The interactions of human mobility and farming systems and impacts on biodiversity and soil quality in the Western Highlands of Cameroon

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2 Determinants and Impacts of Human Mobility Dynamics in the Western Highlands of Cameroon

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Abstract

This article analyses human mobility among the inhabitants of Cameroon's most populous region, the Western Highlands of Cameroon. In order to capture the impact of various determinants on human mobility, a comparative study was conducted through household and field surveys in three villages in the region,the study based on the systems approach. The drop in coffee prices coupled with demographic pressure was a major determinant of mobility and land-use changes in the area. Rural-to-urban migration was significantly controlled by a combination of socio-economic determinants while commuting to other rural areas for farming was triggered by the quest for microclimates suitable for the production of vegetable cash crops. Intensive land-use and a high dependence on off-farm chemical inputs had replaced the traditional long fallow system. This was found to be a threat to the sustainability of the farming system due to vulnerability to pests and erosion. On the other hand, occupational diversification triggered by urban-to-rural migration has had a far reaching effect, improving farming in rural areas and the standard of living.

Keywords

Western Highlands of Cameroon, mobility framework, determinants, impacts.

2.1 Introduction

Mobility in the rural areas has increased to a spectacular degree in most African countries because rural areas are in general no longer isolated or self-sufficient (Mabogunje, 1970; Potts, 2006). Rural-urban migration is a major contributor to urbanization in many developing countries (Tawanchai *et al.*, 2008) and an inevitable part of economic development (Kessides, 2005) driven by various determinants. The determinants so far identified that govern out-migration, include socio-politico-economic and ecological factors (Carr, 2004). Urban centres attract a significant proportion of the rural population and the wages earned there, are often remitted by migrants to their rural homelands transforming croplands and other infrastructures (Lambin *et al.*, 2001). Cameroon is an agricultural economy and the rural sector, which accounts for 30% of GDP, plays a leading role in the national economy (African Development Bank Group, 2008). Rural-rural as well as urban-rural types of mobility are radically changing the natural resources, socio-economic, demographic and development profile of the Western Highlands of Cameroon (WHC), with far reaching implications for its agricultural-based asset. However, very little empirical data exists for this region which is the major food-basket of the country. Originally, the area had a significant forest cover, but due to human

mobility and farming activities, it is now dominated by different types of humid savannah vegetation (Dongmo, 1984) that reduce the production potential of the area. A lot of effort is thus required to shape the livelihood of the WHC. The socio-economic concerns on the impacts of demographic pressure have been addressed to some extent (Dongmo, 1984; Scott, 1980; Sunderlin *et al.*, 2000). Human movements in the rural areas of this region, motivated by the urge for better-quality cropland coupled with the modification of cultivation techniques in the rural environment, are of late development and require some research attention.

Though rural-rural migration involves huge numbers of people (Achanfuo-Yeboah, 1993), and the migrants are the key in population-environment relationships (Carr & Bilsborrow, 2001), the subject is widely neglected and greatly under-researched. Case studies further suggest that Africa and Asia remain at an earlier stage of migration, in which rural-rural migration dominates, whereas urban-urban migration is dominant in Latin America (Bilsborrow & Carr, 2001). From an ecological perspective, rural-rural migration is of eminent importance because of its increasing impact on the rural landscape. Less effort has also been made to research urban-rural migration, despite studies highlighting the continuing links of urban migrants with their home areas and their eventual return to villages for retirement (Peil & Sada, 1984). Information on the determinants of the various types of mobility is primary to understanding and contributing to their evolution. This paper is thus intended to contribute to this hitherto neglected field with reference to the WHC.

Mobility refers to all forms of territorial movement by people at different spatial and temporal scales. It could denote short term mobility between different dwelling sites (Kelly, 1992), or long term mobility between different areas (Kelly, 1992). Mobility and commuting decisions have been shown to emphasize the mutual dependency between migration and commuting (Zax, 1994). While the relationship between the two forms of mobility is theoretically fairly well established and appreciated, empirical work in this field has mainly concentrated on either migration or commuting (Kent *et al.*, 2003). Rural poverty in Cameroon was exacerbated in the early '90s by the devaluation of the CFA franc and slumping coffee and cocoa prices in the world market, until then the major income generators (ASB, 2003). Cash crops, which had earned 123 billion FCFA for rural households in 1984-85, only generated 6.3 billion FCFA in 1992-93 (Amin & Dubois, 1999). Commuting to farms at longer distances due to land scarcity started gaining ground when the production and export of cocoa and coffee declined precipitously after 1989, in response to the cutting of producer prices and subsidies by the government (FAOSTAT, 2010). Thus, currency devaluation exacerbated by changes in the market price of coffee, in addition to the draconian public sector wage cuts in 1993, triggered the

revolution in rural farming practices, characterized by the substitution of the low-valued annual cash crop (coffee) cultivation with bi or tri-annual vegetable crop production systems in the WHC (Gubry & Lamlenn, 1996). Cool season crops are the leading cash crops in the WHC and are better adapted to tropical highlands. Commuting has thus been quasi directional in the WHC, resulting in the exploitation of higher altitudes with the appropriate microclimate for vegetable cash crop production. Migration and especially urban to rural types, has had a significant effect on the diversification of income opportunities in the rural milieu. Movements within the rural areas or between rural and urban areas, involves trade-offs for both those who move and those who stay.

The push-pull theory has been suggested as the main determinants of migration (Lee, 1966), while most researchers have recognized the overriding importance of economic motives such as the rural-urban income disparity (Eicher *et al.*, 1970), as a significant determinant to trigger migration. Responing to land scarcity by adaptating the agricultural system to increase yield has been proposed as an important determinant of mobility (Dasgupta *et al.*, 2000). Such adaptations usually include both intensification and increasing commercial output (Guyer, 1997). The theory of decision making on migration proposed by Byerlee (1974) stated that the policy variables affecting the decision to migrate were influenced by monetary costs and returns relating to rural and urban incomes, education, urban-rural remittances and the labour market, in addition to psychological information or non-monetary costs and returns relating to risk and life styles. Mobility is thus motivated by a multitude of determinants.

Rural farmers in the WHC and other developing countries are not only a larger group, but also far more vulnerable because of their low and volatile income, and hence deserving of more attention. It is, therefore, necessary to carry out research that better reflects the situation and experiences of the rural agricultural sector in developing countries (Zhong *et al.*, 2007). Some factors governing mobility in the WHC have been addressed. Dongmo (1984) found that villages in the WHC adjusted to population pressure by seasonal mobility and the creation of sub-villages, while Scott (1980) suggested that the adaptation in the WHC due to demographic pressure followed the hypothesis of Boserup (1965) implying that this stimulated the adoption of improved agricultural technologies. This study attempts to provide an in-depth analysis of not onlywhy people move, but also the implications and ramifications of mobility in the WHC. Therefore the main objective of this research is to identify the determinants of the mobility and also to quantify and conceptualize the impact of human mobility dynamics on production resources in the WHC.

The specific objectives of this study are therefore:
- to identify the determinants of migration and circular movements
- to analyse the determinants of migration and circular movements
- to identify the impact of the mobility systems on rural livelihood and the environment

2.1.1 Some terminologies

a Mobility encompasses migration and commuting (circulation) (Kent *et al.*, 2003). Population movements fall within a wide range of categories, depending on the length of time spent away from the source, the frequency and duration of the return and may involve very different kinds of people in very different circumstances (Kelly, 1992). The temporal dimension of population movement which can either be circulatory or migratory, determines the circumstances that underpin the decision to move (Parnwell, 1993).

b Circulation encompasses a variety of movements, usually short-term and cyclical and involving no long-standing change of residence. Circulation can be subdivided into daily, periodic, seasonal, and long-term (Gould & Prothero, 1975). Daily circulation involves leaving a place of residence for up to 24 hours. Periodic circulation may vary from one night to a year, while seasonal circulation is a type of periodic circulation in which the period is defined by marked seasonality in the physical or economic environment.

c Migration involves a permanent or semi-permanent change of residence (Newbold, 2004). Migration and circulation are therefore just different forms of the broader phenomenon of human mobility.

d The spatial dimension of population movements is divided into two categories, internal and international. Internal movements occur within the borders of a specific country, while moving internationally means crossing the border of one country into another. Four types of mobility can be identified in the internal movements of population: urban-to-urban (intra-urban), urban-to-rural, rural-to-urban, and rural-to rural (intra-rural) (Cohen, 2006).

e An urban areas relates to a town or city that is freestanding, densely occupied and developed with a variety of shops and services while the rural area can be identified by low population density, extensive land use, primary economic activity and employment, and community cohesion and governance (Scott *et al.*, 2007).

f The natives of the WHC are organized into a number of independent villages, subdivided into a great number of quarters, each with its own hereditary chief (Ouden, 1987). Thus in the framework of this article, rural-to-rural mobility implies mobility in the quarters within or between villages by members of a household, either to carry out agricultural activities or work as hired labourers. Household refers to a body of people who have a shared income and asset pool and who share the same living space and eat together.

2.1.2 Conceptual framework

Our study is based on a conceptual framework of the relationships between determinants that govern natural resource use in the traditional agricultural systems and human response in terms of mobility. This study takes a comparative approach by examining household livelihoods and mobility at different altitudinal levels within three very different villages (Bafou, Baleveng and Fongo-Tongo) in the WHC. They are located in two administrative districts of the Menoua Division where Dschang is the Headquarters and main urban centre.

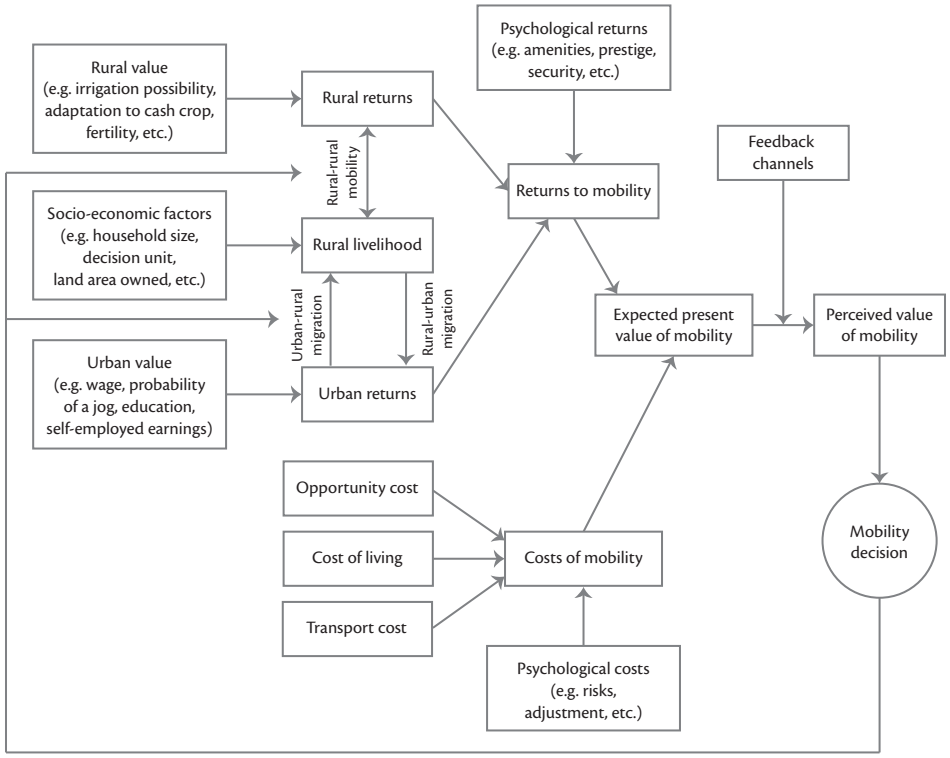

Figure 2.1
System simulation for the analysis of the migration decision and the different types of mobility in the Western Highlands of Cameroon (Adapted from Byerlee, 1974).

The mobility framework (Figure 2.1) is intended as an analytical structure for coming to grips with the complexity of mobility, understanding how it is influenced and identifying where intervention can be most effective. The assumption is, that the environment within which the system of rural-urban mobility operates is characterized by forces (economic conditions, socio-cultural conditions, transport and communications, and government policies), that have contributed to the decline in isolation and self-sufficiency of the rural areas (Mabogunje, 1970; Potts, 2006). The decision to move is governed by monetary and non-monetary or general well-being costs. The financial benefits of migration can be estimated by comparing the difference between the origin and destination incomes. Control sub-systems calibrate the flow of migrants through the system. The rural control subsystem includes the family and community while the urban control subsystem consists of opportunities for housing, employment and general assimilation into urban life. The feedback loops (positive or negative), act to favour or to disfavour the mobility decision. They can be in the form of return migration, flows of information, remittances and other forms. The adjustment mechanisms operate in rural areas to cope with the loss of migrants and in urban areas to incorporate them. The system simulation (Figure 2.1) can thus be used to conceptualize the different types of mobility (rural-to-rural, rural-to-urban and urban-to-rural) addressed in this paper, owing to its effective application in other migration studies (Kritz and Zlotnik, 1992). It identifies first the household and family members who are potential migrants when influenced by stimuli from the rural and urban environments. The components of the system are the rural environment (comprised of agro-ecosystems and natural ecosystems), the urban environment (comprised of the economy context and the socio-cultural context), the migrant, control subsystems, adjustment and feedback mechanisms. The origin in the systems thus denotes either the rural or the urban milieu where the individual resides before movement takes place, while the destination refers to the urban area in urban-rural movements or other rural areas different from the homestead in rural-rural mobility. In reality, the processes described here are not so neatly 'cut and dried': just as mobility is a dynamic process, with largely unpredictable changes in context, constraints and opportunities, as are also household strategies and activities. The drop in the price of coffee on the international market has had a major influence on mobility in the WHC.

2.2 Materials and Methods

2.2.1 Study area

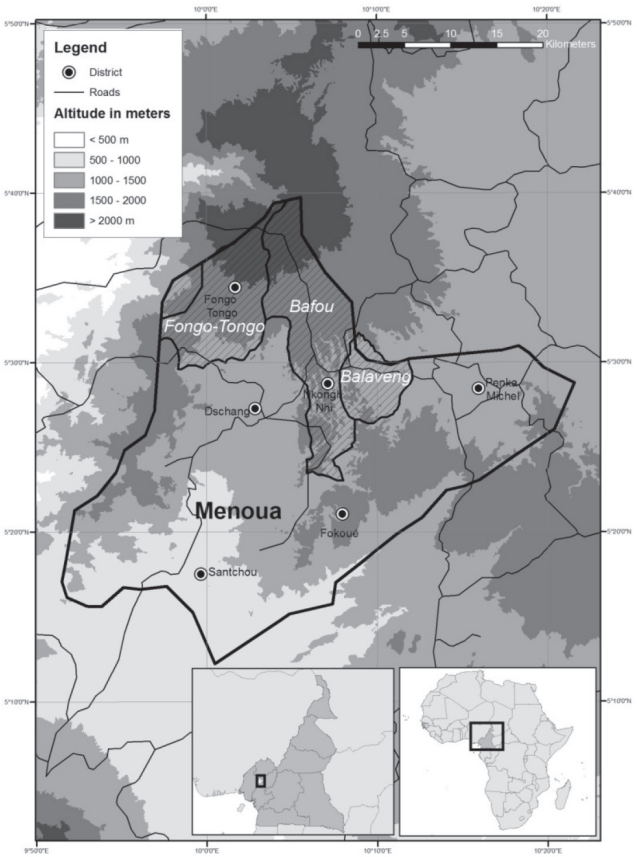

Figure 2.2
Geographical location of research site.

The study was carried out in three villages namely Bafou, Baleveng and Fongo-Tongo all found in the Menoua Division (Figure 2-2) in Cameroon. The reason for choosing these villages was based on the fact that they had the typical characteristics of the WHC with respect to population density, altitudinal levels, distance from the urban centre, and the typical production systems common in the humid savannah. Bafou and Baleveng belong to the same district, Ndozem, while Fongo-Tongo is situated in the Fongo-Tongo district. Access to the urban centre is easier from Bafou and Baleveng, because part of Bafou and the centre of Baleveng (where the village market is located), has access to the tarmac road that links the Menoua Division to the Regional headquar-

ters (Bafoussam), while Fongo-Tongo is more isolated, situated about 10 km away from the Dschang urban centre through difficult terrain.

Based on the classification of Kay *et al.* (1985), the WHC occupies most of the West and North-West Regions of the country with average maximum temperature of 22°C, average minimum temperature of 17°C and an annual rainfall between 1000-2000 mm falling in one long rainy season which is sufficient to grow two rain-fed crops. Fotsing (1992) described the WHC as a mountainous zone with an average altitude of about 1450 m a.s.l. characterized by granite-gneisses (metamorphosed igneous rocks) plateau in the southern lower altitudes and basaltic plateau of better agronomic quality at northern higher altitudes. Basalts weather relatively fast and chemical weathering of basalt minerals release cations such as calcium, sodium and magnesium, which give basaltic areas a strong buffer capacity against acidification. Calcium released by basalts bind with CO_2 from the atmosphere to form $CaCO_3$, thus acting as a CO_2 sink (Fotsing, 1992). The WHC was noted for a gradual degradation of the agro-sylvo-pastoral resources because of irrational exploitation. The population had however re-afforested the area to some extent with timber (*Eucalyptus sp* and *Podocarpus sp*) and fruit trees (*Cola acuminata, Dacryodes edulis, Persea americana, Mangifera indica, Canarium schweinfurthii*, *Spondia mombin*, *Citrus* spp, etc). The North-West and West Regions (Table 2.1) that make up this agro-ecological zone are the most densely populated in the country as shown by the 2005 census results (Libite, 2010). The principal cash crops in the WHC are dominated by cool-season vegetable crops after the substitution of coffee some decades ago, due to the drastic reduction in the purchase price of coffee (Sunderlin *et al*., 2000)

Table 2-1
Population data in 2005 and land area distribution in Cameroon.

Region	Population	Area (km²)	Number of divisions	Population density (inhabitants/km²)
Adamawa	884289	63701	5	13.9
Centre	3098044	68953	10	44.9
East	771755	109002	4	7.1
Far North	3111793	34263	6	90.8
Littoral	2510363	20248	4	124
North	1687959	66090	4	25.5
North-West	1728953	17300	7	99.9
West	1720047	13892	8	123.8
South	634655	47191	4	13.4
South-West	1316079	25410	6	51.8

2.2.2 Data Collection

Data was collected from sampled households at each of three villages (Bafou, Baleveng and Fongo-Tongo) of the WHC at different altitudinal levels, from low altitudes of about 1400m to high altitudes of about 2000 m a.s.l., through surveys and structured questionnaires in 2009, 2010 and 2011. A total of 244 households participated in the study. The survey questions for the head of the households elicited both qualitative and quantitative information on the factors triggering rural-to-rural, rural-to-urban and urban-to-rural types of mobility.

2.2.3 Data Analysis

Although the mobility framework was used to synthesise the findings, the analysis itself incorporated a variety of statistical tests. The data collected from the study was subjected to both non parametric and parametric analyses based solely on the exact number of respondents for the questions concerned. The relationships between qualitative variables were analysed using the Chi square test. Treatment means that showed significant differences at the probability level of $p<0.05$ in the analysis of variance, were compared using the Student Newman-Keuls comparison test. Multiple stepwise regression analysis which generates a linear equation that predicts a dependent variable as a function of several independent variables was used to predict dependent variables responsible for movements. The relationships between the dependent variable "Number of rural-to-urban migrants" (NRUM) and the independent variables: "Fallow duration" (FD), "Size of household" (SH), "Age of head of household" (AHH), "Number of irrigable plots owned by household" (NIPH) and "Number of wetland plots owned by household" (NWPH), were evaluated through stepwise regression analyses. The last two independent variables reflected the opportunities and thus the financial comfort of the household. The equation was of the general form:

$Y = b_o + b_1X_1 + b_2X_2 + \ldots + b_xX_n$ where Y was the predicted dependent variable, b_o to b_x were partial regression coefficients, and X_1 to X_n were the independent variables (Brown, 1998). For each coefficient, the t-test determined whether the value of the coefficient was zero, and if its p-value was less than 0.05, the calculated value was considered statistically significant. Variables with p-values greater than 0.05, were sequentially excluded from the equation during stepwise regression. To assess the statistical validity of the predictive equation, we also computed the coefficient of multiple determinations (R^2 and R^2 adjusted).

2.3 Results

2.3.1 General characteristics of the study area.

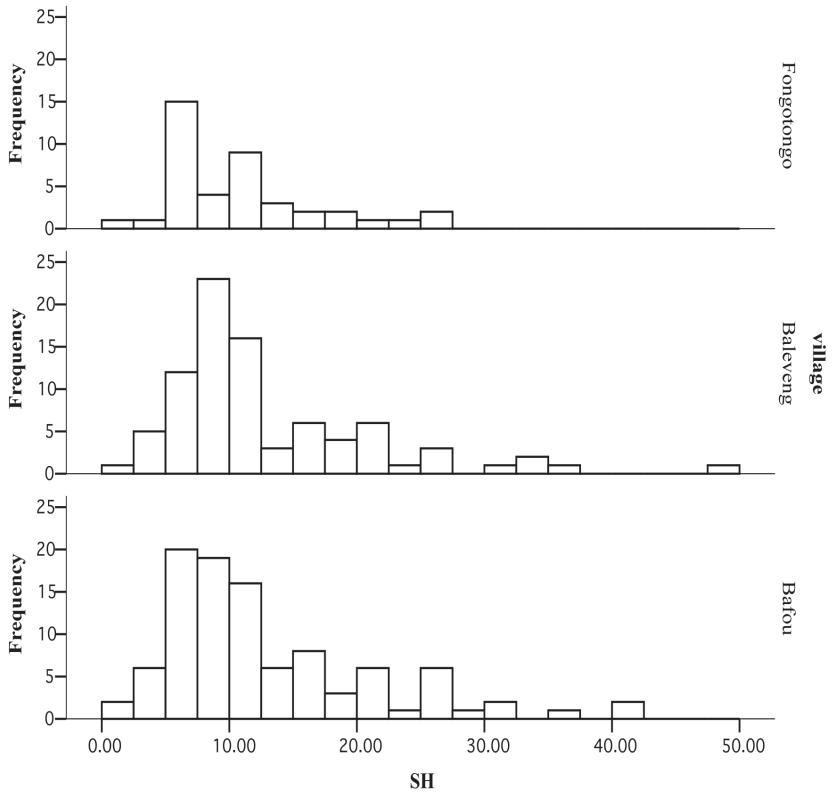

Figure 2.3
Frequency distribution of the size of the household (SH) in the study sites.

In general, the size of the household (SH) peaked at between 8 and 10 (Figure 2.3) and the age of the head of the household (AHH) peaked at 40 years, for Bafou, and 50 years for Baleveng and Fongo-Tongo (Figure 2.4).

A household consisted of a male (head of the household) and one or multiple wives and children. Female heads of households (mostly widows) were rare.

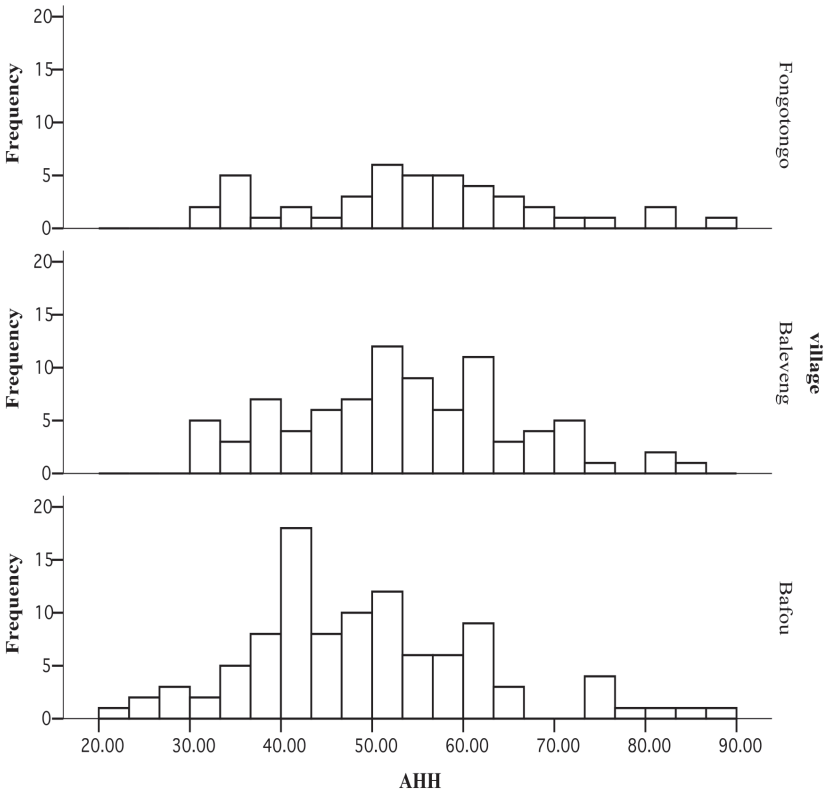

Figure 2.4
Frequency distribution of the age (years) of the household head (AHH) in the study sites.

2.3.2 Migration

In this article, two types of migration common in the WHC are discussed, viz., rural-to urban and urban-to-rural migrations. The use of mobile phones greatly alleviated the hurdles in the exchange of information in the time and space dimensions. Every respondent in this survey possessed a mobile phone and lauded its importance in both social and economic services which thus served as a feedback mechanism in the mobility system.

2.3.3 Rural-to-urban migration

Our results showed that various types of mobility with associated consequences were ongoing in this zone. Though the number of migrants to urban areas was significantly greater in Baleveng ($p < 0.05$) compared to Bafou, there existed no significant difference ($p < 0.05$) in the average numbers between Bafou and Fongo-Tongo and between Fongo-Tongo and Baleveng villages (Figure 2.5).

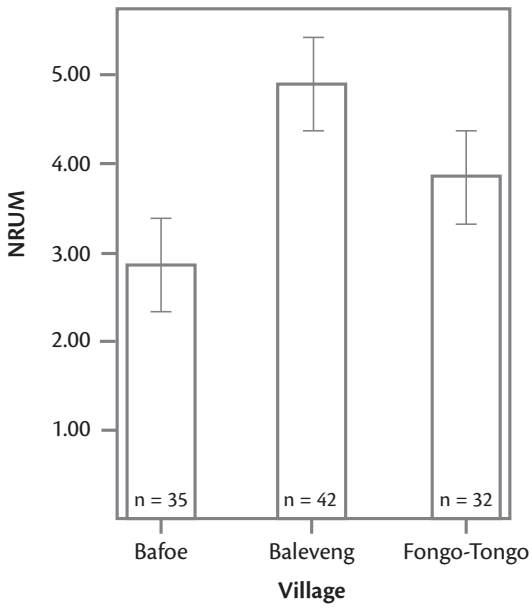

Figure 2.5
Average household rural-to-urban mobility (NRUM) per village.

In general, the number of people who travelled from the rural areas to the urban centres was very small compared to those who stayed behind (Figure 2.5), given that the number of members per household could be 20 or more (Figure 2.6).

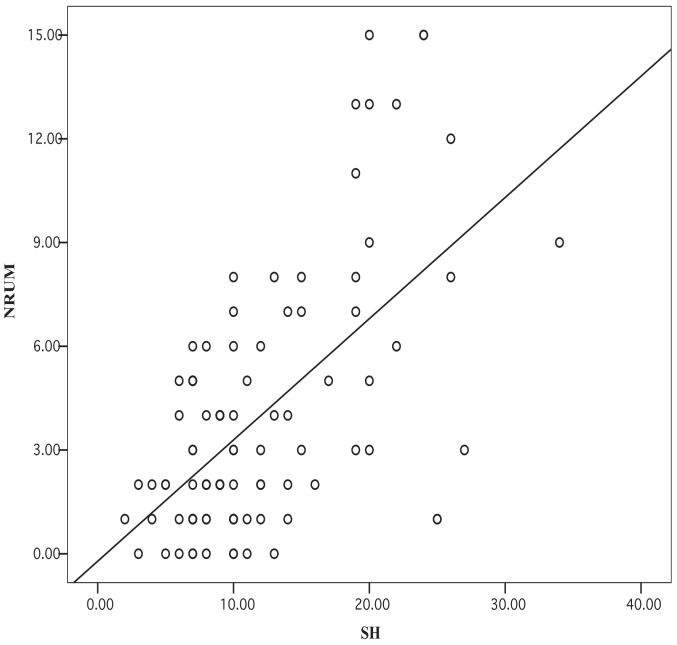

Figure 2.6
Relationship between the size (number of inhabitants) of the household (SH) and rural-to-urban mobility (NRUM).

There existed a strong relationship between the size of the household (SH) and the number of rural-to-urban migrants (NRUM). This was shown by the significant regression coefficient ($R^2 = 0.36^{**}$, n = 109) between the two variables (Figure 2.6). Significant influence on NRUM was also registered with the age of the head of the household (AHH) ($R^2 = 0.20^{**}$, n = 109). A stepwise analysis (Table 2.2) showed the factors that influenced out-migration.

Table 2.2
Stepwise multiple regression for rural-to-urban movement data

Model	Coefficient	Standard error	t value	P value
AHH	0.32	0.02	3.80	0.00
SH	0.53	0.05	6.18	0.00
Constant	-4.52	1.30	-3.48	0.00
R^2	0.46			
R^2 adjusted	0.45			
F-statistic	33.91			
Probability of F-statistic	0.00			

The model that combined AHH and SH was best fit for the data used to explain what influenced rural-to-urban migration. The model was defined as:

NRUM = 0.53SH + 0.32AHH - 4.52 ($R^2 = 0.46$, n = 109). Other combinations of variables that showed significant influence on NRUM were SH and the number of wet land plots owned by households (NWPH) ($R^2 = 0.38^{**}$, n = 109); and also SH and number of irrigable plots owned by households (NIPH) ($R^2 = 0.40^{**}$, n = 109),

Most of the rural-urban migrants carried out technical activities while those who moved to get married in urban areas accounted for the smallest group of migrants in the study area (Figure 2.7).

In the Batsingla sub-chiefdom of the Bafou village, a group of urban-to-rural migrants had formed an association called "*Retour au bercail*" which literally means homecoming. Most of them practiced both agriculture and their former urban occupations. In addition to their weekly activities, it was observed that they organized fortnightly meetings (on Sundays), which went on from mid-day till dusk. During these get-togethers, they shared food and drink, spent some time dancing and singing traditional songs and raised funds that were given on loan to members in need, at relatively low interest rates compared to local commercial financial institutions.

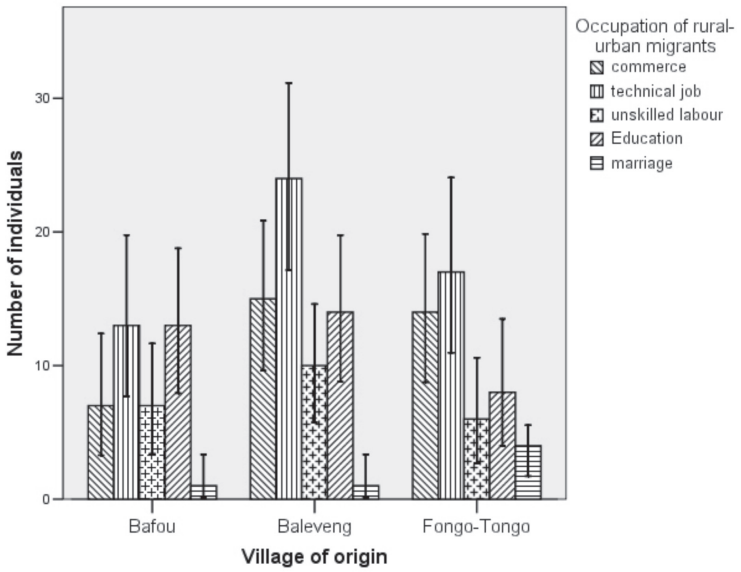

Figure 2.7
Different occupations carried out by rural-urban migrants of the study area.

2.3.4 Circular movements (Commuting)

A more crucial aspect of circular mobility had been provoked by the drop in the market price of coffee (Figure 2.8).

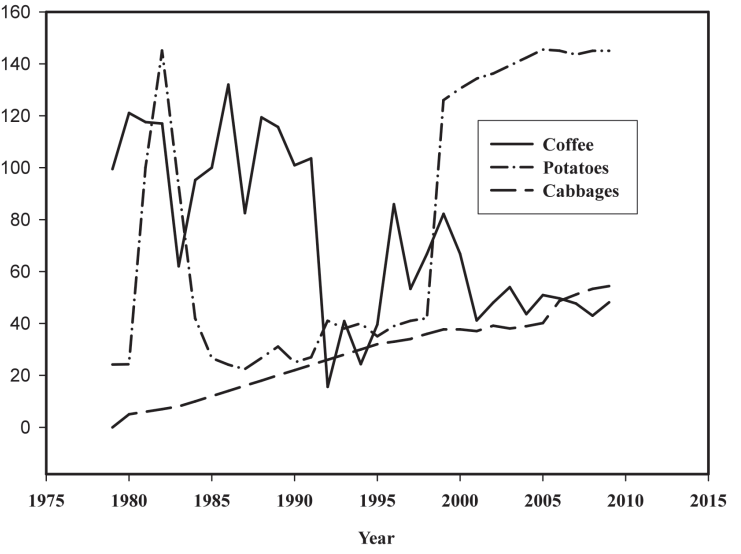

Figure 2.8
Production trend for Coffee, Potatoes and Cabbages in Cameroon (1979-2009)

The prices dropped from 0.73 euro/kg to 0.38 euro/kg for Arabica coffee and from 0.68 euro/kg to 0.24 euro/kg for Robusta coffee in 1992. The lowest production point was reached during the 1992-1994 period which marked the years of liberalization of the sector. Farmers in the WHC adjusted by substituting coffee with vegetable and food crops. Figure 2.8 shows some of the recently introduced vegetable crops that had become the new cash crops for farmers in the high altitudes of the WHC whose rate of production increased at the expense of coffee. Newly introduced cash crops included potatoes (*Solanum tuberosum*), cabbages (*Brassica* sp), leeks (*Allium ampeloprasum* var. *porrum*), carrots ((*Daucus carota* subsp. *sativus*), beetroots (*Beta vulgaris* L.), tomatoes (*Lycopersicon esculentum* L.) and beans (*Phaseolus vulgaris*), while in the low altitudes, coffee was replaced mostly by maize (*Zea mays* L.), plantains and bananas (*Musa* sp), aroids (*Xanthosoma* sp and *Colocasia* sp), and beans (*Phaseolus vulgaris*).

Table 2.3
Variation of number of farm plots at high altitude locations, number of farm plots under irrigation and maximum fallow duration with relation to villages.

Variable	Village	Means[1]
number of farm plots in high altitude areas	Bafou	2.30a
	Baleveng	0.43b
	Fongo-Tongo	0.73b
Number of farm plots under irrigation	Bafou	1.70a
	Baleveng	0.09b
	Fongo-Tongo	2.20a
Maximum fallow duration (years)	Bafou	0.83b
	Baleveng	1.81a
	Fongo-Tongo	2.27a

[1]Means followed by the same letter are not significantly different ($p < 0.05$)

Results of the analyses of variance showed significant differences ($p < 0.05$) among villages with respect to the number of farm plots acquired at the high altitude farming area per household, number of irrigable farm plots per household and the maximum fallow duration (Table 2.3), all of which constituted the main determinants of the daily circular mobility or commuting to the farms located in different quarters in the villages. The average number of farm plots occupied by households in the Bafou village (2.3) at the high altitude zone was significantly ($p < 0.05$) higher than those of Fongo-Tongo (0.73) and Baleveng (0.43). The average number of irrigable plots (based on the proximity to a water source) per household was significantly ($p < 0.05$) smaller for Baleveng (0.09) compared to Bafou (1.70) and Fongo-Tongo (2.20). An important facilitator for rural-to-rural mobility was noted to be the means of trans-

port. Pedestrians were mostly farmers whose farms were located around the homestead while rural-rural mobile farmers travelled more by motorbike and vehicles that enabled them to reach their farms in other rural areas (Table 2.4).

Table 2.4
Relationship between the farm location with respect to the residence of the farming family and the means of locomotion of the head of the household.

Means of transportation	Farm location (%)	
	Farming within locality of homestead (n = 19)	Rural-to-rural (away from homestead) (n = 77)
Pedestrian	89.5	49.4
Use motorbike	5.3	32.5
Use vehicle	5.3	18.2
Pearson Chi Square	0.006	

The choice of markets for farm produce also accounted for commuting. Farmers who invested more in chemical and other off-farm inputs preferred selling their produce in urban markets as opposed to those who depended more on on-farm inputs (Table 2.5).

Table 2.5
Relationship between the market for farm produce and types of input used for production

Type of input used for production	Market for farm produce (%)	
	Rural market (n = 42)	Urban market (n = 20)
Chemical inputs	73.8	95
No chemical inputs	26.2	5
Pearson Chi Square	0.048	

2.3.5 Mobility effects

The traditional shifting cultivation characterized by multiple cropping was noticed to be disappearing. In the Bafou village, 90% of the farmers practiced both sole and intercropping systems and 10% practiced mainly intercropping while in Baleveng, 67.3% of the farmers practiced the two systems while 32.7% practiced mainly intercropping. In Fongo-Tongo, 46.4% of the farmers practiced both systems while 71 % and 46.4% practiced mainly sole and intercropping systems respectively. Pressure on farmland and the consequent reduction in fallow period was observed in the study area (Table 2.3). In the Bafou village, fallow periods (0.83 year) were significantly ($p < 0.05$) shorter than in Baleveng (1.81 years) and Fongo-Tongo (2.27 years) villages.

There was a significant relationship between the use of chemicals (Fertilizers and pesticides) and the villages of the farmers (Table 2.6). More farmers in the Bafou village depended on off-farm inputs which included fertilizers, insecticides, fungicides and herbicides while the reverse was true for the Baleveng village.

Table 2.6
Relationship between the villages and the use of off-farm chemical inputs

Village	Use of off-farm chemical inputs	
	Yes (n = 112)	No (n = 32)
Bafou	37.5	12.5
Baleveng	31.3	53.1
Fongo-Tongo	31.3	34.4
Pearson Chi Square	0.016	

Many plant species and animal breeds were found to be either extinct or near the point of extinction in the WHC. Most farmers blamed this on the introduction of new crop production techniques. The crops that were reported to be extinct or near extinction included cultivars of cabbage (*Brassica* sp), yams (*Dioscorea* sp) and a host of spices and leafy vegetables.

Our survey results show that 85.5% of the labour force in farms far from homesteads was provided by rural-to-rural mobile waged labourers. The following sources of income were distinguished: revenue from cash crops (*Solanum* potato, cabbage, carrot, leek, tomato and beetroot), wages (regular salary or pension, hired labour), food crops, temporary jobs (e.g. carpentry, building, chain sawing, mechanics, motorbike taxi drivers etc.), petty trade, livestock, wood and remittances. The average yearly income per household in FCFA (1 € is approximately 650 FCA) ranged between: 110,000 and 420,000 in the Bafou village, 110,000 and 230,000 in the Baleveng village and 12,000 and 400,000 in the Fongo-Tongo village.

2.3.6 Urban-to-rural migration

Our survey results showed that urban-to-rural migrants were people of different walks of life which included technicians in different domains, traders and unskilled persons engaged in various activities. The urban-to-rural migrants were engaged in agricultural activities and/or their previous urban occupations for income generation (Table 2.7).

Table 2.7
Main occupations or urban-to-rural migrants of different previous urban occupations.

Main occupation after Urban-to-rural migration	Previous occupation in urban area (%)		
	Technical activity (n = 43)	Unskilled labourer (n = 10)	Commercial activity (n = 9)
Agriculture	55.8	70	77.8
Agriculture and technical activity	20.9	10	0
Agriculture and commercial activity	23.3	20	22.2

2.4 Discussion

Rural-urban migration involved the movement of rural people to urban centres particularly Dschang, which is the closest city and urban-rural migration concerned people moving from urban centres to the villages. Both types were found to be geared towards adjustments to buffer the existing socio-economic and biophysical pressures. Due to the high level of integration of rural activities into the national economy and the degree of awareness of opportunities in the rural areas through feedback from migrants, movement out of the rural areas was gaining ground. Population pressure in origin areas has been cited as a factor behind out-migration in the tropics in general (Bilsborrow & Carr, 2001) which agrees with the picture in our study sites (Figure 2.6). The positive relationship that related the size of the household with out-migration was mostly due to the burden of supporting the household population in terms of feeding, clothing, education and medical care. Rural assets in the research area such as irrigable plots and wetlands were income sources used to alleviate the burden and as such negatively encourage out-migration. It has been observed that when people have land, out-migration is attenuated (Bravo-Ureta *et al.*, 1996). A combination of social determinants was found to be responsible for the volume of rural-to-urban migration. In this study areait was both the age of the head of the household and the size of the household which represented the most influential rural control sub-system and accounted for rural-to-urban migration in search of opportunities for commerce, technical jobs, education, marriage, and the unskilled labour market in the urban areas and which were the dominant components of the environment in this system. The positive relationship between the age of the head of the household and out-migration could be related to the fact that older people would encourage household members to explore alternative income sources to improve their quality of life, given that these older people were no longer strong enough, to carry out

their normal functions to support the family. These results are similar to the findings of Boyle (2004) who showed that the characteristics of a rural household that encouraged migration included a desire to improve the quality of life (with respect to education, health care, public works, entertainment, etc.). Educational achievement is mentioned as an important determinant of migration in the broader migration literature (DaVanzo, 1981; Oberai & Bilsborrow, 1984; Root & De Jong, 1991). Bongaarts (1983) proposed that marriage, fertility, adoption, mortality, migration, and divorce were proximate demographic determinants of the size of nuclear households. Macro-level institutional and political factors may determine the overall magnitude of migration, but micro-level factors play a significant role because decisions to migrate are made at the micro level and are usually household decisions (De Jong & Gardner, 1981). In this light, Bilsborrow *et al.* (1984), Findley and Li (1999) argue for an approach that integrates economic and other structural factors inherent in the context within which migration decisions are made (Bible & Brown, 1981).

Circular mobility was found to be an important type of movement in the WHC. Seasonal circular mobility was common, where family members and friends mostly from the urban areas travelled to agricultural sectors to offer their service as labourers, at the end of which they returned home. Farmers in the WHC who relied on costly off-farm inputs preferred selling their produce in urban markets where higher profits could be achieved easily and faster. These conventional farmers relied totally on chemical inputs, viz., improved planting materials, inorganic fertilizers, pesticides and herbicides for the production of the common vegetable cash crops of the area. As a result, their cost of production was relatively high compared to those who relied nearly totally on organic inputs from their farms and previous harvests as a source of planting materials. Given the fact that rural markets were not as accessible to higher bidders as urban markets, urban markets with higher bidders proved the only solution for conventional farmers wishing to make ends meet. This is in accordance with the standard microeconomics approach which hypothesizes, that people compare their earnings in their place of origin with their expected earnings at possible destinations, when making thedecision to migrate (Todaro, 1969). According to this human capital model, potential migrants will make decisions based on the economic costs and benefits of migration (DaVanzo, 1981).

Movement from the rural areas to the urban centres varied in different villages and could be influenced by the mobility channels of the system and the assets in the villages. In our study area, the highest average rural-to-urban mobility per household was recorded from the Baleveng village and the least from Bafou village. The mobility channel was greatly improved for the Baleveng inhabitants as the tarmac road leading to the Regional Headquarters cuts

across the centre of the village, while the Bafou inhabitants occupied most of the favourable farmlands which explained their reluctance to move to urban centres. Migrant networks are potentially expanded by structural factors such as telecommunications and road networks and individual characteristics such as being extrovert, multilingualism, and level of education. The extent and quality of information received from friends or relatives are thus important migration destination determinants and this is confirmed by other studies (Stark & Taylor, 1991).

The results of this study suggest that young household heads with consequently young household members were less mobile because their dependents left them with little or no freedom of movement, compared to older household heads with more responsible household members capable of independent living, hence able to move about. However, the United Nations (1999) observed that the prospect of the younger generation living with their parents was becoming increasingly difficult if not impossible, as the search for employment opportunities increasingly took them to locations away from their homes and to distant lands.

Rural-rural mobility or commuting to farms in different rural neighbourhoods was highly influenced by the quest for more favourable agricultural land. The reduction in coffee prices in the early 90s had undermined the economic sustainability of the farmers in the country in general and those of the WHC in particular. The perennial nature of the coffee crop meant that adjustment to the scale of production through diversification and exiting the coffee production industry had to be slow. The absence of a national effort to assist producers accounted for the adjustments that producers were forced to make to reduce their costs, including the application of inputs and a reduced workforce in coffee production, which resulted in unemployment and migration. The reduction in labour resulted in less care being taken of trees and careless harvesting which also had adverse effects on quality which in turn led to additional pressure on average price levels.

Coffee, the original cash crop had not been location-specific but the cool-season vegetable cash crops yielded better under the low temperature conditions found at the higher altitudes in the study area and many crops per year were possible where water was unlimited. These findings coincide with Porter (1995) who noted that as temperature was such an important regulator of net photosynthetic potential, many of the most fertile areas of the tropics were at relatively high altitudes. This explained why the limited high altitude locations, irrigable and wetlands represented the destination of rural-rural mobility or commuting. AVRDC (2006) revealed that vegetables were the best resource for overcoming micronutrient deficiencies and provided smallholder

farmers with a much higher income and more jobs per hectare than staple crops. The predominance of the agricultural sector and the opening up of new agricultural land were also found to be the major reasons for rural to rural migration in South Asian countries as shown by Perera (1992) where population mobility was still dominated by rural to rural migration. The results obtained in this study supported the fact that agricultural development stimulated circular movement. This was reflected in the movement of hired labourers in the rural areas. Similarly, Chapman and Prothero (1977) showed that circulation, rather than being transitional or ephemeral, was a time-honoured and enduring mode of behaviour, deeply rooted in a great variety of cultures and found at all stages of socioeconomic change. Farmers in this area being already quite satisfied with the results of vegetable crop production, subsequent increases in coffee prices could have very little effect on them, in addition to the fact that food crops had replaced most of the coffee crop. New coffee farmers found in this zone are exploiting newly bought farmlands for the cultivation of the crop.

Through the use of mobile phones, farmers in rural areas could receive or transmit secure and vital agro-produce information and produce supply instructions in real time which made their work more efficient. Most agricultural plots were small, often far from where the farmer lived. Over these distances loads of inputs and outputs had to be transported. The use of motorbikes by most farmers had helped to solve the problem of transportation in the study area. The attitude of give and take governed urban-rural remittances and rural-urban food supply. It has been shown in the study area,that in return for remittences,urban dwellers gained nearly as much, when converted into monetary terms, from the provision of food by their rural relatives.

The relatively short fallow period observed in the study area reflected the drastic change from the former shifting cultivation to the intensive land-use system shown by our results. This also explained the heavy reliance on external inputs such as fertilizers and pesticides and the practice of sole-cropping systems which had a serious impact on biodiversity. Intensive land-use was exacerbated by the exploitation of irrigable and wetlands that permitted year-round cultivation, since water is one of the most limiting factors for crop production in the area. Human pressure on land resources exacerbated by unsustainable land use practices was found to contribute towards the reduction of farm plots (Faye & Ning, 1977), fallow duration (Scott, 1980), and biodiversity (World Resources Institute, 2005), abandoned capital investment features such as terraces and irrigation (Stone, 1998; Ramakrishnan, 1992) and low productivity (Trollope & Trollope, 2004; English, 1998; Turner & Ali, 1996). Lageman (1977) observed that soil fertility, organic carbon and nitrogen declined as population pressure increased. The Global Assessment of Human-induced Soil Degradation showed that soil degradation in one form or

another occurred in about 2,000 million hectares of land in the world. Water and wind erosion accounted for 84% of this damage, most of which was the result of inappropriate land management in various agricultural systems (Oldeman *et al*., 1991).

The different types of mobility had varying effects on the livelihood of the rural population. The production of cool-season vegetables provided a better source of income compared to coffee, the former cash crop. Hired labour in the rural areas for crop production also accounted for rural-rural circular mobility in the study area. Such circular movement provided higher income at less risk than either farm production or migration (Fan & Stretton, 1980). The labour force in the rural areas was provided by inhabitants who could not move to urban areas because of the selective migration factor. Mobility has been shown to be selective (Lee, 1966) where people responded differently to the sets of plus and minus factors at the origin and destination. Selective mobility in these villages was conditional on the potential to be independent at the destination, which could be assured either by some financial backing or a technical package that could enable the creation of a business as noted by Hjort & Malmberg (2006).

The outcome of rural-rural as well as urban-rural types of mobility has had far reaching implications for the agricultural-based assets of WHC. The effects of mobility in the WHC can be grouped into: the introduction of technical expertise, loss of natural resources, diversification and the job market.

In the study area, on-farm dependent systems could be found mainly in home-gardens many of which were found in the low altitude areas, while the higher altitudes were characterized by high off-farm input systems. Both sole and intercropping systems were practiced. The urban-control sub-system (opportunities for housing, employment and general assimilation into urban life) as proposed by Mabogunje (1970), accounted for the urban-rural migration which represented a feed-back mechanism in the mobility system. The standard of living in the rural milieu was also greatly influenced by the urban-rural migrants who introduced new professions and ideas. According to Sjenitzer & Tiemoko (2003), return migration involves the transfer of skills back to the place of origin and job improvement on the part of returning migrants. The consensus among researchers and policy makers worldwide is that poverty alleviation in the tropics can only be achieved through combining increased agricultural production with increased and diversified income for rural households (IFAD, 2001). Diversification contributes to sustain agricultural systems especially under high population densities and climatic risk (Mortimore & Adams, 1999). However, the Batsingla case (*Retour au bercail*), revealed another effect of this type of mobility. These migrants imposed a social class difference as portrayed by the segregated meetings they organized. This sug-

gested social or cultural mobility where the migrants from the urban areas claimed a higher caste owing to the experience they gained in the urban areas. The importance of both physical and cultural mobility has been proposed as aspects of a form of reflexivity that is increasingly a marker of cultural distinction and privilege in the new economy (Adkins, 2003)

Selective mobility to an extent resulted in the fact that most unskilled persons resided in the rural areas, given the job opportunities and competition in the urban centres. However the introduction of a vegetable cash crop production had opened the way for a good farm labour market, for unskilled labourers in the rural areas. In as much as diversification of enterprises increased the options for households, the introduction of modern techniques encouraged farmers to diversify, to move away from the traditional intercropping system of production to sole cropping. Intercropping has been shown to ensure efficient utilization of light and other resources, reduce soil erosion, suppress weed growth, and thereby help to maintain greater stability in crop yields. It has also been shown to guarantee greater land occupancy and consequently higher net returns (John & Mini, 2005). This explains why the sole cropping vegetable cash crop production in the WHC which was highly dependent on off-farm inputs (improved planting materials, mineral fertilizers and pesticides) was found to put land at greater risk of degradation and to be a threat to biodiversity.

2.5 Conclusion

Mobility in the WHC is guided by specific determinants and each type of movement has a specific impact on the livelihood of the population. Our results suggest that mobility does not support the unidirectional individualist and structural theories in which cause and effect relationships are much more straightforward (Bakewell, 1996). The variables determining migration to all destinations are similar, it is the relative magnitude or value of each variable and the relative vulnerability and coping options of different populations that differ. Migration networks assuage the stress associated with migration (Root & De Jong, 1991). Coffee trees take four to five years to become productive and remain productive for fifteen to twenty years thereafter. In combination with the view that coffee prices are nearly impossible to predict over a five year stretch and that farmers therefore rely on adaptible expectations when investing, this suggests potential for a coffee price cycle and a change in farmers' attitudes. However, in the WHC, an increase in coffee prices would have an insignificant effect since the majority of farmers abandoned the crop when hit the first time by low market prices. However, some new coffee farmers are emerging in the study area.

This study shows that human mobility in general can be a double-edged sword and can be a threat or an opportunity for development, as observed by Taran (2007). Mobility connects people to jobs, markets and essential services. Mobility also disconnects people from jobs and essential services as is the case with the drain of the rural workforce by the urban centres with serious consequences for agricultural production. While rural-urban migration deprives the rural areas of important human capital, return-migration brings with it knowledge, expertise and skills valuable for the socio-economic development of the rural areas. Scarcity of land in the WHC has changed the traditional extensive cultivation into an intensive sole cropping system,thus forcing the population to engage in rural-rural mobility for land expansion and to exploit vulnerable lands for farming, often without the appropriate conservation measures which cause of the loss of soil fertility and land degradation.

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