for addressing the objective of this study. They constitutes to the four administrative districts of the coast region in Tanzania. Mkuranga is located on the coastal land with undulating plains while Kibaha is located in the inland coastal plains that constitute the Ruvu sub basin of Rufiji Basin (Figure 1). The environmental of Mkuranga is characterized by a variation in both maximum and minimum coastal temperature with both short and long rain seasons. The climate of Mkuranga district is basically of an inland equatorial type modified by the effects of altitude and distance from the Equator (De Pauw, 1984).

### Data and analysis

Both secondary and primary data were collected from various source using different techniques. Secondary sources included published research papers and relevant social and ecological reports about the area. Primary data were collected using multiple approaches including both quantitative and qualitative participatory rural assessment (PRA). The methods included focus group discussions (FGD) and household questionnaire. For FGD discussion at total of 15 people in each village were involved. For household interview a total of 52 and 38 head of houses were interviewed using a semi structured questionnaire and two figures represents 10% of the total number of households for Mwanambaya and Kwala respectively. A stratified random sampling procedure based on the locally perceived wealth categories was used for household interviews (Kothari, 2004). The methodology used in data collection and analysis is quite similar to that reported by Kangalawe et al. (2005); Majule and Kalonga (2008) and Lema and Majule (2009). Key informant interviews and FGD generated general information about the villages on ecological gradients and linkages across and within gradients and also social economic information. On the other hand, household data validated critical information generated during FDG. Qualitative data from household survey were first edited, coded and entered in a computer and the statistical package for social science (SPSS) software version 11.5 spread sheet was used for the analysis. Tables and bar charts were used to present different evolution of variables.

## RESULTS AND DISCUSSION

### Social economic characteristics

Ethnicity in both villages studied is presented in Table 1. Results show that both villages have more than one tribe and this suggests that in migration has taken place due to different ecological and social economical factors. Common tribes in Mwanambaya village are *Zaramo*, *Ngindo* and Wandengereko forming 48, 24 and 16% respectively of the total number of households. *Zaramo*

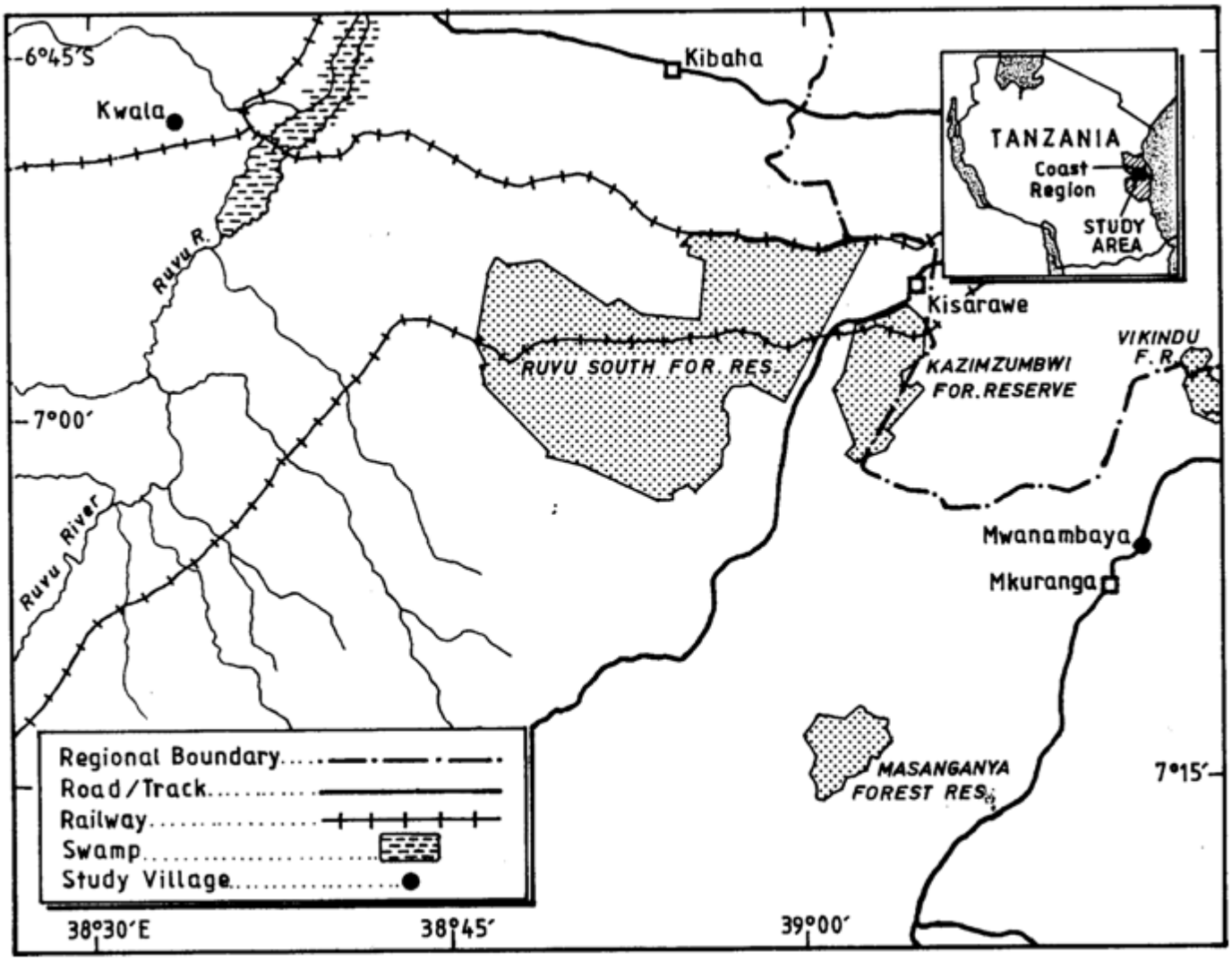


**Figure 1.** Map of coastal region showing the location of the study villages (need to be improved-not clear).

**Table 1.** Ethnicity of communities by % in two villages studied.

| Major tribes | Study villages | |
|---|---|---|
| | Mwanambaya (n=52) | Kwala (n=38) |
| *Zaramo* | 48 | 56 |
| *Ngindo* | 24 | 0 |
| *Ndengereko* | 16 | 0 |
| *Sukuma* | 4 | 24 |
| *Chaga* | 4 | 0 |
| *Maasai* | 4 | 20 |
| Total | 100 | 100 |

and *Ndengereko* are native tribes while *Ngindo* originated from Lindi region and they migrated into the area for agricultural reasons in particular cashewnut and cassava farming.

On the other hand, Kwala village which is found within Ruvu sub basin is also dominated by *Zaramo*. However Maasai from the northern pastoral areas of Tanzania and *Sukuma* tribes from the central and western parts of

**Table 2.** Education profiles by % of community members in study villages.

| Level of education | Study villages | |
|---|---|---|
| | Mwanambaya (n=52) | Kwala (n=38) |
| No formal education | 44 | 32 |
| Primary education | 36 | 68 |
| Secondary education | 4 | 0 |
| Post secondary education | 16 | 0 |
| Total | 100 | 100 |

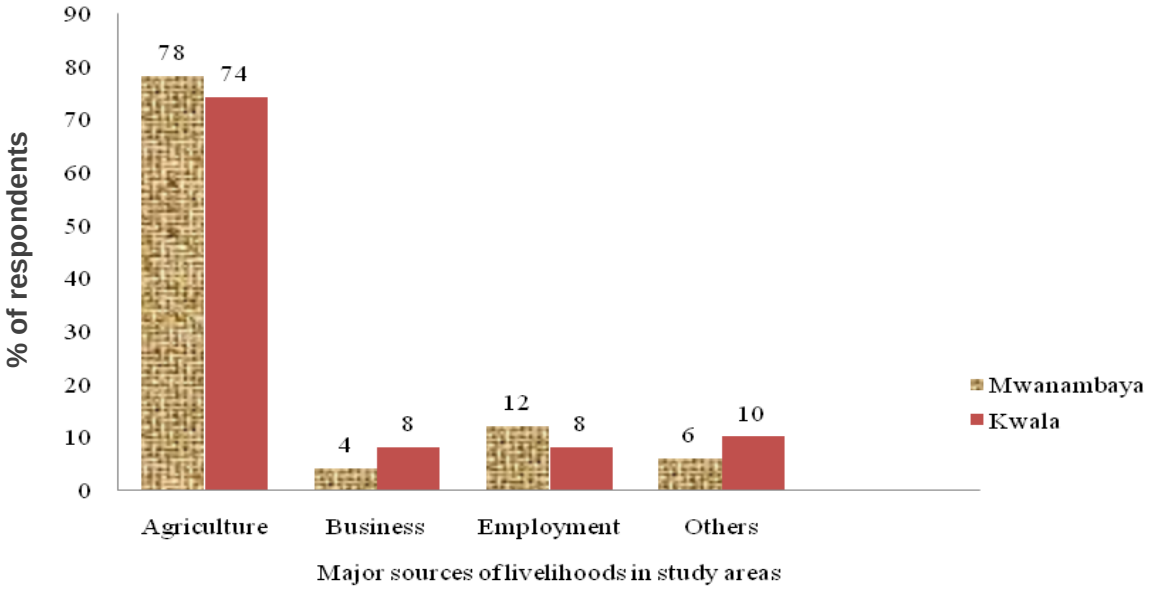


**Figure 2.** Main sources of livelihoods by % in study villages.

Tanzania have migrated into the village. The *Maasai* are pastoralist and have moved into the area for livestock keeping due to suitable characteristics of the village in terms of water and pasture. *Sukuma* are agro pastoralist. They have moved into the village due to similar reasons but additionally they are also engaged into farming activities due to high natural fertility of soils in area. During focus group discussions it was revealed that the number of immigrants for livestock keeping is increasing although it was not possible to establish the actual statistics.

Education level plays a significant role in managing natural resources and ecosystems. The numbers of household members who have no formal education (Table 2) are not comparable in both villages probable due to some cultural reasons. This is suggesting a need for promoting and encouraging communities to allow their children to attend schools. More have attended primary education in Kwala due a presence of a nearby primary school within a village while slightly lower members have attended primary school in Mwanambaya due to the fact that a primary school a little bit far from the village. Provision of social services near the communities including schools (both primary and secondary) is under the government agenda and this is a being effected in order to improve education levels in the country. The numbers of households who have attended secondary and post secondary education is high in Mwanambaya due to accessibility to urban center (Dar es Salaam and Mkuranga) where secondary schools area found.

## Main sources of livelihoods in study area

Figure 2 presents major sources of livelihoods in study villages. Agriculture is the main source of income in both villages and is followed by employment in formal sectors such as teaching and health sectors in on both villages. Such pattern is quite similar to that reported by Majule et al. (2009) for southern coastal areas of Tanzania.

According to focus discussions conducted in study villages and also household interview results (Table 3), different crops contributes to community livelihoods. For example cassava and pineapples contributes more in

**Table 3.** Major crops grown in study villages by % of respondents.

| Livelihood source | Study villages | |
|---|---|---|
| | Mwanambaya (n=52) | Kwala (n=38) |
| Cassava | 32 | 8 |
| Maize | 8 | 40 |
| Rice | 4 | 32 |
| Pineapples | 28 | 12 |
| Coconut | 16 | 0 |
| Water melon | 16 | 8 |
| Total | 100 | 100 |

**Table 4.** Formal land use prior occupation by % in study villages.

| Formal land use | Study villages | |
|---|---|---|
| | Mwanambaya (n=52) | Kwala (n=38) |
| Forest land | 64 | 56 |
| Woodlands | 4 | 32 |
| Grazing land | 0 | 8 |
| Crop land | 32 | 4 |
| Total | 100 | 100 |

Mwanambaya village as compared to maize and rice in Kwala village. Maize and rice are heavy feeder crops which needs fertile soils, reliable rainfall and enough water to grow (Rowell, 1994; Sakala, 1998; Majule and Mwalyosi, 2005). Such ecological conditions are found in Kwala village and this indicates a potential for promoting such crops in the long run due to land suitability.

Studied villages are not densely (with less than 100 people per square km) populated at the moment and this is indicated by the fact that 96 and 80% of the households surveyed does own land in Mwanambaya and Kwala villages respectively. An increase in the proportion of households renting land in Kwala (12%) compared with 4% in Mwanambaya is mainly for livestock and grazing and agricultural production reasons. The findings suggests that in both villages there are opportunities for absorbing immigrants unlike high potential areas in east African gradients reported by Maitima et al. (2009).

## Major landuse/cover and changes

There has been a significant change in landuse over the last 50 years in study villages according to FDG discussions. Household survey statistics (Table 4) also revealed that; i) forest land has decreased on the expense of agriculture and human settlements in both villages; ii) in Kwala village there is still more land covered by woodlands and this allows for charcoal production and trade to continue; iii) crop land (32%) is common in Mwanambaya village and this is managed by immigrants from urban areas; iv) grazing land is still available in Kwala village and this has been a driving force for agropastoralist (Wasukuma and Maasai tribes) who migrate to Kwala with their livestock as coping and adaptation strategies from their degraded environment.

In exploring reasons contributed to landuse changes in the coast region of Tanzania, this study has revealed that both social economical and ecological factors have played a significant role (Table 5). Accessibility to market centers accounts for 56 and 20% in Mwanambaya and Kwala villages respectively. The reason for such a difference is that Mwanambaya is very close to urban centers compared to Kwala village. Being close to market centers in urban areas whereby demand on natural resources and products is high has been reported to contribute towards landuse changes in many areas (Muganyizi, 2009; Majule et al., 2009). On the other hand, Mwanambaya is well connected to urban areas by a tarmac road to from Dar es Salaam city to the southern parts of Tanzania (Figure 1). This allows for easy and faster transport of different products from and to the village. This is not the case with Kwala village although it has railway connection which is not functional most of the time. Deforestation (Table 5) is more significant in Kwala and this has contributed significantly to landuse changes (40%). Invasion by livestock keepers coupled with expansion of farmland in Kwala also contributes to landuse changes. These observations are in broad agreement with findings by Majule et al. (2010) under similar environment in western parts of Tanzania.

**Table 5.** Major factors for land use changes in study area.

| Major reasons | Study villages | |
|---|---|---|
| | Mwanambaya (n=52) | Kwala (n=38) |
| Accessibility to market centers | 56 | 20 |
| Deforestation | 12 | 40 |
| Arrival of livestock keepers | 8 | 24 |
| Expansion of farmland | 24 | 16 |
| Total | 100 | 100 |

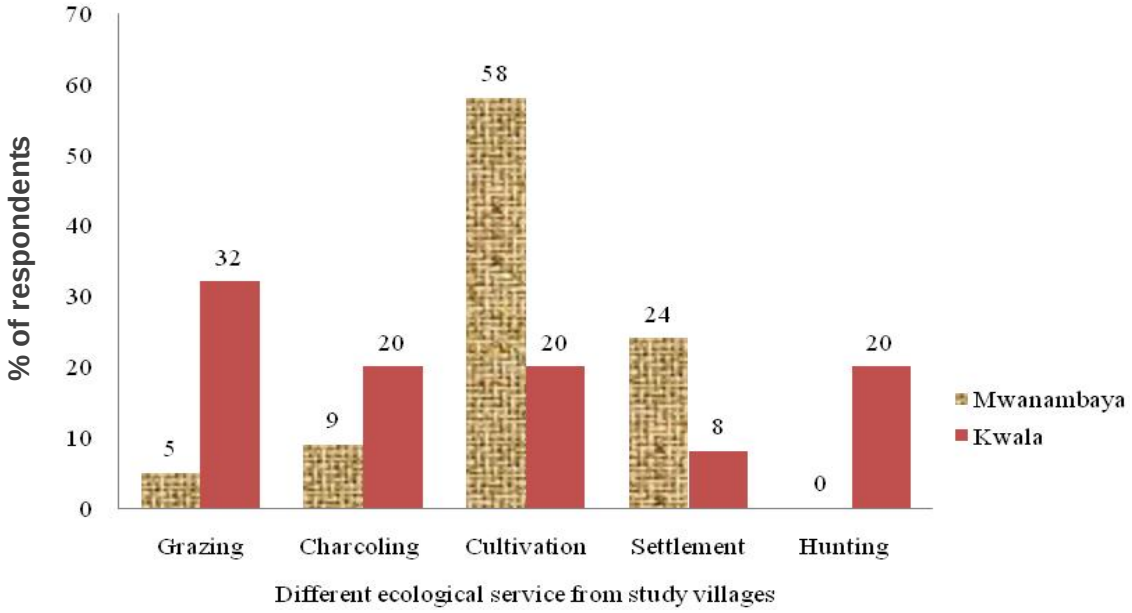


**Figure 3.** Major services offered by ecosystems in study villages.

On the other hand, both villages are equally important in terms of providing different services from the natural resources they have. Figure 3 presents contributions from different natural resources to community livelihoods. The ecology of Kwala provides conducive environment for livestock grazing as compared to Mwanambaya and this is due to availability of water from Ruvu river and associated wetlands as well as pasture for livestock. As indicated in Figure 3, the ecosystem in Kwala provides a wide opportunity for grazing livestock equally followed by agricultural, charcoal supply and seasonal hunting. Hunting activity was reported to be negatively affected by increasing number of livestock keepers looking for pasture land and this has pushed wildlife animal further into protected areas. On the other hand there is large opportunity for crop cultivation in Mkuranga but more people are now moving into the area to settle. The cost of land has increased over the last 10 years from an equivalent price of approximately US$ 200 in year 2000 to more than US$ 1000 to date based on local market prices.

More land in Mwanambaya is currently under agricultural crops in particularly cashewnut, cassava and orchards particularly citrus. However there is more expansion of human settlements in Mwanambaya due to in migration of people from urban areas in particularly Dar es Salaam. On the other hand, the woodlands and forests in Kwala are designated as open areas which also accommodate wild animals including elephants and buffaloes. They are therefore a source of animal proteins from wild animals. Through FDG it was revealed that invasion of livestock has pushed further towards to the boundaries of Selous Game Reserve which has a diversity of wildlife species and types thus threatening their security and survival. Negative impact due to pastoral and human activities on wildlife dynamics has also been reported by Kangalawe et al. (2005) and Majule and Kalonga (2008). In general the ecology of Kwala allows for different social economic activities to be undertaken. However sustainable management plan of natural resources needs to be developed and implemented in order to reduce land degradation (Majule,

**Table 6.** Commodity flows by % from study villages to peri and urban centers.

| Sources of income | Study villages | |
|---|---|---|
| | Mwanambaya (n=52) | Kwala (n=38) |
| Sell of cattle | 04 | 32 |
| Sale of fruits | 24 | 4 |
| Sale of cash crops | 20 | 8 |
| Supply of charcoal | 20 | 32 |
| Supply of building poles | 24 | 08 |
| Supply of wild meat | 08 | 16 |
| Total | 100 | 100 |

2008; Kangalawe and Lyimo, 2010).

## Rural-urban linkages in relation to ecological and social settings

Commodities and products flowing from the two villages (Table 6) to peri and urban centers are not equally the same in terms of magnitudes and this reflects a strong variation in terms of ecological characteristics to offer a particular service. More meat and charcoal for example comes from Kwala village due to abundant livestock keeping (32%) of the total respondents and more charcoal dwellers (32%). More building poles come from Mwanambaya probably due to availability and accessibility to the market centre. On the other hand fruits particular oranges, pineapples and passion originates from Mwanambaya and this is due to favorable physical conditions particularly deep and well drained sand soils which favors the production of such crops (Rowell, 1994). Different products also flow from urban areas to study area. Those of relevance includes maize and wheat flours, clothes, roofing materials, cooking oils and other products like kerosene oil. Most of the products flowing to study areas are from manufacturing industries.

Community livelihoods of the majority of people living in both urban and rural areas depend on natural resources and their products for their livelihoods (Majule et al., 2009). Findings reported are also in broad agreement with those reported by other scientists under similar conditions.

## Conclusions

Crop production and livestock keeping are the major agricultural activities in the coastal areas of Tanzania. The study has been able to establish that different ecological and social economic settings have significant contribution to community livelihoods in a number of ways. They also determine a kind of service and products to be offered depending on a particular need in both rural and urban areas. Potential areas in terms of soil fertility, water availability and pastures for livestock attract agro-pastoralists to migrate into. Such interaction brings about changes in landuse and degradation of natural resources in case of unsustainable extraction of different natural resources. Expansion of agricultural activities further contributes to landuse changes. In order to sustain the ecosystems productivity the study recommends establishment and implementation of village landuse plans and come up with sustainable strategies for use of natural resources in their villages. These must be supported by their local district councils for their effectiveness.

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