Determinants And Impacts Of Human Mobility Dynamics In The Western Highlands Of Cameroon

C.M. Tankou, H.H. de Iongh, G. Persoon, M. de Bruijn, G.R. de Snoo

Abstract: This study analyses human mobility among inhabitants of Cameroon's most populous region, the Western Highlands of Cameroon. In other 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 and conceptualized 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 adapted for the production of vegetable cash crops. Intensive land-use and high dependence on off-farm chemical inputs was found to have replaced the traditional long fallow system. This represented 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 had far reaching effects on the improvement of rural livelihood.

Index Terms: Determinants, human mobility, rural, urban, Western Highlands of Cameroon,

INTRODUCTION

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 implication on its agricultural-based asset. However, very few empirical data exist on this region which is the major food-basket of the country. The socio-economic concerns on the impacts of demographic pressure have been addressed to some extent (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 contemporary and require some research attention. Mobility refers to all forms of territorial movement by people (Bell and Taylor 2004) 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 (Reitsma and Vergoossen, 1988). 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).

- *C.M. Tankou Faculty of Agronomy and Agricultural Sciences, University of Dschang, P.O. Box 222 Dschang, Cameroon. Corresponding author.*
  Email: cmtankou@yahoo.com
- *H.H. de Iongh. Institute of Environmental Sciences, Leiden University, P.O. Box 9518, 2300 RA Leiden, The Netherlands*
- *G. Persoon. Department of Anthropology, Leiden University, P.O. Box 9518, 2300 RA Leiden, The Netherlands*
- *M. de Bruijn. African Studies Centre, Leiden University, P.O. Box 9555, 2300 RB Leiden, The Netherlands*
- *G.R. de Snoo . Institute of Environmental Sciences, Leiden University, P.O. Box 9518, 2300 RA Leiden, The Netherlands*

Though rural-rural migration involves huge numbers of people (Achanfuo-Yeboah 1993), and the migrants are the key in population-environment relationships (Carr and Bilsborrow 2001), it is widely neglected and greatly under-researched. From an ecological perspective, rural-rural migration is of eminent importance because it results in increasing impact on rural landscape. Less effort has also been made on research in urban-rural migration despite studies highlighting the continuing links of urban migrants with their home areas and the eventual return to villages for retirement (Peil and Sada 1984). Information on the determinants of the various types of mobility is primordial to understand and contribute to their evolution. This study was thus intended to contribute to this hitherto neglected field with reference to the WHC. 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 and Dubois 1999). Commuting to farms at longer distances due to land scarcity started gaining grounds when the production and export of cocoa and coffee declined precipitously after 1989, in response to the government cut of producer prices and subsidies (FAOSTAT 2010). Hence, currency devaluation exacerbated by changes in the market prices of coffee in addition to the draconian public sector wage cuts in 1993 triggered the revolution of 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 and Lamlenn 1996). Cool season crops were found to be the leading cash crops in the WHC and better adapted to tropical highlands. Commuting had thus been quasi directional in the WHC leading land mongers to higher altitudes with the appropriate microclimate for vegetable cash crop production. Migration and especially urban to rural types had a significant effect on the diversification of income opportunities in the rural milieu. 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. Response to land scarcity through adaptation of 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). Rural farmers in the WHC and other developing countries are not only a larger group, but also far more vulnerable because of their much lower and volatile income, and hence deserve 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. 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 attempted to provide an in-depth analysis not only on why people moved, but also on the implications and ramifications of mobility in the WHC. Therefore the main objective of this research was 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 were 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.

MATERIALS AND METHODS

Study area

The study was derived from an explorative field work, participant observation and various forms of informal conversations carried out in three villages namely Bafou, Baleveng and Fongo-Tongo all found in the Menoua Division (Fig. 1.) 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 variations, distance from the urban centre, and the typical production systems common in the humid savannah. Bafou and Baleveng belonged to the same district called Ndozem while Fongo-Tongo was found in the Fongo-Tongo district. Access to the urban centre was easier from Bafou and Baleveng because part of Bafou and the centre of Baleveng (where the village market was located) were traversed by the tarmac that linked the Menoua Division to the Regional headquarters (Bafoussam) while Fongo-Tongo was more interior at about 10 km away from the Dschang urban centre through difficult terrain.

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. In total, 244 households participated in the study. The survey questions for the household heads elicited both qualitative and quantitative information on the factors triggering rural-to-rural, rural-to-urban and urban-to-rural types of mobility.

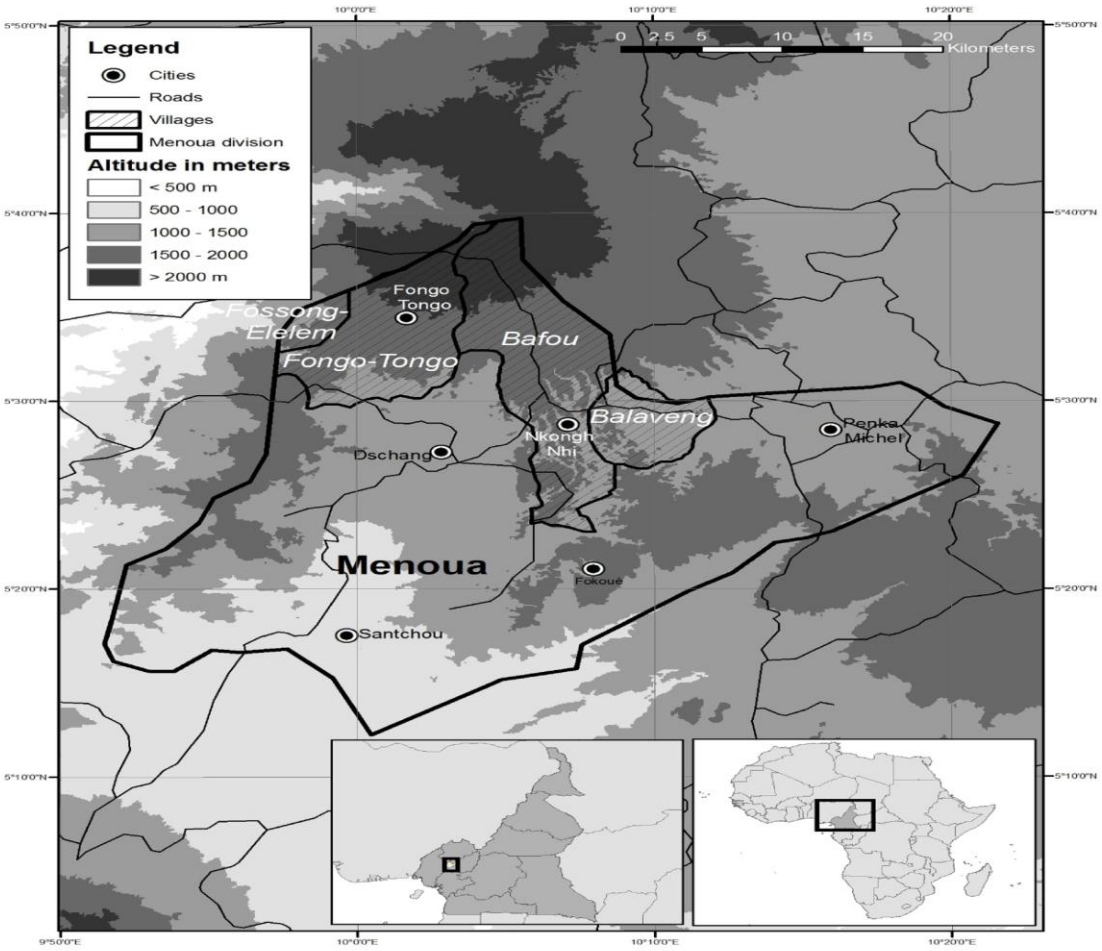

Fig. 1. Geographical location of research site.

Data Analysis

The data collected from the study were subjected to both non parametric and parametric analyses based solely on the exact number of respondents for the questions concerned. Treatment means that showed significant differences at the probability level $p<0.05$ in the analysis of variance, were compared using the Student Newman-Keuls comparison test. Multiple stepwise regression analysis 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 was 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 statistical validity of the predictive equation, the coefficient of multiple determinations was computed

RESULTS

General characteristics of the study area.

In general, the size of the household (SH) peaked at between 8 and 10 (Fig. 2) and the age of the head of the household (AHH) peaked at 40 years, for Bafou, and 50 years for Baleveng and Fongo-Tongo (Fig. 3). 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.

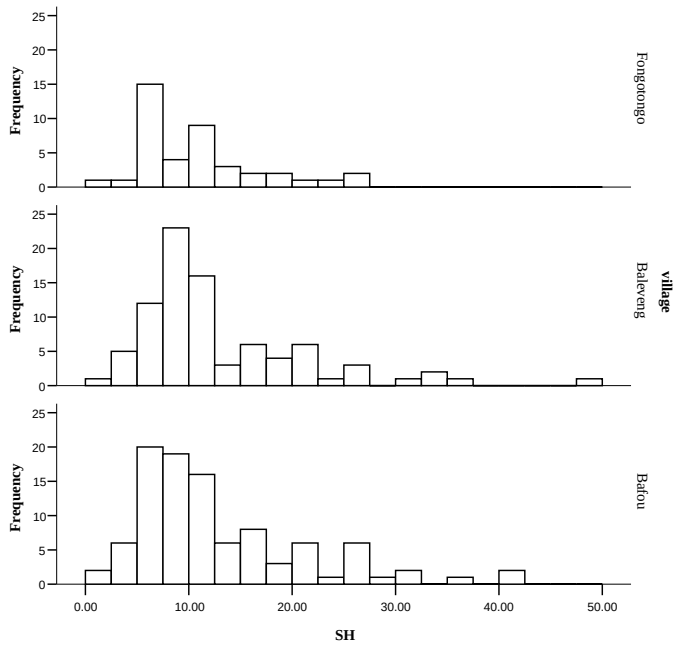

Figure 2. Frequency distribution of the size of the household (SH) in the study sites

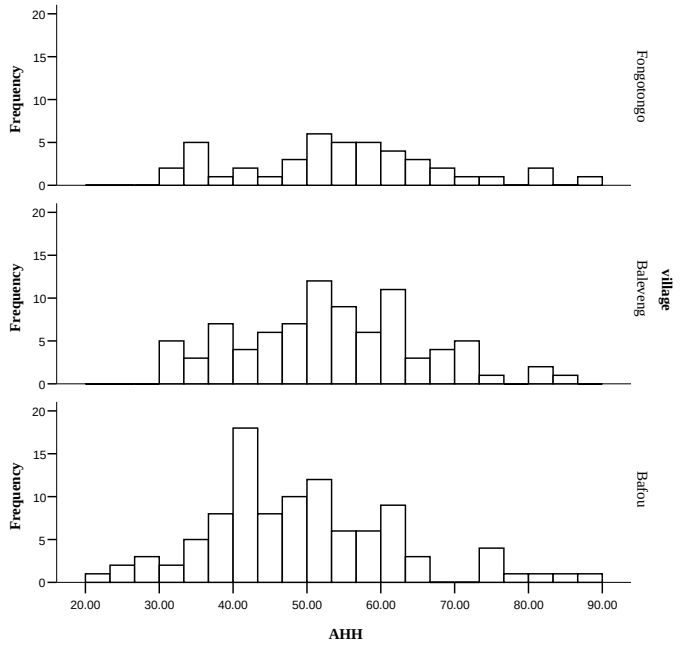

Figure 3. Frequency distribution of the age (years) of the household head (AHH) in the study sites.

Migration

In this study, two types of migration common in the WHC were treated, viz., rural-to urban and urban-to-rural migrations. The use of mobile phones greatly alleviated the hurdles in 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.

Rural-to-urban migration

Our results showed that various types of mobility with associated consequences were ongoing in this zone. 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 (Fig.5) given that the number of members per household could be 20 or more (Fig. 6). 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 (Fig. 4).

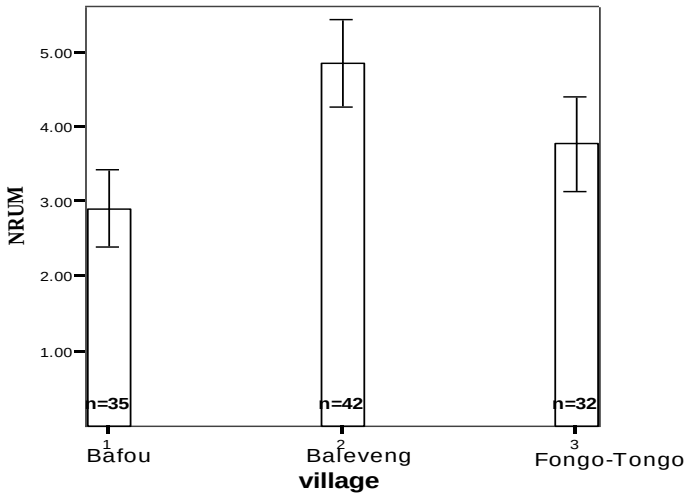

Fig.4. Average household rural-to-urban mobility (NRUM) per village.

There existed a strong relation 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 (Fig. 5).

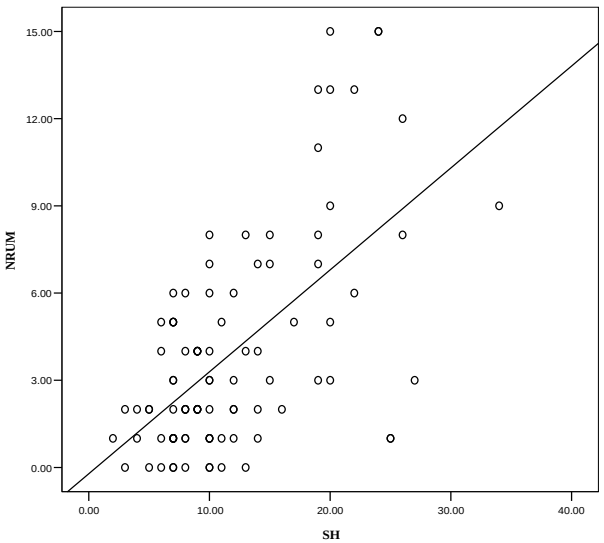

Fig. 5. Relationship between the size (number of inhabitants) of the household (SH) and rural-to-urban mobility (NRUM).

Significant influence on NRUM was also registered with the age of head of household (AHH) (R^2 = 0.20**, n = 109). A

stepwise analysis (Table 1.) showed the factors that influenced out-migration. The model that combined AHH and SH was the best fit for the data to explain the reason that influenced rural-to-urban migration. The model was defined as:

NRUM = 0.53SH + 0.32AHH - 4.52 (R^2 = 0.46, n = 109).

Table 1. 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			

Other combinations of variables that showed significant influence on NRUM were SH and number of wet land plots owned by household (NWPH) (R^2 = 0.38**, n = 109); and also SH and number of irrigable plots owned by household (NIPH) (R^2 = 0.40**, n = 109), Most of the rural-urban migrants carried out technical activities while those who moved to wed in urban areas accounted for the smallest group of migrants in the study area (Fig. 6).

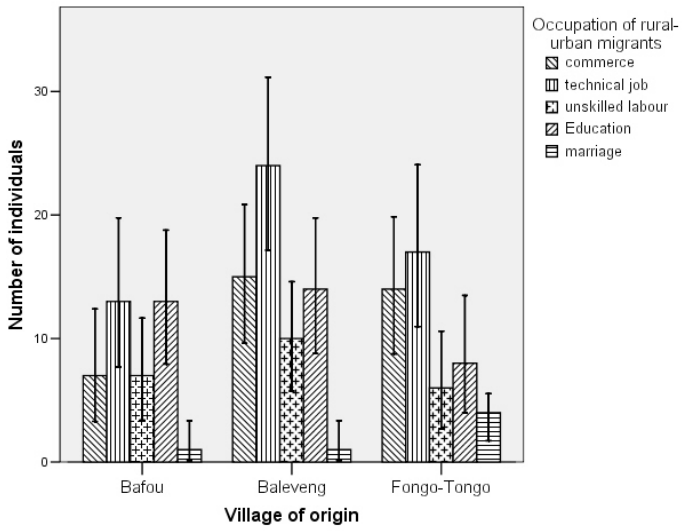

Figure 6. Different occupations carried out by rural-urban migrants of the study area

Urban-to-rural migration

These 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).

Table 2. 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 laborer (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

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

Circular movements (Commuting).

A more crucial aspect of circular mobility had been provoked by the drop in market price of coffee (Fig. 8). 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 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. Fig. 7 shows that the recently introduced vegetable crops had become the new cash crops for farmers in the high altitudes of the WHC and their production increased at the expense of coffee.

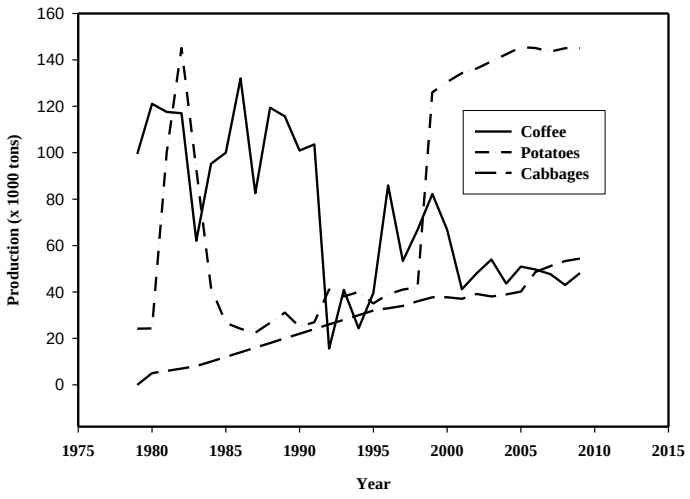

Fig.7. Production trend of Coffee, Potato and Cabbages in Cameroon (1979-2009)

These crops included potato (*Solanum tuberosum*), cabbages (*Brassica sp*), leeks (*Allium ampeloprasum* var. *porrum*), carrot ((*Daucus carota* subsp. *sativus*), beetroot (*Beta vulgaris* L.), tomato (*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*). 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 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.

Table 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	2.3a
	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

Means followed by the same letter are not significantly different ($P < 0.05$) 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 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 transport. Pedestrians were mostly farmers whose farms were around the homestead while rural-rural mobile farmers owned more motorbikes and vehicles that enabled them travel to these other rural area for farming (Table 4).

Table 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 on 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 5).

Table 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	

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 consequent reduction in fallow period was observed in the study area (Table 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 6).

Table 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	

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. 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. The survey results showed 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 crop (*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 vehicle drivers etc.), petty trade, livestock, trees and remittances. Household average yearly income 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.

DISCUSSION

Rural-urban migration involved movement of rural people to urban centres particularly Dschang which was 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 the integration of rural activities into the national economy and to the degree of awareness of opportunities at the rural areas through feedbacks from migrants, movement out of the rural areas was gaining grounds. Population pressure in origin areas has been cited as a factor behind out-migration in the tropics in general (Bilsborrow and Carr 2001) which agrees with the picture in our study sites (Fig. 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 to alleviate the burden and as such negatively encourage out-migration. It has been observed that when people have land, out-migration is attenuated (Findley 1987).A combination of social determinants was found to be responsible for the volume of rural-to-urban migration. In this study area, influences of both the age of the head of the household and the size of the household which represented the most influential rural control sub-system, accounted for rural-to-urban migration in search of opportunity for commerce, technical jobs, education, marriage, and unskilled labour market in the urban areas 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 not strong enough as before, to carry out their normal functions to support the family. These results are similar to the findings of Boyle (2004) who showed that characteristics of the rural household that encourage migration included the 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; Root and De Jong 1991). Bongaarts (1983) proposed that nuptiality, fertility, adoption, mortality, migration, and divorce were proximate demographic determinants of the size of nuclear households. Following household survival strategy, rural migration is a way for the household to maximize its chance for survival in an uncertain environment (Arguello 1981). 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 and Gardner 1981). In this light, Findley and Li (1999) argued for an approach that integrates economic and other structural factors inherent in the context within which migration decisions are made (Bible and Brown 1981). Circular mobility was found to be an important type of movement in the WHC. The seasonal circular mobility was common, where family members and friends mostly from the urban areas conveyed in agricultural sectors to offer labour services at the end of which they regained their homes. 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 the others who relied nearly totally on organic inputs from the farms and previous harvests as source of planting materials. Given the fact that rural markets were not easily accessible by higher bidders, urban markets with higher bidders were the only solution for conventional farmers 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 in making their migration decisions (Todaro 1969). According to this human capital model, potential migrants will make decisions based on the economic costs and benefits of migration (DaVanzo 1981). The 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 this 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 cut 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 extroversion, multilingualism, and education level. 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 and Taylor 1991). Conversely, strong local community ties (Abeysekera 1984) may favor retention. The results of this study suggest that young household heads with consequently young household members were less mobile because of the little or no potential for movement compounded with the difficulties associated with independent livelihood compared to older household heads with more responsible household members capable of independent living hence apt to mobility. However, United Nations (1999) observed that the prospect of the younger generation living with their parents was becoming increasingly difficult if not impractical as the search for employment opportunities took them more 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 lands. Coffee, the original cash crop had not been location-specific but the cool-season vegetable cash crops yielded better under low temperature conditions found at the higher altitudes in the study area and many crops per year were possible where water was non-limiting. 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 resources for overcoming micronutrient deficiencies and provided smallholder farmers with much higher income and more jobs per hectare than staple crops. The predominance of

the agriculture 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. Through the use of mobile phones, farmers in the 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 agriculture was done on small plots, often far from where the farmer lived. Over these distances loads of inputs and outputs had to be transported. The accessibility of motorbikes by most farmers had greatly solved the problem of transportation in the study area. 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 these results. This also explained the heavy reliance on external inputs such as fertilizers and pesticides and the practice of sole-cropping systems with serious impacts on biodiversity. Intensive land-use was exacerbated with the exploitation of irrigable and wetlands that permitted year-round cultivation since water was the most limiting factor 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 and Ning 1977), fallow duration (Scott 1980), and biodiversity (World Resources Institute 2005), abandoned landesque capital such as terraces and irrigation (Ramakrishnan 1992) and low productivity (Trollope and Trollope 2004). 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 these damages, most of which were 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 and Stretton 1980). The labour force in the rural areas was provided by inhabitants who could not move to urban area because of selective migration factor. Mobility has been shown to be selective (Everett 1966) where people responded differently to the sets of plus and minus factors at the origin and destination. Selective mobility in these villages was conditioned by 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 and Malmberg (2006). The outputs of rural-rural as well as urban-rural types of mobility had far reaching implication on the agricultural-based assets of WHC. The effects of mobility in the WHC could be grouped into: introduction of techniques, loss of natural resources, diversification and 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 livelihood in the rural milieu was also greatly influenced by the urban-rural migrants who introduced new professions and ideas. According to Sjenitzer and Tiemoko (2003), return migration involves the transfer of skills back to the place of origin and job improvement on the part of return 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 and Adams 1999). However, the Batsingla case (*Retour au bercail*), revealed another impact of this type of mobility. These migrants imposed a social class difference as portrayed by the segregate meetings they organized. This suggested social or cultural mobility where the migrants from the urban areas claimed a higher caste owing to the experiences 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 to 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 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 of households, the introduction of modern techniques made farmers to diversify 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 and 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 be at great risk of land degradation and threat to biodiversity.

CONCLUSION.

Mobility in the WHC is guided by specific determinants and each type of movement provokes specific impacts on the livelihood of the population. These 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 and De Jong 1991). This study shows that

human mobility in general can be considered as a double-edged sword and can either 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 to jobs and essential services as is the case with the drain of rural workforce by the urban centres with a serious consequence on 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 to intensive sole cropping system hence 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 is the cause of the loss of soil fertility and land degradation.

Acknowledgment

This research was made possible by funding from Volkswagen foundation. We are very grateful to the extension workers of the Menoua Division who participated in the data collection and the household members who provided the useful data for the study.

References

[1]. Achanfuo-Yeboah,D. (1993). 'Grounding a Theory of African Migration in Recent Data on Ghana', International Sociology, 8(2): 215-226.

[2]. African Development Bank Group (2008). Evaluation of Bank Group Assistance to the Agricultural and Rural Development Sector. 1996-2004. Operations Evaluation Department (OPEV)

[3]. Amin AA and Dubois J-L (1999). A 1999 Update of the Cameroon Poverty Profile. Washington, DC: World Bank, 2001.

[4]. ASB. (2003). Forces driving tropical deforestation. ASB Policy Briefs November 2003.

[5]. Alternatives to Slash-and-Burn, Nairobi, Kenya.

[6]. Adkins, Lisa (2003) 'Reflexivity: Freedom or Habit of Gender', Theory, Culture & Society 20(6): 21–42.

[7]. AVRDC (2006) Vegetables Matter. AVRDC – The World Vegetable Centre. Shanhua, Taiwan. Bell, D and Taylor, J. (2004). 'Conclusions: Emerging research themes' in J. Tayloy and M. Bell (eds) . Population Mobility and Indigenous peoples in Australasia and North America. London: Routledge. pp 262-67.

[8]. Bakewell, O. (1996). Refugee Repatriation in Africa: Towards a Theoretical Framework? Occasional paper 04/96. Centre For Development Studies University of Bath, UK.

[9]. Bible, D. S. and L. A. Brown (1981). Place utility, attribute tradeoff, and choice behavior in an intra-urban migration context. Socio-Economic Planning Sciences 15(1): 37-44.

[10]. Bilsborrow, R. E. and D. L. Carr (2001). Population, Agricultural Land Use, and the Environment in the Developing World. In Tradeoffs or Synergies? Agricultural Intensification, Economic Development and the Environment. Ed. D. R. Lee and C. B. Barrett, Wallingford, U.K., CABI Publishing Co.**:** 35-56.

[11]. Bongaarts, J. (1983). "The formal demography of families and households: An overview," IUSSP Newsletter no. 17 (January–April): 27–42.

[12]. Boserup, E. (1965). The conditions of agricultural growth: The economics of agrarian change under population pressure. London: EartWHCan Publication.

[13]. Boyle, P. (2004). "Population geography: migration and inequalities in mortality and morbidity." Progress in Human Geography **28**(6): 767-776.

[14]. Brown, C.E. (1998). Applied multivariate statistics in Geohydrology and related sciences. Springer-Verlag, Berlin.

[15]. Carr, D.L. and Bilsborrow, R.E. (2001). Population and land use/cover change: A regional comparison between Central America and South America. Journal of Geography Education. 43: 7-16.

[16]. Chapman, M., and Prothero, R.M. (1977). "Circulation between home places and towns: A village approach to urbanization." Paper presented at a Working Session on Urbanization in the Pacific, Association for Social Anthropology in Oceania, Monterey, California (March).

[17]. Dasgupta, P., Levin, S. and Lubchenco, J. (2000). Economic pathways to ecological sustainability. BioScience 50: 339–345.

[18]. DaVanzo, J. (1981). Repeat migration, information costs and location-specific capital. Population and Environment 4: 45-73.

[19]. De Jong, G. F. and R. W. Gardner (1981). Migration Decision Making: Multidisciplinary Approaches to Microlevel Studies in Developed and Developing Countries. In Studies in Developed and Developing Countries. Ed. G. F. De Jong and R. W. Gardner, New York, Pergamon Press.

[20]. Eicher, C.K; T. Zalla, J. Kocher and F. Winch. (1970). Employment Generation in African Agriculture (East Lansing: Institute of International Agriculture, Michigan State University).

[21]. Everett S. L. (1966). "A Theory of migration". University of Pennsylvania. Fan, Yiu-Kwan, and Alan Stretton. 1980. "Circular migration in South East Asia: Some theoretical explanations." Research paper no. 8002, Department of Economics, University of

Southern California

[22]. FAO (2001). The global forest resources assessment 2000 summary report. Report No. COFO-2001/INF.5. Rome, Committee on Forestry. Food and Agriculture Organziation (FAO) of the United Nations.

[23]. FAOSTAT (2010). Food and Agricultural Organization statistics database.

[24]. FAO-UNDP (1979). Soil Science Project. Soil survey and Land Evaluation for the Selection of land for seed multiplication farm. UCAO-World Bank Development Project. Haut plateau de L'Ouest Technical Report No 9. Soil Science Department IRAFONAREST ELOMA (Cameroon).

[25]. Faye and Ning (1977). An experiment in Agrarian Restructuration and Senegalese Rural Space Planning. African Environment 2 (4) and 3 (1). Pp. 143-153.

[26]. Findley, S. (1987). Rural development and migration: A study of family choices in the Phillipines. Boulder and London, Westview.

[27]. Findley, A. M. and F. Li (1999). Methodological Issues in Researching Migration. The Professional Geographer 51(1): 50-67.

[28]. IFAD. 2001. Rural Poverty Report. The challenge of ending rural poverty. IFAD, Rome.268 p.

[29]. Gubry, P. and Lamlenn, S.B. (1996). Le retour du migrant au village. In Le retour au Village: une solution à la Crise Economique au Cameroun?, ed. P. Gubry, S.B. Lamlenn, E. Ngwé, J.M. Tchégo J.P. Timnou and J. Véron, pp. 83-121. Paris, France : L'Harmattan.

[30]. Guyer, J.I. (1997). Diversity and intensity in the scholarship on African agricultural change. Review of Anthropology 26, 13–32.

[31]. Hjort, S. and Malmberg, G., (2006). The attraction of the rural: characteristics of rural migrants in Sweden. Scottish Geographical Journal, 122(1), p.55-75.

[32]. John S,A, and Mini, C. (2005) Biological efficiency of intercropping in okra (*Abelmoschus esculentus* (L.) Moench) Journal of Tropical Agriculture 43 (1-2): 33-36.

[33]. Kelly. R.L. (1992). "Mobility/Sedentism. Concepts : Archaelogical Measures and Effects. Annual Review of Anthropology". 21: 43-66 in J. Tayloy and M. Bell (eds) . Population Mobility and Indigenous peoples in Australasia and North America. London: Routledge. pp 117-35.

[34]. Kent E, Lindgren U, and Westerlund O. 2003. Geographical Labour Mobility: Migration or Commuting? Regional Studies 37.8: 827-837.

[35]. Lageman, J. (1977). Traditional African Farming Systems in Eastern Nigeria: An Analysis of Reaction to Increasing Population Density. Munich, West Germany, Weltforum Verlag. Lewis, W.A. 1967. Reflections on Nigeria's Economic Growth (Paris: Organization for Economic Cooperation and Development).

[36]. Lee, E. S. (1966). A Theory of Migration. Demography 3: 47-57.

[37]. Mabogunje A.L., (1970). 'Systems Approach to a Theory of Rural-Urban Migration', Geographical Analysis, 2(1): 1-18.

[38]. Mortimore, M. and Adams, W.M., (1999). Working the Sahel:Environment and society in Northern Nigeria. Routledge, London.

[39]. Oldeman, L.R., Hakkeling,R.T.A., and Sombroek, W.G. (1991). World map of the status of human-induced soil degradation: An explanatory note. Int. Soil Reference and Information Centre and UNEP, Wageningen and Nairobi.

[40]. Ouden, J. H. B. den (1987). In Search of Personal Mobility: Changing Interpersonal Relations in Two Bamileke Chiefdoms, Cameroon. Journal of the International African Institute, Vol. 57, No. 1, pp. 3-27

[41]. Parnwell, M. (1993) Population Movements in the Third World, London: Routledge

[42]. Peil M. and Sada P.O. (1984). African Urban Society, John Wiley and Sons, Chichester.

[43]. Perera. P. D. A. (1992). Migration and its implications for socio-economic development policies, paper submitted at the Fourth Asian and Pacific Population Conference, Indonesia; 19-27 August.

[44]. Porter, P.W. (1995). "Note on Cotton and Climate: A Colonial Conundrum." Cotton, Colonialism, and Social History in Sub-Saharan Africa (A. Isaacman & R. Roberts, Eds.) London: James Currey.

[45]. Ramakrishnan, P.S. (1992). Shifting agriculture and sustainable development: an interdisciplinary study from North-Eastern India. Parthenon Publ., Carnforth. Stern N. (ed.) (2006), Stern Review on the Economics of Climate Change, Cambridge, Cambridge University Press.

[46]. Reitsma R. F. and Vergoossen D. (1988). A causal typology of migration: the role of commuting, Reg. Studies 22, 331–40.

[47]. Root, BD and G. De Jong (1991). Family migration in a developing country. Population Studies 45(2): 2212-33.

[48]. Scott A, Gilbert A and Gelan A (2007). The Urban-

Rural Divide: Myth or Reality? SERG Policy Brief Series. Macaulay Institute Craigiebuckler, Aberdeen AB15 8QH, UK

[49]. Scott, W. (1980). Development in the Western Highlands. United Republic of Cameroon. USAID/Cameroon Office of Agricultural and Rural Development, Yaounde.

[50]. Sjenitzer, T. and Tiemoko, R. (2003). 'Do Developing Countries Benefit from Migration? A Study of the Acquisition and Usefulness of Human Capital for Ghanaian Return Migrants'. Sussex Centre for Migration Research.

[51]. Stark, O. and Taylor J. (1991). Migration incentives, migration types: the role of relative deprivation. Economic Journal 101(408)(1): 163-178.

[52]. Sunderlin, W.D., Ndoye, O., Bikie, H. Laporte N., Mertens, B., and Pokam, J. (2000). Economic crisis, small-scale agriculture, and forest cover change in southern Cameroon. Environmental Conservation 27 (3) pp 284-290. Taran P. 2007. Launch Seminar OSCE-ILO-IOM Handbook on Labour Migration Mediterranean Edition Rabat, Morocco, 12-13 December 2007

[53]. Trollope W.S.W., Trollope L.A. (2004). Prescribed Burning in African Grasslands and Savannas for Wildlife Management, Arid Lands Newsletter, 55, May/June

[54]. Todaro, M. P. (1969). A model of labour migration and urban unemployment in less developed countries. American Economic Review 59(1): 138-148.

[55]. United Nations (1999). The Family and Older Persons in Bangladesh, Pakistan and Sri Lanka, Asian Population Studies, No. 151, New York.

[56]. World Resources Institute (2005). Millennium Ecosystem Assessment, Washington, D.C., Island Press.

[57]. Zhong F. Zhu J., Xie Z. (2007). Resource Mobility and Agricultural Trade Policy. Proceedings at an IATRC Symposium July 8-9, 2007 Beijing, China