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Full Length Research Paper

Peri-urban development, livelihood change and household income: A case study of peri-urban Nyahururu, Kenya

Nicodemus Mandere Mandere[1,2]*, Barry Ness[1] and Stefan Anderberg[1]

[1] Centre for Sustainability Studies (LUCSUS), Lund University P.O. Box 170, SE-221 00, Lund Sweden.
[2]Department of Physical Geography and Ecosystems Analysis, Lund University, Sweden.

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Peri-urban development has attracted increased attention in recent years particularly due to conflict/competition between new (urban) and traditional (rural) land uses as a result of peri-urban expansion. Much of the research in peri-urban development is concentrated in peri-urban concepts and definitions, environmental impacts and also impact on agriculture. Little attention is put in the assessment of the peri-urban development on household livelihood and income. This study was therefore conducted with the objective of assessing the impact of the peri-urban development dynamics to household income using the case study of peri-urban Nyahururu, Kenya. The analysis shows a decline in full time farming households from 90% in the 1960s to 49%; an indication of the declining economic significance of agriculture. The decline in significance of agriculture was mainly due to rapidly shrinking household agricultural land as well as low and fluctuating agricultural output prices which reduced the profitability from agricultural production. The decrease in agricultural land was due to the sale of land for residence/business premises and also land bequests to children. In return, households have adopted diverse non-farm activities whose earnings proved to be of varying importance to the annual household income. However most of the households engage in low income productive non-farm activities – nevertheless, the number of households engaged in high income productive non-farm activities was comparatively higher (10% more) compared to the most rural parts of the district. The infrastructural developments coupled with emerging business enterprises were found to be the main factors that enhanced the opportunities for household engagement in high income productive activities. However most of these developments are limited to the financially constrained informal sector and hence can not provide sufficient high income opportunities to lift majority of the population from poverty. Therefore, the possibility for peri-urban development to accomplish a reduction in poverty for the households will not only depend on the infrastructural developments but also on the socio-economic opportunities that arise from the developments – which will be dependent on the developers involved and the government policy. In addition, despite the declining economic significance of agriculture in the study area, we emphasize the importance of government intervention to enhance agricultural productivity and control agricultural land conversion for food security reasons.

Key words: Kenya, peri-urban, household land holding, land use change, agriculture, non-farm income.

INTRODUCTION

Increased attention in recent years has been given to peri-urban development (c.f. Bryant et al., 1982; Anthrop, 2000; Wiggens and Proctor 2001; Maconachie and Binns 2006; Busck et al., 2006; Qviström, 2007). A number of alternative terms have been used to describe the same geographical area these are; the urban fringe, the periphery, inner rural, and rural commuting zone (Bryant et al., 1982). Busck et al. (2006), Anthrop (2000) and Ode and Fry (2006) describe the peri-urban areas as those

*Corresponding author: E-mail: nicodemus.mandere@lucsus.lu.se. Tel. +46462228083.

areas adjacent to built up areas of high population concentrations (that is, urban), they specified that they are the zones where traditional farming activities come into conflict with alternative economic, residential and recreational interests. Wiggins and Proctor (2001) describe the peri-urban as the zone engaged in intense interactions with the urban. They also add that it is the area of daily commuting from village to city Central Business Districts (CBDs) for work. Adell (1999) portrays the peri-urban as being significantly pre-urban where the issues of job creation, transport, housing and environ-mental issues are important. Finally, with African peri-urban focus, Maconachie and Binns (2006) characterize the peri-urban zone as the area with a "blurring" between rural and urban. They also emphasize this area as possessing great dynamism with a focus on competition for basic resources.

From the above literature definitions of peri-urban there are a few unifying components that have become apparent and have formed the basis of the peri-urban despite an inability to reach an all-encompassing definition. First, peri-urban areas are predominantly defined, in almost all the definitions, as places of conflict or competition which exist in between new (urban) and traditional (rural) land uses. Second, the outer limits of the peri-urban zone are demarcated by maximum daily commuting distances into CBDs of the urban areas determined by the means of transportation available for large portions of the population. Based on these two understood definitions, the peri-urban areas in this study are defined as those areas which are transitioning between the urban and traditional landscapes as determined by daily commuting distance to the CBDs of the nearby city and or town.

Urban growth and peri-urban development

During the last half of the 20th century in Western Europe, relatively steady economic and population growth and stable patterns of governance have led to outward urban growth, creating what has been referred to as dynamic and/or multiple use landscapes (Busck et al., 2006) in these areas. Urbanization in Africa, on the other hand, has generally been more rapid and chaotic than in Europe with deficiencies in regulation and infrastructural development (Maconachie and Binns, 2006). The rapid urban growth is often in conjunction with inadequate governance systems, infrastructural development and land administration and most often, lack of industrial and economic growth has led to what is often called the African urban crisis (Rakodi, 2005). According to Keiner et al. (2005) it is predicted that by the year 2020 more than half of the world's 8 billion human inhabitants will live in cities. This growth will result in an increase in the number of mega-cities (that is cities with over 10 million inhabitants), from 19 to 27, and in the number of large cities (that is, cities with populations greater than 1 million), increasing from 405 in 2000 to over 900 by 2020 (Redman and Jones 2005; Keiner et al., 2005; van Ginkel and Marcotillio, 2005). Urban population growth results to increased population densities within established urban areas as well as in the outward thrust of urban agglomerations (that is peri-urban regions). It is therefore anticipated that this enormous urban growth will result in outward population thrust of the urban agglomerations (that is peri-urban regions).

Following the outward urban population thrust, many recent rural areas around the cities will convert to peri-urban status. Like other peri-urban regions, their land use is expected to change from one currently dominated by agriculture to a multiple land use landscape (Antrop, 2000; Gallant et al., 2004; Busck et al., 2006). According to Carr (1997) peri-urban development is a transition development stage between rural and city. In line with Lanjouw et al. (2001) peri-urban areas have comparatively better infrastructure such as roads, electricity and telephone than their rural counterparts. However, Lee (1979) and also Lanjouw et al. (2001) acknowledge that level of infrastructure and land use changes vary from region to region on the basis of the initiatives and developers involved. According to Chaudhry (2007), limited economic opportunities and lack of basic infrastructure are main contributors to rural poverty. Therefore, it can be argued that the infrastructural development in the peri-urban areas would create new economic opportunities through creation of business opportunities and new jobs. Consequently, these will reduce poverty in the particular peri-urban areas (that is, former rural). Current peri-urban research is concentrated on assessing peri-urban land use change and environmental impacts (Busck et al., 2006, Maconachie and Binns, 2006), impact on agriculture (Houston, 2005; Vagneron, 2006; Thapa and Murayama, 2007) as well as peri-urban concepts and definitions (Kule, 2008). Little emphasis is placed on studies that evaluate the impact of peri-urban development on household livelihood support and income. This study was therefore conducted with the objective of assessing the impact of peri-urban development on household income using peri-urban Nyahururu, Kenya as the case study. To achieve this objective, the study strives to answer three research questions: 1) Have changes occurred in the land use in the region of peri urban between 1960s and now; 2) if the changes have occurred what are the contributing factors; 3) what is the impact of the land use changes on the residents' household income? This study examines the periods from the 1960s to now since many studies (e.g. Macharia, 2003) indicate that the most rapid urbanization in Kenya started being recorded in the post-colonial period that is after 1963. During the colonial period, the movement of Africans to the urban areas was

restricted -only a few with passes were allowed to move and settle in urban areas where they provided labour force for the white settlers. However, after Kenya gained independence in 1963, the policy was changed and all people were free to move to any part of the country without any restrictions. This change in policies resulted in many people moving to various urban centres in search of employment and business opportunities, thus leading to what Macharia (2003) refers to as "boom urbanization". Nyahururu town like many other urban areas was affected by the change of the policy and has therefore expanded rapidly during this period.

Peri-urban Nyahururu

This study was conducted in the peri-urban Nyahururu for two reasons: 1) it is characterized by the dynamic urban sprawl that exists in an area with high agricultural potential, which implies competition between agriculture and urban development; 2) the region where the peri-urban is situated has been the focus for an earlier study on determinants of household diversification (Mandere et al., 2009). In the earlier study, the respondents were drawn from both the rural and the peri-urban parts of the district. The results of this earlier study indicated that larger household land ownership was one of the most important factors that lead to higher diversification and subsequently higher revenues for the households situated in more rural areas. However, for those households located in the peri-urban setting, the level of diversification and household income did not show a clear relationship with how much land they owned. Despite that, the outcome of the earlier study also revealed that households in the peri-urban area had access to comparatively better infrastructure than those in more rural areas; this study did not go deep into a further investigation of the unique factors that determine the land use change and household income in the peri-urban setting. As stated above, the aim of this study is to further investigate this issue. Therefore, conducting this study in the peri-urban Nyahururu could help to build upon and expand the findings of the previous study.

The peri-urban Nyahururu is an area around the town of Nyahururu. The town is the capital of Nyandarua District in the Central Province of Kenya. The geographical location of the town of Nyahururu is shown in Figure 1. The core urban centre of the town was founded in 1929 following the establishment of the railway transport system through the area. Since then the town has been expanding and by 1999, the population of the urban core reached 37,412 with a population density of 151 people per square kilometer (250 km^2 in total) (Central Bureau of Statistics, 2001). The Nyandarua District has fertile soils of volcanic origin with a high potential for agricultural cultivation (Ministry of Finance and Planning 2002). Except for the urban areas, the dominant livelihood activity in the District is agriculture. Most of the farmers in the District are smallholders, that is; farmers whose household land holding is less than 10 ha. The majority of the rural population in Nyandarua depends on agriculture for direct employment, income and food. Most of the agricultural production is rainfed. The nearby urban centres are important market points for most of the agricultural produce from the District (Ministry of Finance and Planning, 2002).

MATERIALS AND METHODS

The data for this study was collected through questionnaires and interviews with individual households in the peri-urban Nyahururu. This was mainly because there were no secondary data for the peri-urban. The lack of secondary data was an indication that the peri-urban development in the region has received little attention and, or that the process was as a result of a recent spurring rapid development.

As a first step, discussions were held with local government officers from Nyahururu town. The aim was to learn about where the peri-urban area was perceived to start and end in terms of road distance from the centre of Nyahururu town. Using indicators of peri-urban development such as multiple land use, that is intermix of agriculture, buildings, road infrastructure and also daily commuting distance to and from Nyahururu town, the start and end boundaries were approximated. The starting boundary of the peri-urban Nyahururu was found to be 9 km road distance from Nyahururu town centre while, the end boundary was estimated at 15 km road distance from the town centre. The town of Nyahururu has four main roads leading out of the town: Nyahururu-Ol Kalou - to the south; Nyahururu-Nyeri - to the east; Nyahururu-Rumuruti - to the north; and Nyahururu-Nakuru - to the west. Along all the four roads there is identifiable peri-urban development. This development provides grounds for interviews along the four transects. However, the study concentrated on the peri-urban areas in the direction of the first two roads. The reasoning behind this focus is that the peri-urban areas along the two roads lie within Nyandarua District where earlier studies on determinants of rural diversification have been conducted. Concentrating on the two transects could therefore give the opportunity to build upon and augment our findings from the previous studies. For this reason the other two transects whose peri-urban areas are located within Laikipia District were left out of observations.

Data collection

Semi-structured questionnaires were administered to 52 respondent households along the two transects earlier discussed. The respondents were selected at random along each road. During the interviews, the principal researcher read each question from the questionnaire in an open manner allowing for any other questions that arose during the interview process. The answers were recorded down in writing. According to Bowler (2005, 232), rurality is "a system with three elements – users of space, used space and use of space". This definition implies that in order to assess the impact of peri-urban development, one has to evaluate the trend of the three elements over time and the resulting effects within this

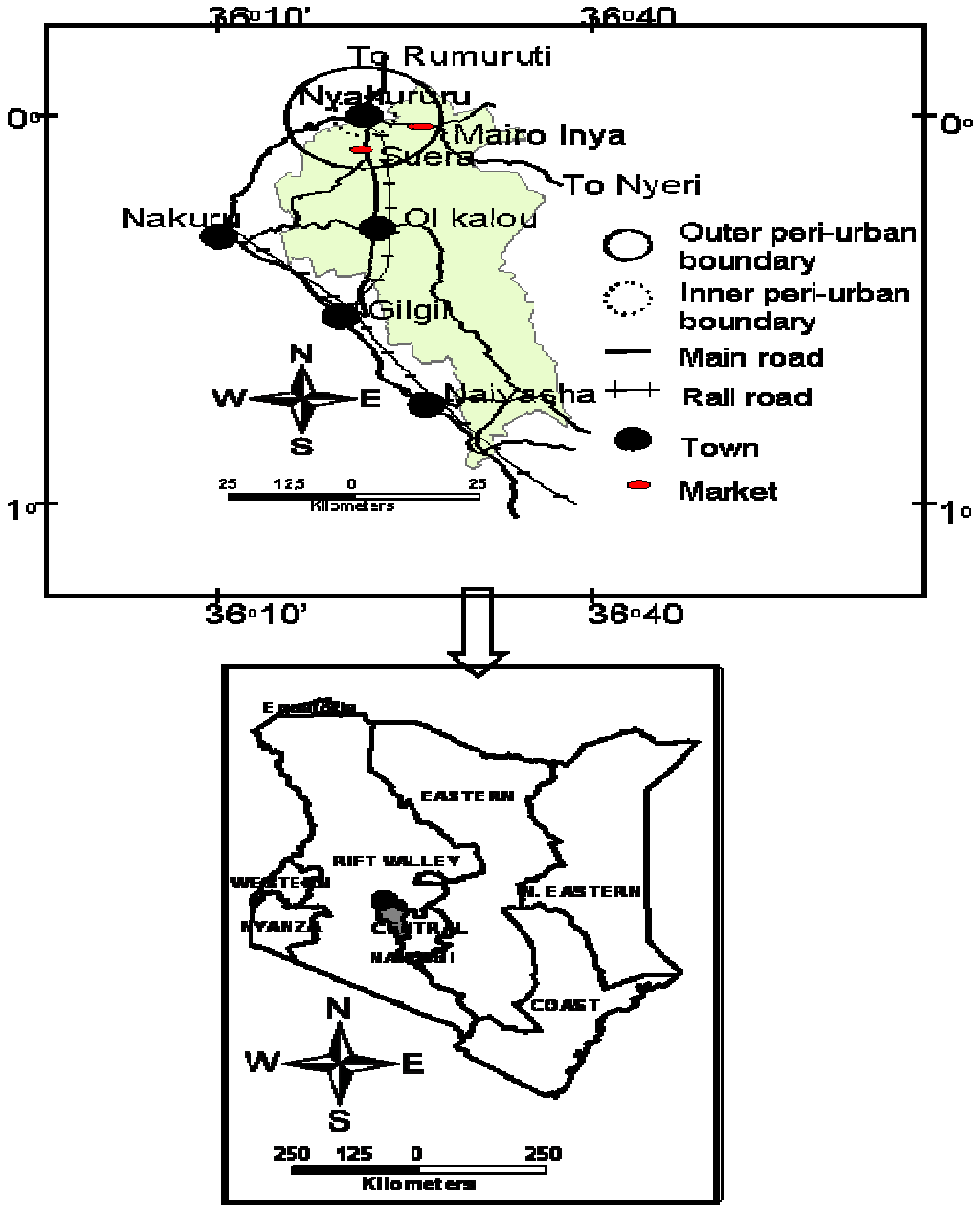

Figure 1. Geographical location of peri-urban Nyahururu.

framework. Based on these criteria, a questionnaire was designed to investigate the dynamics in regards to who is using the land (population dynamics), the used area (household land size holding) and how the area is used (household land use changes). Different parts of the questionnaire covered these different questions.

The data was qualitatively analyzed by content analysis method. The collected data were studied carefully and data coded and categorized based on the topical issues covered in the questionnaire which provided the data for the results and discussion of this study. The respondents constituted 41 men and 11 women; the age range was between 32 to 88 years. The men dominated the interview process because in the region and Kenya in general the men are the heads of the households and whenever they are present, they are given the opportunity to talk on behalf of the household (this then implies that due to this cultural inclination, gender balance - which was an aim of the researchers - was not achieve). We only managed to interview a comparatively small part of the female population, mainly those who represented the household heads that were absent during the time of the interview as well as a smaller percentage who were household leaders of households with single parents. The respondents were from seven different Kenyan tribes that is Kikuyu (71%); Luhya (8%); Luo (6%);

Kisii (6%); Kalenjin (4%); Somali (4%); and Turkana (1%). The Kikuyu tribe that dominated the interview are the natives of the study area. However 20% of the respondents from the Kikuyu tribe had immigrated to the region from parts of Central province such as Nyeri and Muranga. This implies that respondents that were native to the peri-urban region were around 55% of the total respondents. Most of the respondents were educated; 33% had attained college or higher level training while 48 and 15% had attained secondary and primary education levels respectively. Only 4% of the respondents did not attend any school at all.

RESULTS AND DISCUSSION

The results and discussion are presented in the following order: population dynamics; household land size holding; household land use changes; what factors increase the possibility for better household livelihood and income; and implications of the study's findings.

Population dynamics

In the last two decades there has been a rapid growth in population in the town of Nyahururu. According to the respondents the population growth in the town was mainly as a result of groups of migrants from several parts of Kenya and neighbouring countries such as Tanzania and Uganda. The respondents explained that the mass migration to the town was as a result of the positive economic development following the expansion of the service and manufacturing industries. The respondents mentioned tourism, banking, health care, education, roads and railway infrastructure as main service industries that have served as a magnet to the increasing population. The Kenya co-operative creameries and floriculture were mentioned as other industries that have accelerated rapid population growth.

The respondents also observed that the population of the peri-urban Nyahururu has grown rapidly, specifically beginning in the 1990s. They attributed the growth to births and also to outward thrust of the urban population (that is, migration from the urban core to the peri-urban region). According to the United Nations (2005) the population growth rate in Kenya is around 2.5% for the 5 year period from 2005 to 2010. The population growth has increased because of high birth rates and low mortality (United Nations 2005). Migrations from the urban core to the peri-urban region as explained by the respondents was driven mainly by the search for cheaper land to construct a residence or business premise and the hope to find a larger land area to accommodate both residence and gardening to supplement household food demand as living costs and food prices have escalated. Those immigrants who moved from the rural areas in search for employment and decided to directly settle in peri-urban region, cited the cheap cost of accommodation and access to the urban core - where non-farm jobs most often are found - as the main reasons for settling in the peri-urban area. The common thread is that both reasons are economically motivated, that is, based on a desire to improve livelihoods at minimum cost. These are people that Burnley and Murphy (2004:38) refer to as 'forced relocators'. They are poor or middle class people seeking employment opportunities or cheaper livelihood and they can find cheap and perhaps the only alternatives for housing in the urban fringe. Their reasons for settling in the peri-urban area are thus in sharp contrast to the dominating reasons for moving to peri-urban regions in the industrial world. For instance, Busck et al. (2006) found a longing for quietness and attractive landscapes to be the catalyst for moving to peri-urban area surrounding Copenhagen, the capital city of Denmark. Such migrants can be categorized as 'free agents' (Burnley and Murphy, 2004:38), that is those after a specific quality of life, such as serenity. Immigrants to peri-urban regions in Kenya are 'forced relocators' while those in Copenhagen are 'free agents'. This is a reflection of the different economic and social context.

The migration to the peri-urban Nyahururu has created a population composition that is cosmopolitan. According to the respondents, the incoming migrants who are from many parts of Kenya belong to different tribes than the native populations of the peri-urban region. Foreigners, particularly from neighbouring countries such as Uganda and Tanzania, are also common in the peri-urban region. These immigrants are thus fairly diverse in terms of culture, skills, economic wealth and social classes, and a new multi-ethnic community with a diverse livelihood portfolio has developed. Consequently, the land use in the area has been transformed from one dominated by agriculture to multiple land use including several non-farm economic activities as presented in subsequent sections. Besides the land use changes, this new multi-ethnic community was found to be living harmoniously together without much intertribal tensions. Actually new lifestyles where members of these new communities are getting intermarried as well as adopting each others feeding habits were common.

Household land size holding

The pressure from the peri-urban expansion due to immigrations to the region has contributed to decreasing household land holding size due to the sale of part of the land to new developers for residence, business use or both residence and agriculture. Ten percent of the respondents had actually sold part of their own farmland to new developers. The land was further divided because of land bequests to children. This is also an important contributor to the decrease of farm sizes according to

majority of the respondents. The average household land holding size in the 1960s was estimated to be around 4 to 5 ha. Currently the figures the respondents gave for average household land holding size range from 0.125 to 3 ha, the mean of which is 1.2 ha. This average household land holding size is much less compared to the 2.5 ha observed by (Mandere et al., 2009) as the average household land size for Nyandarua District where the peri-urban is situated. According to Kenya National Bureau of Statistics (2006), the birth rate for the whole of Nyandarua District is uniform at 2.2% per year. Therefore, the finding that average household land size in the peri-urban area is small when compared with the whole Nyandarua District underscores the significant contribution of peri-urban expansion to diminishing household land holdings. Published literature from other developing countries similarly reveals that peri-urban sprawl resulted in declining household land holding in the peri-urban Kano, Northern Nigeria (Maconachie and Binns 2006) and also in the peri-urban regions around Dar es Salaam, Mwanza, Moshi, Arusha, Mbeya and Lindi cities of Tanzania (Lanjouw et al., 2001).

The respondents who had sold part of their land to new developers provided varying reasons as motivations behind the land sales. A majority of them sold part of their land out of urgent need to raise additional finances for basic household needs, specifically for school fees for their children. According to the responses, there are many willing buyers of land in the region due to land speculation and hence the land market is easily available. However most of them emphasized that despite the easily accessible land market and increasing land prices they only sell land as a last resort. Nonetheless, the land is privately owned and the government has currently no policies to regulate land sale and land subdivision, considering that most people in the district are poor (Ministry of Agriculture and Ministry of Livestock and Fisheries Development, 2004). Similar to the observation by Kombe (2005) in Tanzania, land is sold by willing buyer-willing seller; selling land and subdivision is likely to continue, and this may result in very small and economically non-viable household land holdings for many households.

Household land use changes

Under the household land use changes, the following were assessed: agriculture; non-farm income generating activities; as well as the factors that increase the possibility for better household livelihood and income.

Agriculture

Agriculture still remains one of the predominant economic sectors in the peri-urban Nyahururu. However, the outcome of the interviews also reveals that its economic significance is declining. This is reflected by the declining number of households that engage in agriculture as a full time activity. Over 90% of the respondent households were full time farmers in the 1960s but this has since fallen to 49% of the respondent households, with the remaining households only cultivating their land on a part time basis. The respondents offered two reasons for the declining economic importance of agriculture sector: 1) reducing household agricultural land holding size; 2) low returns from investments in agriculture mainly due to declining yield per unit area and also high cost of agricultural inputs coupled with low market price for the output.

Due to the sale of part of the household land to the new developers and also to land bequests, the household land area that is available for agriculture has declined rapidly. In response to declining agricultural land, most farmers have shifted from traditional extensive agriculture towards more intensive agricultural practices. The respondents were in agreement that historically agricultural production systems in the peri-urban region were dominated by extensive farming. A fallow system was practiced where crop land was rotated with grazing fields, a practice that optimized soil nutrient utilization and regeneration. However in the last two decades, the economic difficulties of small farms have stimulated new agricultural management practices in order to increase yield levels and incomes. The respondents were unanimous in their responses explaining that the fallow system has largely been abandoned because of land limitations, leading to a more intensive system where crops are grown in the same piece of land year after year. Similar trends were also recorded on livestock grazing fields. The finding that the farmers in the peri-urban Nyahururu have shifted from extensive to intensive agriculture. This is in contrast with other research findings in the peri-urban area around Copenhagen, Denmark (e.g. Busck et al., 2006) and in the Netherlands (e.g. Berg and Wintjes, 2000). This is because of past agricultural policies, which have resulted to the significant reduction of rents from small scale farming - leading to the fall in small scale production. The demise has in many cases caused a shift from intensive to extensive land management practices. Instead of farm properties in the European periphery being used for (intensive) agricultural production, new owners with little or no experience in agricultural production, financially stable people in search of properties in socially and environmentally attractive areas with ample space for leisure and hobby activities are been attracted (Busck et al., 2006).

The investigation also revealed a shift in the kinds of crops currently grown in the peri-urban region compared to the traditional crops of the 1960s. The traditional and

Table 1. Traditional and present crops in peri-urban Nyahururu.

Traditional crops	Currently cultivated crops
Sweet potato	Maize
Cassava	Irish potato
Maize	Beans
Arrowroot	Peas
Wheat	Tomato
Pyrethrum	Carrot

currently grown crops in the peri-urban region as obtained from the respondents are shown in Table 1. The table indicates that most of the traditionally cultivated crops such as sweet potato, cassava, arrowroot and wheat have disappeared. In their place Irish potato, beans, peas, tomatoes and carrots have been adopted. The main reasons expressed for the cultivation of new crops were that these new crops attracted the attention of the market while the demand for traditional crops has diminished dramatically. The increased market demand for the new crops is viewed as a result of migrants into the area whose diets are different from the native inhabitants of the peri-urban region. Despite that, most of the natives would like to continue cultivating some of their native crops, due to the rapidly shrinking household agricultural land most of them have been forced to shift in response to market demand as a survival strategy. Those few who are still cultivating the native crops do so in very small quantities and often in their home gardens. Among the currently cultivated crops, maize and beans are the most dominant crops and are cultivated by over 80% of the respondents. The two crops are predominant since they are staple food for most people living in the peri-urban region and the Nyahururu town including migrants from other parts of Kenya and neighbouring countries. In addition, both maize and beans are easily sold for extra household income. Other crops currently grown such as Irish potato, peas, tomatoes and carrots are cultivated in small quantities by about 30% of the respondents. These latter crops are considered specialized crops because they mature fast, have readily available market although their market price is highly fluctuating. The unstable market price discourages the majority of respondents from cultivating these crops because these crops mighnot provide steady incomes. Furthermore the volatile market value encourages the tendency of households to give priority to crops that provide steady food supplies. This led to the transition to a more intensive production system since the field soil nutrients have been exhausted. Over the years, this has yielded an overall decline in agricultural production and created the need for larger amounts of fertilizers. The need to use larger amounts of fertilizer in order to boost crop yields has driven up the production cost which together with low and often highly fluctuating market prices for the agricultural outputs has lead to a decline of the economic significance of agriculture to most households. Consequently most of the households seek additional livelihood income by engaging in non-farm income activities.

Non-farm income generating activities

As earlier stated, in response to the declining economic significance of agriculture, most of the respondent households have adopted non-farm income activities for additional income. In addition, a number of new migrants to the peri-urban region, particularly those lacking the farming skills and those without access to farming land, are mainly engaged in non-farm income generating activities. The non-farm activities that the households participated in to create an additional source of income were diverse; they include business activities, professional employment, non-farm wage, and farm wage labour on the nearby agricultural farm.

The importance of non-farm incomes to the overall household incomes varied widely among respondents on the basis of the type of non-farm activity they were engaged in. The results are shown in Table 2. The table indicates that many households took part in more than one non-farm income generating activities. It also shows that households who get part of their income from business activities and professional jobs have a dramatically higher income than the rest of the households. Furthermore it can be seen that the households that are employed in non-farm activities such as business and professional jobs draw over 80% of their annual incomes from the non-farm activities. Those engaged in professional jobs were all college graduates, while those running business were a mixture of college, secondary, and primary school graduates. This indicates that educational level is a basic requirement to gain access to professional jobs, while possibilities of venturing into business is primarily determined by the possibility of access to the necessary financial means. Interestingly, for those households involved in non-farm wage labour and farm labour as their non-farm income activities, their annual income was much lower. For these households, the share of non-farm income to the total annual household income was less than 50% - thus implying that agriculture is a very important economic sector in the peri-urban environment. The size of land owned by household was important in determining household activities and income level for these latter categories of households. In general, the larger the household land ownership, the more the diversification particularly in crops and the higher the annual household income. Employment in the non-farm wage

Table 2. Income share for each activity as a percentage of household annual income

Business (%)	Professional jobs (%)	Crops (%)	Livestock (%)	Farm labour (%)	Non-farm labour (%)	Average household income (KES/yr)	Respondents (%)
36	60	4	0	0	0	586000	7
0	95	5	0	0	0	416000	3
81	0	7	12	0	0	238950	3
90	0	10	0	0	0	216000	10
0	0	70	30	0	0	85000	33
0	0	55	22	23	0	80000	3
0	0	52	0	21	27	48000	10
0	0	65	0	0	35	46000	6
0	0	100	0	0	0	46000	16
0	0	70	0	30	0	43000	9

labour, and farm wage labour activities within the scope of this study was dominated by people with primary and secondary education levels.

According to Bryceson (1996; 2002), it is the non-agricultural activities that lead to more lucrative, poverty alleviating strategies in Africa. However, this study may at least in part contradict the conclusions made by Bryceson; it is clear that not all non-farm activities lead to a higher income. Judging from the responses, it is only the professional jobs and business that are likely to lead to poverty reduction as the results indicate that these types of jobs lead to higher income. These are the kind of non-agricultural activities that according to Lanjouw et al. (2001) would be classified as high labour productivity activities. However, the non-farm wage labour and farm labour would be categorized as low labour productivity activities. Our findings further indicate that in the peri-urban Nyahururu, only a few respondents (23%) are involved in high labour productivity activities while the rest are either engaged in low labour productivity activities or are not engaged at all in non-farm income activities. Like most other parts of Kenya (Nyang'au, 2002), most of the employment opportunities are found in the informal sector. The professional jobs are limited both in the peri-urban and the core urban area-the opportunities for professional jobs are mainly found in government or private institutions such as hospitals, schools, banks, processing and other service industries where professional skills are of vital necessity. But these latter institutions are few and hence limit professional employment opportunities in the region. As argued by Boardi et al. (2005), salaries in the informal sector are very low and are often not adequate to alleviate poverty amongst the poor. In addition, according to (Ministry of Agriculture and Ministry of Livestock and Fisheries Development, 2004) most people in Nyandarua district are poor and access to any credit is constrained due to lack of collateral and high interest rates. It could therefore be argued that it is the domination of employment in the informal sector coupled with a possible lack of sufficient finances that prevent the majority of households from engaging in high productive activities that would yield a higher income. Nonetheless, the proportion of those who worked in high labour productivity is 10% higher compared with observations (Mandere et al., 2009) for the whole of Nyandarua where the peri-urban region is situated. With this in mind, one interesting question needs to be further looked into namely; what factors increase the possibilities for a higher income and a subsequent better household livelihood?

What factors increase the possibility for better household livelihood and income in the peri-urban setting?

In the process of developing non-farm income generating activities, a majority of immigrants and wealthier natives invest in commercial properties and a wide range of business activities. The newer businesses are often located in the periphery of the urban core because of road infrastructure and in order to provide farmers with outlets to sell products or to purchase what is needed for farming. They also give peri-urban dwellers access to food supplies and other basic necessities without traveling to the urban core. The businesses are commonly owned as single person enterprises, only a few of them are owned by a group. The size of the businesses varies greatly; however most of them are relatively small enterprises employing only a few people besides the owners. In addition, a majority of the businesses are of the informal

type and involve low capital investments. This kind of business development has been growing rapidly in the peri-urban area during the last two decades and dispersed market centres, e.g. Mairo Inya and Suera have emerged within the area.

The development of these market centres has lead to the establishment of infrastructures such as electrification, telephone services, new schools and health centres. This development has created new employment opportunities and thereby increased immigration to the area. Existing road infrastructure coupled with the new infrastructural development (as mentioned above) do not only lead to further expansion of the new market centres but also increase chances for enhanced household income through the subsequent creation of employment . Lanjouw et al. (2001), mention infrastructure, and particularly roads, as one of the main factors increasing probability for an engagement in business and thereby the possibilities for a higher income. Heyer (1996) also Ellis (1998) emphasize the vital role of access to infrastructure and services as a key to poverty reduction in Africa by fostering adoption of non-farm activities. The infrastructural developments in the peri-urban area may therefore partly explain why the number of households in the high income productive activities in the peri-urban was 10% more than the rural parts of the district where infrastructure is often lacking. However, as earlier stated, a majority of the household in the peri-urban region have no access to the higher income productive activities. This could indicate that pre-dominate informal sector employment and income opportunities do not foster sufficient socio-economic opportunities for most households – and that this informal sector does not allow the majority to improve their income levels. According to Kombe (2005), it is the socio-economic opportunities that are available together with peri-urban expansion that are key determinants of benefits to household income levels. These socio-economic opportunities are primarily based on the pattern and rate of peri-urban development (lanjouw et al., 2001; Kombe, 2005). According to lanjouw et al. (2001), the pattern and rate of peri-urban expansion is dependent on the developers involved and their initiatives. We would therefore like to argue that the possibility for peri-urban development to accomplish a reduction in poverty for the households, will depend on the level of infrastructure and availability of high productive job opportunity-this in turn is dependent on government policy as well as private sector developers who will be attracted to the region.

Implications of the study findings

Since our findings have shown that majority of the peri-urban residents lack the opportunity for high income generating activities; we argue that although more people in the peri-urban area are engaged in high income productive activities than the rural parts; there is need for government intervention to ensure that the benefits trickle down to majority of the poor. The government may intervene by providing the necessary strategies to attract developers with sufficient funds to invest in high income generating opportunities and also to increase benefits from the engagement in the informal sector businesses. This is of vital necessity considering that the economic significance of agriculture is declining and that conversion of agricultural land to non-farm activities is rapid and likely to accelerate. The rapid conversion of the agricultural land to non-agricultural land use in the study area poses a threat to future food production and food security in the region since the production in this peri-urban area is of central importance of food supply for the expanding urban population. Government intervention to control the land sale and conversion rate seems necessary to secure food production. The need for government intervention can not be overemphasized as the finding indicates that peri-urban expansion is in a rapid process in many parts of the world and this threatens agricultural land and local food security (Buxton et al., 2006). Peri-urban sprawl has caused a reduction of agricultural land in Nigeria (Maconachie and Binns, 2006), Tanzania (Lanjouw et al., 2001) as well as in Australia, South America, North America and Asia (Buxton et al., 2006) indicating that it is not only a local problem but an issue of global significance.

Bunce and Walker (1992) assert that declining agricultural returns are main contributors for conversion of farmland to other uses in peri-urban regions. But Barr (2005) argues that this conversion is driven by land speculation arising from proximity to the urban cores. Our studies indicate that both these factors are important drivers for land conversion. Declining agricultural returns acts as a catalyst to the sale of part of the farmland to new developers and or for households to convert part of their agricultural land for non-farm activities, while land speculation creates the increased land demand and hence provide readily available land market. Since it is almost impossible to control land speculation, to protect agricultural land the government intervention should be aimed at increasing profit from agricultural production. There are many approaches to increasing agricultural productivity and profits among which include subsidies on agricultural inputs (Boadi et al., 2005; Buxton et al., 2006) availability of credit and financial services (Ministry of Agriculture and Ministry of Livestock and Fisheries Development, 2004; Boadi et al., 2005) as well as price guarantees (Boadi et al., 2005). Besides price guarantees, all the fore-mentioned measures are part of the Kenyan government strategy to help improve agricultural production and income for farming households (Ministry of Agriculture and Ministry of Livestock and Fisheries

Development, 2004). Other strategies being implemented in efforts to revitalize agriculture in Kenya are lowering cost of agricultural inputs by encouraging competition in farm input supplies, reducing taxation on agriculture and improving agricultural extension services. Our finding on economic significance of agriculture is still on the decline in spite of these efforts. This indicates that the policy instruments have not worked sufficiently in addressing the problem in the study area. A further research to assess the pitfalls of the current strategies to revitalize agriculture is therefore of vital necessity. The outcome of such a study will assist the policy makers to improve on the agricultural production and profitability through adoption of improved strategies.

Conclusion

The analysis has shown that the peri-urban Nyahururu has undergone some vigorous developments in population composition; household land size holding; and household land use changes leading to declining significance of agriculture; adoption of diverse new non-farm activities; and improvement livelihood and income. The decline in significance of agriculture was mainly due to rapidly shrinking household agricultural land as well as low and fluctuating agricultural output prices. This in return reduces the profits from the agricultural production - consequently the number of households engaged in full time farming has reduced by 41% since the 1960s. Thus, non-farm activities have become common among most households. However most of the households engage in low income productive activities- nevertheless, the number of households engaged in high income productivity was comparatively higher (10% more) compared to the most rural parts of the district.

The infrastructural developments (e.g. roads, schools, electricity, telephone etc) together with emerging business enterprises were found to be the main factors that enhanced the opportunities for household engagement in high income productive activities. However most of these developments are limited to the financially constrained informal sector and hence can not provide sufficient high income opportunities to lift majority of the population from poverty. Therefore, the possibility for peri-urban development to accomplish a reduction in poverty for the households will not only depend on the infrastructural developments but rather the socio-economic opportunities that arise from the developments-which will be dependent on the developers involved and the government policy. In addition, despite the declining economic significance of agriculture in the study area, the importance of government intervention to enhance agricultural productivity and control agricultural land conversion for food security reasons is emphasized.

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