



doi:10.1111/j.1468-2435.2010.00645.x

North-South Migration in Ghana: What Role for the Environment?

Kees van der Geest*

ABSTRACT

The purpose of this paper is to determine the importance of the environment as a driver of North-South migration in Ghana. Almost one in every five people born in northern Ghana is living in southern Ghana. Interviews with 203 migrant farmers suggest that migration from the North to the South is, to a large extent, environmentally induced. Many Northerners decided to migrate because of poor agro-ecological conditions at home combined with easy access to fertile lands in the more humid destination area. The interviews with migrant farmers yielded several insights that are relevant for the environmental refugee debate. Firstly, environmental pull appears to be at least as important as environmental push. Secondly, scarcity of fertile land was mentioned much more often as a reason to migrate than climate change or erratic rainfall. Thirdly, none of the respondents ascribed the migration decision to sudden-onset environmental stress. If the environment is indeed an important driver of migration, one would expect migration rates to be higher in places with and times of more severe scarcity. A cross-sectional analysis of migration propensities and natural resources scarcity confirms that out-migration rates are significantly higher in poorly endowed districts. A longitudinal analysis of migration and rainfall shows that the period of worst environmental stress – during the Sahelian droughts of the late 1970s and early 1980s – was a time of reduced out-migration from northern Ghana. In this period of northern Ghana's migration history, economic and political factors weighed heavier than environmental factors. The picture that emerges for northern Ghana is not one of distress migration in the face of environmental disaster but rather of migration as a way of dealing with structural environmental scarcity.

* Amsterdam Institute of Social Science Research, University of Amsterdam, The Netherlands.

INTRODUCTION

Rural people in developing countries, and particularly in Sub-Saharan Africa, are among the most vulnerable to climate change. Most of them depend on rain-fed agriculture for their livelihood and their governments often lack the resources to protect citizens against the adverse effects of climate change and other environmental disruptions. High levels of poverty limit their capacity to cope with extreme weather events and to adapt to more permanent changes in the climate. However, in risk-prone environments where the state has little to offer, surprisingly adaptable livelihood systems can evolve. In the savannah of West Africa, for example, people have had to deal with climatic variability and environmental stresses since time immemorial, and most of the time they have done so quite successfully. Human mobility has a very central place in the adaptive strategies of farmers and pastoralists in this region (Broekhuis et al., 2004; Davies, 1996; De Bruijn and van Dijk, 2004; Dietz et al., 2004; Mortimore, 1989; Van der Geest, 2004).

The International Panel on Climate Change (2007) foresees that one of the consequences of climate change will be increased migration flows from affected areas. This sounds commonsensical but, so far, studies of migration-environment linkages have shown above all that explaining migration flows is a very complex undertaking.¹ There are numerous overlapping theories that each have some explanatory power.² Environmental push and pull can be important contributing factors in many migration flows, but except under very specific circumstances, they never act alone.

In a survey among 203 migrants from the savannah in northwest Ghana, the majority stated that they left their homes for environmental reasons. The respondents were farmers living in rural destinations in the forest-savannah transition zone in Ghana's Brong Ahafo region. Most of them indicated that they decided to migrate because of the scarcity of fertile land, low crop yields and food security problems in the North. The main attraction of their destination area in southern Ghana was access to fertile land to farm. Unreliable rainfall and climate change were mentioned by much fewer respondents than expected. Many migrants stated quite generally that poverty and financial problems were an important reason for them to migrate. Being farmers, one can reasonably expect a link between their lack of income and poor agro-ecological conditions. A minority mentioned non-environmental reasons for migrating, like family conflicts, witchcraft, lack of non-farm income opportunities and the desire to be free and independent.

The purpose of this paper is to determine the importance of the environment as a driver of North-South migration in Ghana. The survey findings summarized above indicate that this group of migrants indeed experienced a certain degree of environmental push and pull. However, such survey findings provide an insufficient basis for a proper assessment of the environment-migration link. If the survey respondents had been migrants in urban localities, for example, the answers would have been different. Moreover, respondents will not refer to certain underlying causes of migration and underdevelopment when asked about their personal motivation to migrate. The environment, on the other hand, easily becomes part of local discourses on migration because farmers experience the environment every day.

One of the problems in migration-environment studies is the difficulty of establishing causal relations (see e.g., Black, 2001; Castles, 2002; Renaud et al., 2007). In his critical review of the environmental refugee debate, Black (2001: 6) states:

For the 'environmental refugees' thesis to be plausible in the Sahel and other semi-arid regions, what is required is not simply evidence of migration from what have always been harsh, marginal environments; rather evidence is needed of an increase in migration at times, or in places, of more severe environmental degradation.

Indeed, if the environment is an important factor in explaining migration from the West African interior savannah to the moister forest and coastal zones, one can reasonably expect migration propensities to be higher (1) in less environmentally endowed areas and (2) in times of increased environmental scarcity. In this paper, these hypotheses are tested for northern Ghana. The analysis is based on a variety of secondary data sources, including population censuses, meteorological data, remote sensing data and agricultural statistics. This part of the paper does not include the views of migrants. However, in section five survey findings are presented that detail people's personal motivations to migrate. None of these sources alone can adequately address the complex reality of migration-environment relations. It is only through a sensible combination of sources that a 'moving picture' can emerge that holds some degree of trustworthiness.

The structure of this paper is as follows. The patterns and trends of North-South migration in Ghana are introduced in section two. Section three presents a cross-sectional analysis of migration, rainfall,

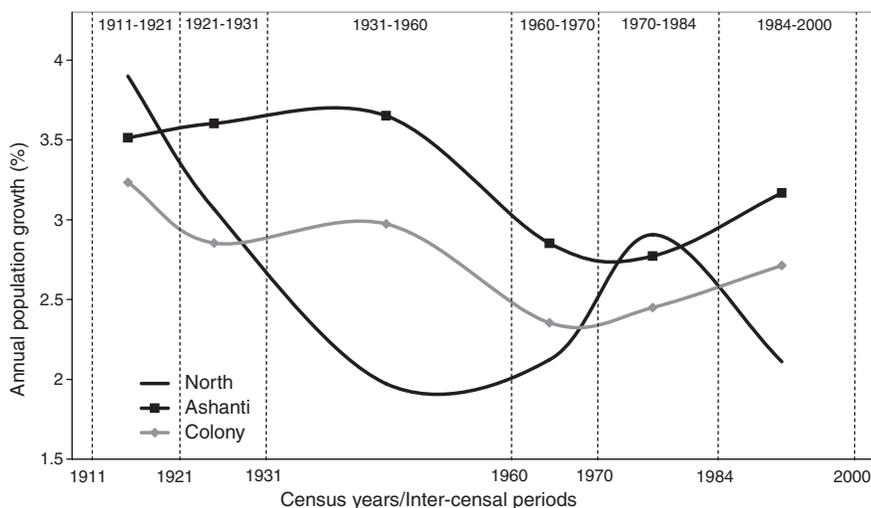
vegetation, agricultural productivity and rural population density to show that migration propensities indeed tend to be higher in districts with more natural resources scarcity. The longitudinal analysis of migration, rainfall and vegetation in section four provides no evidence of increased migration in times of more severe environmental stress. The findings from section three and four indicate that the environmental driver of migration from northern Ghana is not so much degradation, but rather structural scarcity. The survey data presented in section five confirms this finding: very few respondents talked of environmental change, while the vast majority did allude to structural characteristics of the environment in northern Ghana.

MIGRATION FROM NORTHERN GHANA: PATTERNS AND TRENDS

In pre-colonial times there seems to have been little migration from present-day northern Ghana to the South. Cleveland (1991: 222) describes human mobility in this era as “a tradition of local migration by many and long-distance migration by a minority of warriors and traders.” As in many other parts of Africa, people migrated over shorter distances in search of fertile lands and to escape conflict and slave raiders (Adepoju, 1995; Van Dijk et al., 2001). In the eighteenth and nineteenth centuries, large-scale voluntary migration was impeded by conflict and insecurity resulting from the wars between the Ashanti, the Gonja and the Dagomba and the related activities of slave raiders. The Northern Territories of the Gold Coast (now northern Ghana) were colonised by the British at the turn of the century. The first decades of colonial rule were the time of forced migration through labour recruitment. This period lasted about two decades, from 1906 to 1927 (Lentz, 2006: 139–142). The colonial government recruited labourers for the mines and for railway and road construction in southern Ghana. Voluntary migration started not long after the first forced migrants had returned from southern Ghana. Most of the early voluntary migrants were attracted by good labour opportunities in the booming cocoa sector.

Figure 1 shows the trend in annual population growth for different parts of present-day Ghana. It shows the approximate trend in out-migration propensities in northern Ghana. The figures are rough because the quality of the early census data is questionable and because population change is not only determined by migration rates, but also by fertility and mortality. However, regional variations in fertility and mortality trends are

FIGURE 1
ANNUAL POPULATION GROWTH IN SIX INTER-CENSAL PERIODS (1911–2000)



Notes: Based on population data from Engman (1983) and Ghana Statistical Service (2005). The 1948 census is excluded because the data is unreliable (Engman, 1983). 'North' consists of the present Upper East Region, Upper West Region and Northern Region; 'Ashanti' consists of the present Ashanti Region and Brong Ahafo Region; and 'Colony' consists of the present Western Region, Central Region, Eastern Region, Volta Region and Greater Accra Region. See also Figure 2.

much smaller than regional variations in net migration rates.³ Therefore, it can be argued that periods in which population growth declined in northern Ghana, while it increased in southern Ghana, were periods of increasing North-South migration. This is the case between the 1910 and 1960 censuses and in the last inter-censal period (1984–2000). Increasing population growth in northern Ghana is an indication of reduced North-South migration and/or increased return migration. This was the case in the 1970s and early 1980s, a time of widespread economic crisis, political instability and high food prices in the South (see below). The trend in annual population growth for northern Ghana therefore indicates that migration gradually increased during the course of the twentieth century with a temporary decline in the 1970s and 1980s.

Historical migration data confirm this trend. Ghanaian censuses since 1931 provide information on people's birthplaces. People who were born in northern Ghana and enumerated in southern Ghana are considered to be migrants.⁴ Table 1 shows the trend in North-South migration

TABLE 1
TREND IN NORTH-SOUTH MIGRATION PROPENSITIES (1931–2000)

	1931	1948	1960	1970	1984 [*]	2000
Population N-Ghana (1000)	717	1,077	1,289	1,590	2,375	3,141
People born in N-Ghana (1000)	759	1,150	1,215	1,708	-	3,673
Population S-Ghana (1000)	2,131	3,042	5,438	6,969	9,921	15,595
<i>North-South Migrants</i>	44,013	152,960	189,160	262,296	144,588	677,069
<i>% pop N-Ghana</i>	6.1	14.2	14.7	16.5	6.1	21.6
<i>% born N-Ghana</i>	5.8	13.3	15.6	15.4	-	18.4
<i>% pop S-Ghana</i>	2.1	5.0 ^{&}	3.5	3.8	1.5	4.7

Sources: Census Office Gold Coast (1932: 21); Census Office, Gold Coast (1950: 360, 362–366); Census Office (1962: 13–14); Census Office (1973: 106–110); Ghana Statistical Service (1995: 157); Ghana Statistical Service (2005: 130–131).

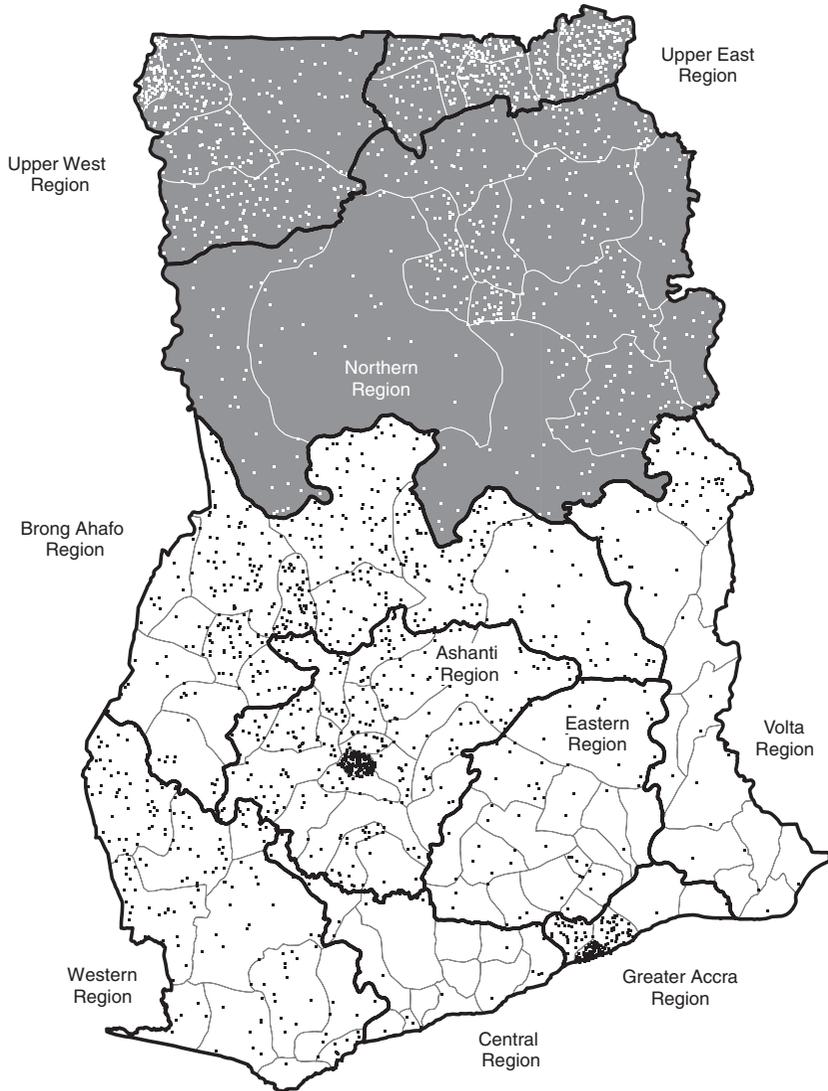
* Inter-regional migration figures are published in a census volume called “detailed demographic characteristics”. This volume was not published in 1984 and there is, therefore, no detailed migration data for 1984. The figure for 1984 was calculated from Ghana Statistical Service (1995: 157). According to this report 121,324 people who were born in northern Ghana and who were older than fifteen resided in southern Ghana. The total number of North-South migrants in 1984 were estimated by using the proportion of migrants aged > 15 from the 1970 census (83.91%): $100/83.91 * 121,324 = 144,588$.

& The 1948 census encountered serious problems. The population was under-estimated for southern Ghana (Engman, 1983). Therefore, the number of migrants from northern Ghana as percentage of the total population in Southern Ghana was probably lower than 5.0 per cent.

propensities for the period 1931–2000. Out-migration from northern Ghana gradually increased, although there was a temporary decline in the 1970–1984 inter-censal period. After that, migration propensities increased sharply in the last inter-censal period (1984–2000).

Figure 2 shows the map of North-South migration in Ghana, based on data from the population census of the year 2000. For each district, the census provides information on birthplace by region, but not on birthplace by district. Consequently, the number of people born in northern Ghana are known for each district in the South as are the number of out-migrants per region of origin in the North. However, the number of out-migrants per district of origin in the North had to be estimated. Three variables for which data was available at the district level were used to estimate⁵ out-migration rates: population growth between 1970 and 2000 (the lower the growth, the greater the out-migration), the proportion of elderly in the population (the higher the proportion, the greater the out-migration), and the sex ratio⁶ of the population aged 15–65 (the lower the ratio, the greater the out-migration). Together,

FIGURE 2
MAP OF NORTH-SOUTH MIGRATION IN GHANA (2000)



Each dot represents 500 migrants. The white dots in the North symbolize the number of out-migrants per district of origin. The black dots in the South correspond to the number of northern in-migrants in the destination districts. A migrant is defined here as someone born in the North and presently living in the South, so this excludes second or subsequent generation migrants.

Source: Estimated from Ghana Statistical Service (2005).

these three variables account for 92.1 per cent of the variation in out-migration rates at the regional level.

The map of North-South migration shows that the densely populated northeast is a principal source area of migrants, but the Upper West region has the highest out-migration rate: 26.9 per cent of the people born in that region were living in the South. The figure for the Upper East region is 22.2 per cent and for the northern region it is 13.0 percent (Ghana Statistical Service, 2005). The food crop producing middle belt, the cocoa frontier in the Southwest, and the cities of Kumasi and Accra are prime destination areas of migrants from the North (figure 2).

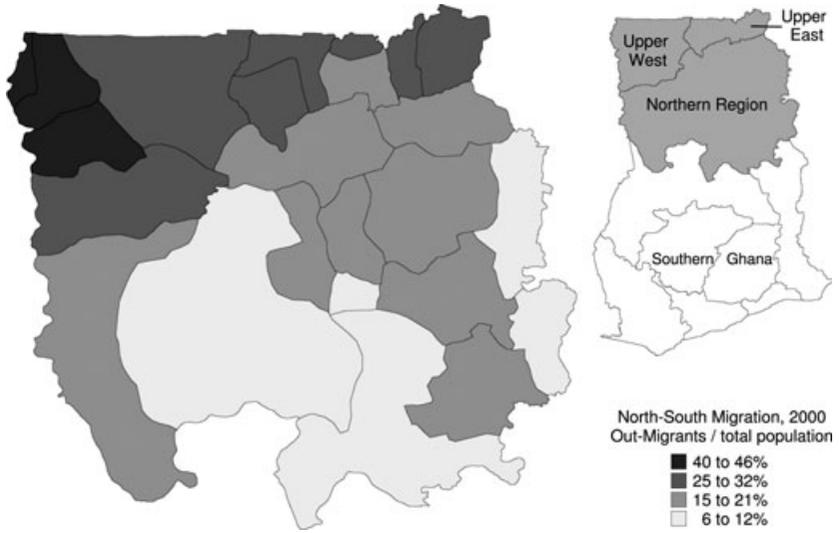
CROSS-SECTIONAL ANALYSIS

In this section, the geographic relation between out-migration propensities and different indicators of natural resources scarcity is investigated. The units of analysis are the 24 districts of northern Ghana that existed at the time of the 2000 census. The indicators of natural resources scarcity are rainfall, vegetation, crop yields and rural population density. The aim of this analysis is to test the hypothesis that migration propensities are higher in environmentally less endowed areas.

The maps and scatter plots in figure 3, 4, 5, 6 and 7 show the distribution of migration propensities and different indicators of natural resources scarcity. Figure 3 shows that the highest migration propensities are found in three districts in the extreme northwest. In these districts, out-migration rates range from 40 to 46 per cent. Figure 4 shows the geography of rainfall in northern Ghana. Annual rainfall amounts decrease from the southeast to the north. As expected, there is a negative relation between precipitation and out-migration ($R = -0.713$, significance 0.000). Districts that receive less rainfall tend to experience more out-migration. The scatter plot shows that the three districts with the highest out-migration rate (in the northwest) receive relatively low amounts of rain, but not less than some other districts (in the northeast).

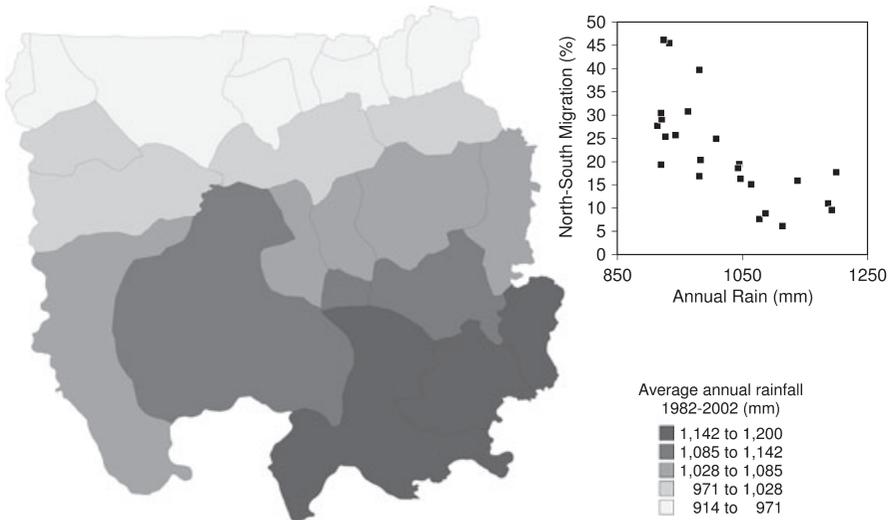
Figure 5 shows the average “greenness of the environment” as measured by the Normalized Difference Vegetation Index (NDVI). The greenness of the environment in northern Ghana is mainly influenced by rainfall, soil type and population density. Low NDVI values are an indicator of natural resources scarcity. As expected, the map and scatter plot show that there is a negative relation between migration propensities and the vegetation

FIGURE 3
MIGRATION PROPENSITIES IN NORTHERN GHANA (2000)



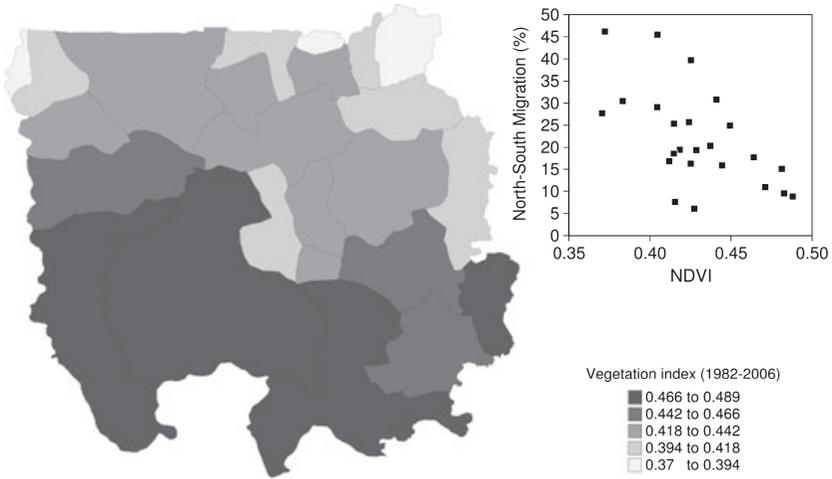
Source: Calculated from Ghana Statistical Service (2005).

FIGURE 4
AVERAGE ANNUAL RAINFALL IN NORTHERN GHANA (1982 TO 2002)



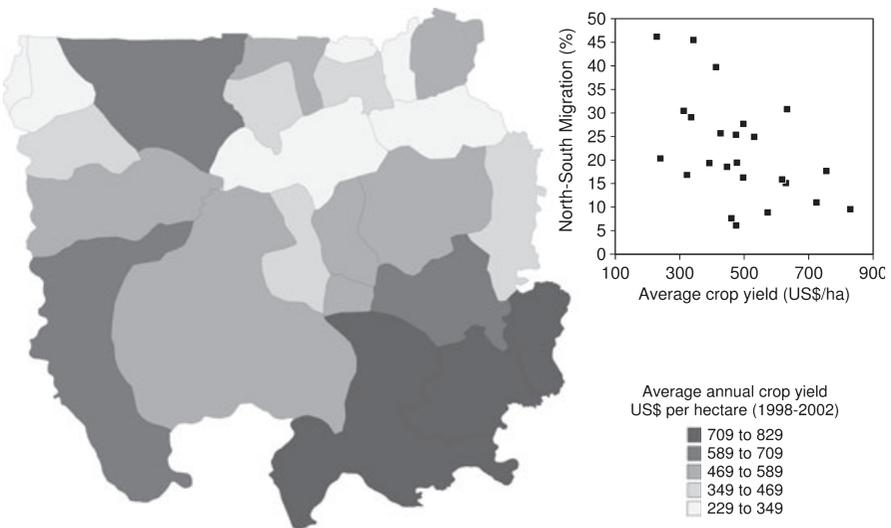
Source: Calculated from the TS 2.1 dataset of the Climate Research Unit of the University of East Anglia.

FIGURE 5
NORMALIZED DIFFERENCE VEGETATION INDEX (1982–2006)



Source: Calculated from 8*8 km satellite data by NASA's Earth Observatory (Chen et al., 2004).

FIGURE 6
CROP YIELDS PER HECTARE (1998–2002)

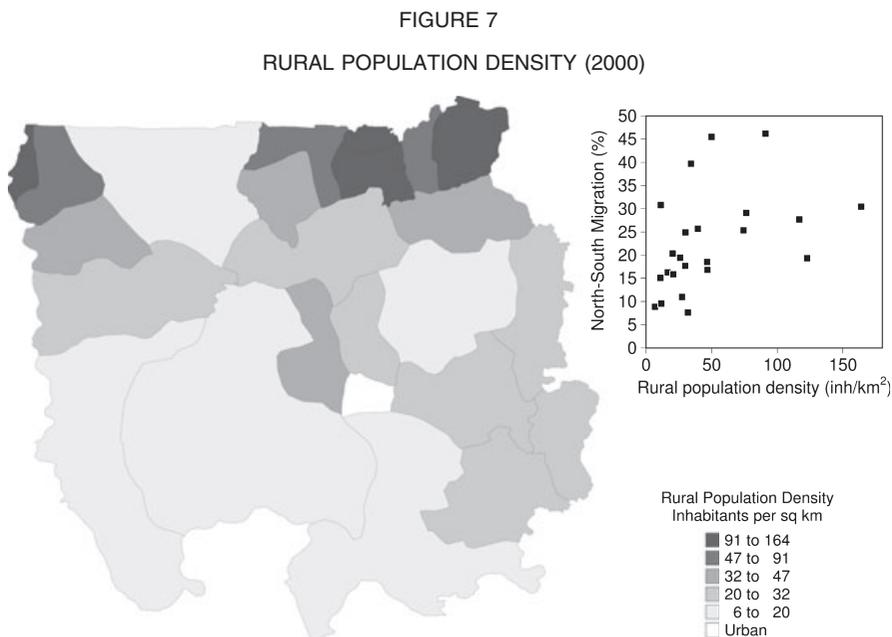


Source: Calculated from Ministry of Food and Agriculture (crop yields and market prices).

index. The correlation is weaker ($R = -0.601$, significance 0.002) than the relation between migration and rainfall but still very significant.

Despite lower rainfall, the southwestern part of northern Ghana is greener than the southeastern part (see figures 4 and 5). This is mainly because of the soil type. The western districts are covered with ground-water laterites and savannah ochrosols that developed over granite and Birimmian subsurface. These soils have a higher water retention capacity than the soils of most southeastern districts that developed on the so-called Voltaian shell (Varley and White, 1958). Large parts of this area are unsuitable for agriculture and even for human habitation because of low water tables.

Erratic rainfall and poor soils would not be prime drivers of migration from northern Ghana if the population did not depend so much on these resources for their livelihoods. The poor agro-ecological conditions in some parts of northern Ghana result in low agricultural output, which is an important reason for farmers in the area to migrate. The map in figure 6 shows the distribution of average annual crop yields for the 24 districts of northern Ghana. The yields are expressed in monetary



Source: Calculated from Ghana Statistical Service (2005).

value per cultivated hectare. The crops that are included in the total yield figure are millet, sorghum, maize, groundnuts, rice, beans, cassava and yam. The scatter plot shows that there is quite a strong negative correlation ($R = -0.529$, significance 0.008) between crop yields and out-migration. Districts with low crop yields tend to have more out-migration than districts with high crop yields.

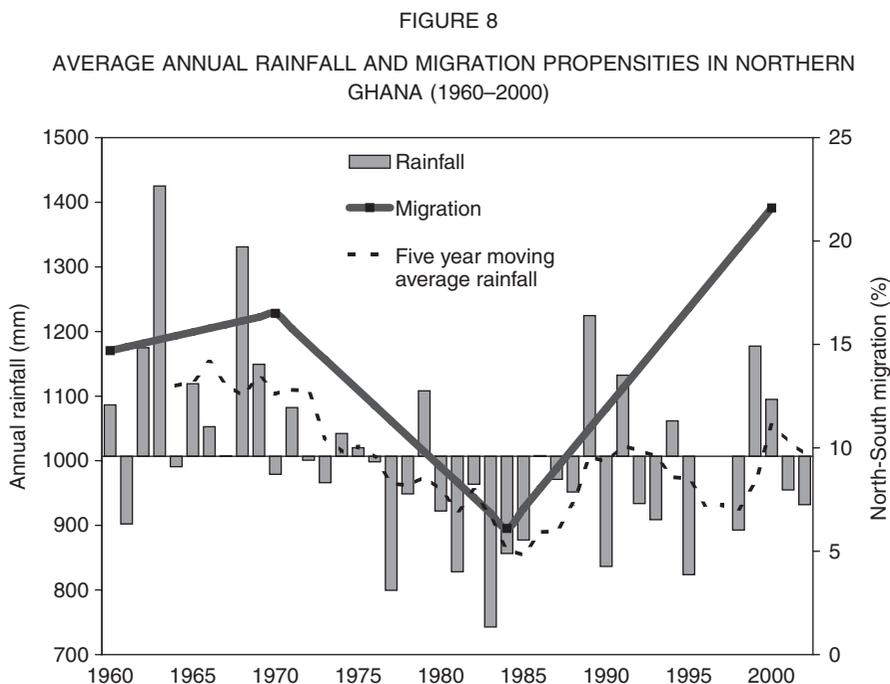
Figure 7 shows the geographical distribution of rural population densities. Rural population density is calculated as the population living in localities with fewer than five thousand inhabitants divided by the district surface area. High rural population density is an indicator of scarcity of land for farming, which was a prime motive for migrating according to the survey respondents (see below). The scatter plot in figure 7 indeed shows that densely populated districts tend to have higher out-migration rates, but the correlation is not very strong (R is 0.424, significance 0.044). The Upper East region, for example, is more densely populated than the Upper West region, while out-migration rates are higher in the Upper West Region than in the Upper East region (see figure 3).

The cross-sectional analysis of migration and environmental scarcity shows that migration propensities indeed tend to be higher in districts that experience more resource scarcity. Migration rates correlate quite strongly with annual rainfall, vegetation cover, crop yields and, to a lesser extent, rural population density. However, none of the environmental scarcity indicators could explain why migration propensities are higher in the Upper West region than in the Upper East region. To explain this phenomenon, some non-environmental factors need to be considered. Migration rates may be higher in the Upper West region due to the greater influence of Christianity, especially in Jirapa and Lawra district. In the Upper West region a lot more people have converted to Christianity than in the Upper East and especially the northern region where Islam is the dominant religion (Ghana Statistical Service, 2005). This may have two relevant consequences for migration propensities. Firstly, southern Ghana is predominantly Christian and this may make it a more attractive destination area for potential migrants with a Christian background. It may be easier for them to integrate into southern Ghanaian society. Secondly, the first schools in the North were founded by Christian missionaries and in the areas where they have been most active, people are still better educated and this has a positive effect on migration propensities. Another historical reason why the Upper West region has such high out-migration rates could be the intensive

labour recruitment among the Dagara people of northwest Ghana in the colonial era (Lentz, 2006). Since the early decades of the twentieth century a culture of migration evolved and the influence may still be felt today. A third explanation could be that the Upper East is more developed in terms of road and dam infrastructure, which facilitates the production of perishable cash crops for urban markets in the South. This may have been an incentive for a good number of farmers in the area to build a more sustainable livelihood at home, rather than through migration.

LONGITUDINAL ANALYSIS

In this section the hypothesis is tested that migration propensities increase in times of greater environmental stress. Figure 8 shows the trends in annual rainfall and migration propensities in northern Ghana.



Based on twenty rainfall gauges in northern Ghana. The data for 1996 and 1997 are missing.

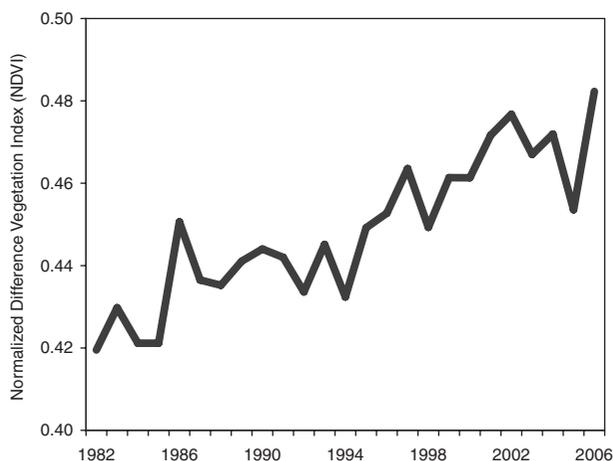
Sources: Ghana Meteorological Services Department and Census Reports, see table 1.

The figure shows that after the relatively wet 1960s, rainfall conditions deteriorated in the late 1970s and early 1980s. This was the time of the great Sahelian droughts that also affected northern Ghana (Dietz et al., 2004). Most people in northern Ghana practice rain-fed agriculture and the drought years of the late 1970s and 1980s have entered collective memory as an extremely harsh time (Van der Geest, 2004). If environmental degradation is a prime driver of migration, one would expect an increase in migration during this period. Surprisingly, this was a period of reduced out-migration from northern Ghana (see also figure one and table one). Apparently, stronger forces were at play.

The 1970s and 1980s were times of widespread economic crisis, political instability and high food prices in Ghana. Southern Ghana, the main destination area of northern migrants, was particularly affected. The adverse conditions in the South made many decide to refrain from migrating. Many migrants also returned to the North. The census data do not disclose when exactly the drastic reduction in out-migration from northern Ghana started. GDP growth figures for Ghana as a whole indicate that the worst economic crisis lasted from the mid-1970s to the early 1980s (Aryeetey and Fosu, 2004). There were two military coups in 1979 and 1981. In the pre-census year (1983) the drought also reached southern Ghana, causing widespread bush fires and destroying large areas planted with cocoa. Moreover, about one million Ghanaians were forcefully expelled from Nigeria in 1983. The shops were almost empty and people had to queue for long hours to buy basic commodities and foodstuffs. In the same year, the Ghanaian government accepted the structural adjustment policies of the IMF and many government workers were laid off causing large-scale unemployment. Southern Ghanaians started competing with northern migrants for the unpopular jobs that were previously occupied by the latter. For many Northerners, a return to their farm-based livelihoods in the North seemed the best option, at least for the time being. In the last inter-censal period (1984–2000), annual rainfall figures in northern Ghana partially recovered, the economy stabilized (Aryeetey and Fasu, 2004), and out-migration from northern Ghana increased sharply.

The late 1980s and 1990s were not only a time of partial recovery of precipitation, but also of a regeneration of vegetation cover (see figure 9). After the droughts of the late 1970s and early 1980s it comes as no surprise that the vegetation shows a positive trend in the late 1980s and 1990s. Unfortunately, no NDVI data exists of the pre-droughts period. The data for northern Ghana shows that the 1990s

FIGURE 9
NDVI TREND IN NORTHERN GHANA (1982–2006)



Source: Calculated from 8*8 km satellite data by NASA's Earth Observatory (Chen et al., 2004).

were a period of regeneration or at least recovery from the droughts of the late 1970s and early 1980s. Despite environmental recovery, out-migration from the area increased sharply.

Turning around the causality, it could also be argued that large-scale out-migration reduces the pressure on natural resources and that together with improved rainfall, this facilitates the regeneration of the land. There is quite a strong and significant positive correlation between NDVI trend and out-migration rate at district level ($R = 0.569$, significance 0.004). In districts that experience more out-migration, the vegetation cover (or the “greenness of the environment”) has increased more than in districts that experienced less out-migration.

Although the NDVI trend provides an indication of environmental change, it does not fully cover the different environmental processes on the ground. It may come as a surprise to some observers that northern Ghana has experienced regeneration rather than degradation in the past two decades. The population of northern Ghana is still growing (2.11 percent between 1984 and 2000) despite large-scale out-migration. Pressure on farmland is still increasing and many farmers complain that the land does not produce as much as it used to do. As we will see below,

scarcity of fertile land is a prime motive for farmers in northern Ghana to migrate to the South.

CASE STUDY: THE DAGARA OF NORTHWEST GHANA

In this part of the paper the focus shifts from the 24 Districts of northern Ghana to a specific North-South migration system. A survey was carried out among 203 Dagara settlers in rural areas of the Brong Ahafo region to establish their reasons for migrating. The Dagara originate from Ghana's Upper West region in northern Ghana. The respondents were household heads of whom the majority were men (93.1%). Most of them were married (79.7%). Their average age was 43 and most of them had migrated more than ten years ago (65.7%). Almost all respondents were farmers (95.6%), but many of them also had some source of non-farm income (47.3%). On average, they had only attended school for 2.4 years.⁷ The settlers were first asked what situation made them to migrate from the Upper West region. In a second question they were asked why they chose to settle in the Brong Ahafo region.

A migration decision usually results from a complex set of overlapping causes at different levels. At micro-level there are individual reasons pertaining to the respondent's specific situation. At a higher geographical level, there are underlying causes of migration that are related to the characteristics of the source area and the destination area of the migrants. In Hugo's (1996: 111) "simple model of environmentally induced migration" the latter are called "predisposing conditions". Hugo also identifies "precipitating events' and 'facilitators and constraints to migration". All these factors could potentially feature in the respondents' answers. Indeed, some respondents chose to mention underlying causes (e.g., "poor conditions for farming"); others mentioned the objective of their migration (e.g., "to make money to build a house"); some referred to individual circumstances (e.g., "my parents couldn't cater for me"); others emphasized factors relating to the process of migrating (e.g., "I worked here as a seasonal labourer and saw that it was a good place to settle"); and facilitators of migration were also mentioned ("relatives settled here before me").

In the sections below, the survey findings are discussed with a focus on some theoretical issues in the environmental refugee debate. This should help to answer the complicated question of whether North-South migration in Ghana is environmentally induced and to what extent migrants are forced to migrate.

Land turned out to be the key factor in causing Dagara migration to the Brong Ahafo region. Many respondents mentioned land scarcity (29) or infertility (35) at home, but even more indicated that they were attracted to the Brong Ahafo region because of the abundance (54) and fertility (79) of land. Seventy per cent of the respondents mentioned one of these four reasons for migrating. More generally, one can say that Dagara migrants settle in the Brong Ahafo region because the conditions for farming are much better than at home. Surprisingly, few Dagara settlers referred to the poor rainfall pattern at home (6) or the more attractive rainfall pattern in the destination area (17). The Upper West has only one rainy season while the main destination areas in the Brong Ahafo regions have two rainy seasons with enough precipitation to sustain two harvests per year. Moreover, farmers in the Upper West region often complain about the increased unreliability of rainfall (Van der Geest, 2004). None of the respondents mentioned this factor, and neither did they mention droughts or floods. Another important observation is that there was no mention of environmental stresses other than those related to soil and rain.

The second most important reason that Dagara settlers mentioned for their migration to the Brong Ahafo region is financial (65). This category included a wide range of answers to the open questions. The answers had in common that migrants were either pushed to migrate because of poverty or that they were attracted by prospects of making money in southern Ghana. Prior to their migration, most of the respondents were farmers depending on the natural resource base for their livelihood. Hence, the causes of their poverty were at least partly environmental. The same applies to the causes of “hunger” and “food scarcity”, which 48 respondents referred to as causes of migration. In a more benign natural environment, food insecurity would not be a major problem. To sum up, the most-mentioned causes of migration are either directly or indirectly environmental. A common migration cause like “lack of employment opportunities” was mentioned by only seven respondents. Other non-environmental reasons were also mentioned by relatively few respondents. However, one has to bear in mind that the respondents were almost exclusively farmers in rural destinations. In a smaller survey among Dagara migrants in an urban destination, non-environmental reasons proved to be more important than environmental ones (Van der Geest, 2009). The validity of the findings presented here is limited to migrant farmers in the Brong Ahafo region, but this type of migrant is indeed very common. The Brong Ahafo region is the home of 50.6 per cent of the Dagara who settled in southern Ghana

and most of them are farmers (Ghana Statistical Service, 2005; Van der Geest, 2009).

Slow and sudden onset

In the discussion about environmental refugees and environmentally induced migration, an important distinction is made between “slow-onset” and “sudden-onset” environmental causes of migration (Gemenne and Dun, 2008). In the case of sudden-onset environmental disruptions, such as floods, the causality of migration is relatively clear. In the case of slow-onset environmental deterioration, such as land degradation, there is usually a set of overlapping causes at play (multi-causality). Political and socioeconomic factors combine with environmental degradation to undermine the resource base of affected people.

The respondents did not mention sudden-onset environmental disruptions at all. It should be noted that sudden-onset stresses tend to be temporary while more gradual deteriorations tend to be more permanent or at least hard to reverse. So it could be that people who migrated in response to sudden environmental stresses in the past returned to their home areas and were therefore not part of the survey sample. In the years prior to the interviews no serious sudden-onset environmental stresses were recorded in the source areas of Dagara migrants. Another indication that migration is not so much a response to sudden environmental stress is that about seventy-five percent of the survey respondents already knew the Brong Ahafo region from previous experiences as seasonal farm labourers before they migrated there more permanently. It seems that, for most Dagara migrants, the decision to move to the Brong Ahafo region is based on good information regarding better agro-ecological conditions and prospects for increased food and livelihood security.

Push and pull, forced and voluntary migration

The findings presented above suggest that environmental factors play a major role in causing migration from the Upper West region to the Brong Ahafo region, and that slow-onset environmental disruption are much more important than sudden-onset disruptions. It is usually assumed that sudden environmental triggers tend to result in forced displacement while those suffering from gradual environmental degradation tend to have more of a choice whether or not to move. This is not

necessarily true, however. A clear example of slow-onset change that can force people to relocate is sea level rise affecting small island states and coastal areas. Usually there is a continuum between forced and voluntary migration with increasing freedom and choice of movement when one moves from forced to voluntary on the continuum (Bates, 2002; Faist, 2000; Hugo, 1996; Renaud et al., 2007).

One way to determine the extent to which migrants from northwest Ghana are forced to relocate due to environmental pressure is to differentiate between environmental push and environmental pull. Environmental push suggests that people are forced out of their home region while environmental pull suggests that people opt to relocate to a region with a more benign environment. Another way to determine the degree of force is to carefully analyse people's motivation to migrate and differentiate levels of urgency. A migrant who indicates that he or she has travelled "to see the world" experienced less force than someone who migrated because he or she could not feed the children due to a prolonged drought and subsequent crop failures.

In the migration reasons mentioned by Dagara settlers, environmental pull factors seem to be stronger than environmental push factors. Land scarcity and soil infertility in the home area are mentioned by a substantial number of Dagara migrants (62), but the abundance and fertility of land in the Brong Ahafo region is mentioned by more than twice as many (132). The same applies to the poor rainfall pattern in the North (6) and the more attractive rainfall pattern in the Brong Ahafo region (17).

An examination of the level of urgency in the migration reasons mentioned by Dagara settlers shows that a substantial group of migrants (48) indicated that they moved because of food insecurity or hunger. This indicates a high level of urgency and force. This is not surprising because many farm households in northwest Ghana experience chronic food insecurity. Their harvest is below subsistence levels and they do not have enough non-farm income to supplement their own food production (Van der Geest, 2004). Since the late 1970s and early 1980s there have not been any widespread famines in northwest Ghana, but each year a substantial part of the population experiences a "food gap" in the months prior to the first harvests. Migration to the Brong Ahafo region is a well-established strategy for the migrants to increase their own food security and indirectly contribute to the diet of their relatives at home (Van der Geest, 2010).

For a large group of migrants, the level of urgency is clearly lower. Their migration is not one of distress but an attempt to accumulate some wealth and to structurally improve their livelihood by making use of better agro-ecological conditions in a region that is already familiar to them because of past experiences as seasonal migrants and because they have other relatives who settled there before them.

A note on international migration

In the past three decades, Ghana has become an important source country for international migrants to Europe and North America. Recent studies on migration from Ghana to non-African destinations show that inter-continental migrants hail almost exclusively from southern Ghana, especially the Ashanti, Eastern and Central regions (Asiedu, 2005; Litchfield and Waddington, 2003; Mazzucato et al., 2008). Entry costs for international migration are high and people from northern Ghana generally do not have the means and the networks to make it to Europe or North America. In my sample of 204 rural households in Ghana's Upper West region, none of the respondents had direct relatives (children, siblings, parents) that had migrated to a non-African destination. In southern Ghana, by contrast, it is very common to have inter-continental migrant relatives (Kabki, 2007; Smith, 2007). The fact that northern Ghanaians hardly migrate internationally is in line with the "migration hump" theory (De Haas, 2005) that the poorest people are not the ones who migrate internationally, and the most deprived regions are not the main source areas of international migrants. If environmental conditions in northern Ghana were to deteriorate in the future, it is very unlikely that the people affected would migrate to non-African destinations, at least not in a "legal" way. Those who suffer most from environmental stress are farmers and other people who depend on the natural resources base for their livelihoods. In northern Ghana, farmers are the most deprived occupational group (Ghana Statistical Service, 2000) and they will not be able to migrate internationally as a response to environmental degradation or climate change.

CONCLUSION

The data presented in this paper suggests that the environment plays an important role in explaining migration from northern Ghana to southern Ghana and that the environmental driver of migration is structural scarcity rather than degradation. Structural agro-ecological differences

between northern Ghana and southern Ghana are an important incentive for people to move. In the centuries preceding colonial rule, these differences did not result in widespread migration to present-day southern Ghana because of a situation of insecurity due to warfare and slave raiding. In the course of the twentieth century, pacification, forced labour, unequal development and increased cash needs were the necessary triggers for the North-South migration system to evolve. Once the migration flow was set in motion, environmental scarcity became an important additional factor in the course of the twentieth century. The cross-sectional analysis showed that migration propensities are significantly higher in environmentally less-endowed districts. Dagara migrants in rural destinations of the Brong Ahafo region attribute their migration decision strongly to soil fertility problems. Adverse climatic conditions in the North featured less strongly in the migration reasons they mentioned. The longitudinal analysis revealed that out-migration from northern Ghana declined in the most pronounced era of environmental stress (the late 1970s and early 1980s). In this period of the region's migration history, political and macro-economic factors played a more decisive role than environmental stress. In the late 1980s and in the 1990s, a time of environmental recovery in northern Ghana, migration increased again.

An important constraint of the analysis presented in this paper is the limited availability of historical data on natural resources. The longitudinal analysis covers four decades in the case of rainfall and two decades in the case of vegetation cover. These variables are important indicators of environmental change, but for a more thorough analysis of the agro-ecological conditions in which farmers in northern Ghana eke out a living, long-term longitudinal data on soil fertility and land degradation would be needed in addition. This paper has shown that North-South migration propensities have steadily increased in the course of the twentieth century; that environmentally poor districts tend to have higher out-migration rates; and that, somewhat surprisingly, North-South migration declined in a period of severe environmental stress. Without a more complete set of agro-ecological data, going back three to four generations, it is not possible to determine whether environmental conditions in northern Ghana have deteriorated in the long run and if so, whether this has accelerated migration to the South.

If environmental conditions in northern Ghana deteriorate in the future, migration to southern Ghana is likely to increase more than it already does, but this also depends on social, economic and political changes, both in the source areas and in the prime destination areas. The picture

that emerges for northern Ghana is not one of distress migration in the face of environmental disaster. Rather, migration is a way of dealing with structural environmental scarcity and limited non-farm opportunities. Human mobility has become an omnipresent characteristic of the livelihoods and culture of northern Ghanaians. Policies to curb migration will be met with suspicion and may have very negative effects in terms of livelihood security and environmental management.

ACKNOWLEDGEMENTS

This paper is the result of a larger research project on migration, environment and development in Ghana, funded by the Dutch Council for Scientific Research (NWO). The paper summarizes the findings from a case study conducted for the Environmental Change and Forced Migration Scenarios (EACH-FOR) research project, co-financed by the European Commission – Sixth Framework Programme (contract No.: 044468). The author would like to thank Ton Dietz, Kees Burger, Alfons Fermin, Olivia Dun, Janos Bogardi, Han Entzinger and Jill Jäger for their comments on earlier drafts of this paper. Richard de Jeu and Anton Vrieling assisted with the remote sensing data. The author also wishes to express his gratitude to Augustine Yelfaanibe, Kogme Augustine, Sylvester Bafere, Martin Ngmenkpeng and Edward Maakpe for assisting in the data gathering.

NOTES

1. See Renaud et al., (2007) for an overview of earlier studies in the field of migration-environment linkages.
2. See Massey et al., (1993) for a good review of migration theories. A shortcoming of this article is that it makes no mention of the environmental causes of migration.
3. In the first half of the twentieth century, mortality rates declined rapidly while fertility remained high throughout the country: around 7 children per woman (Ghana Statistical Service, 2005). In the past two to three decades, Ghana has gone through a “reproductive revolution” (Chucks, 2002). Fertility rates dropped sharply, especially in urban areas. This trend is also discernible in the Upper East and Upper West Region, but in the Northern Region fertility remains high (Ghana Statistical Service, 2004).
4. There is an important drawback to measuring migration flows by looking at people’s birthplace and place of residence at the time of the census. It only reveals migration rates at the time of census. People who migrate and

return within an inter-censal period are not counted as migrants. Moreover, the population is counted only once every ten to fifteen years so the effect of a drought year or other extreme weather event cannot be adequately measured with this type of migration data.

5. Out-migration (%) = $55.530 - (\text{population growth} * 0.07) + (\text{proportion elderly} * 3.397) - (\text{sex ratio} * 0.483)$.
6. Sex ratio refers to the number of males per hundred females.
7. A more detailed description of the research population is provided in Van der Geest (2011).

REFERENCES

- Adepoju, A.
 1995 "Migration in Africa: an overview". in J. Baker and T.A. Aina (Eds), *The migration experience in Africa*, Nordiska Afrikainstitutet, Uppsala: 97–108.
- Aryeetey E., and K. Fosu
 2004 "Economic growth in Ghana: 1960-2000", paper presented at the International Conference on Ghana at the half of the century, Accra, 18-20 July.
- Asiedu, A.
 2005 "Some benefits of migrants' return visits to Ghana", *Population, Space and Place*, 11: 1–11.
- Bates, D.C.
 2002 "Environmental refugees? Classifying human migrations caused by environmental change", *Population and Environment*, 23(5): 465–77.
- Black, R.
 2001 "Environmental refugees: Myth or reality? " *New Issues in Refugee Research, Working Paper No.34*, UNHCR, Vienna.
- Broekhuis, A., M. de Bruijn, and A. de Jong
 2004 "Urban-rural linkages and climatic variability", in A.J. Dietz, R. Ruben and A. Verhagen (Eds), *The Impact of Climate Change on Drylands: With a Focus on West Africa*, Kluwer, Dordrecht: 301–321.
- Castles, S.
 2002 "Environmental change and forced migration: making sense of the debate", *New Issues in Refugee Research, Working Paper No. 70*, Vienna: UNHCR.
- Census Office, Gold Coast
 1932 *Appendices Containing Comparative Returns and General Statistics of the 1931 Census*, Census Office, Accra.
- Census Office, Gold Coast
 1950 *The Gold Coast: Census of Population 1948: Report and Tables*, The Crown Agents for the Colonies, London.

- Census Office, Ghana
 1962 *1960 Population Census of Ghana. Advance Report, Volumes III and IV*, Census Office, Accra.
- Chen, J., P. Jönsson, M. Tamura, Z. Gu, B. Matsushita, and L. Eklundh
 2004 "A simple method for reconstructing a high-quality NDVI time-series data set based on the Savitzky-Golay filter", *Remote Sensing of Environment*, 91(3-4), 332–344.
- Chucks, J.
 2002 "Ghana's reproductive revolution: analysis of the determinants of fertility transition", *African Population Studies*, 17(1): 47–67.
- Cleveland, D.A.
 1991 "Migration in West Africa: a savanna village perspective", *Africa*, 61(2): 222–46.
- Davies, S.
 1996 *Adaptable Livelihoods: Coping with Food Insecurity in the Malian Sahel*, MacMillan Press, London.
- De Bruijn, M., and H. van Dijk
 2004 "The importance of socio-cultural differences and pathway analysis for understanding local actors' responses", in A.J. Dietz, R. Ruben, and A. Verhagen (Eds), *The Impact of Climate Change on Drylands: With a Focus on West Africa*, Kluwer, Dordrecht: 341–362.
- De Haas, H.
 2005 "International migration, remittances and development: myths and fact", *Global Migration Perspectives No.30*, Global Commission on International Migration, Geneva.
- Dietz, T., R. Ruben, and A. Verhagen
 2004 *The Impact of Climate Change on Drylands With a Focus on West Africa*, Kluwer, Dordrecht.
- Engman, E.V.T.
 1983 *Population of Ghana, 1850-1960*, Census Office, Accra.
- Faist, T.
 2000 *The Volume and Dynamics of International Migration and Transnational Social Spaces*, Oxford University Press, Oxford.
- Fawcett, J.T.
 1989 "Networks, linkages, and migration systems", *International Migration Review*, 23(3): 671–80.
- Gemenne, F., and O. Dun
 2008 "Defining environmental migration: why it is difficult, why it is controversial, why it matters and some practical processes which may help move forward", *Forced Migration Review*, 31.
- Ghana Statistical Service
 1995 *Migration Research Study. Vol 1: Internal Migration*, Ghana Statistical Service, Accra.
 2000 *Poverty Trends in Ghana in the 1990s*, Ghana Statistical Service, Accra.

- 2002 *2000 Population and Housing Census: Summary Report of Final Results*, Ghana Statistical Service, Accra.
- 2004 *Demographic and Health Survey 2003*, Ghana Statistical Service, Accra
- 2005 *Population Data Analysis Reports. Vol 1: Socioeconomic and Demographic Trends Analysis*, Ghana Statistical Service, Accra.
- Hugo, G.
1996 "Environmental concerns and international migration", *International Migration Review*, 30(1): 105–31.
- International Panel on Climate Change
2007 *Climate Change 2007: The Physical Science Basis*, IPCC, Geneva.
- Kabki, M.
2007 *Transnationalism, Local Development and Social Security: The Functioning of Support Networks in Rural Ghana*, African Studies Centre, Leiden.
- Lentz, C.
2006 *Ethnicity and the Making of History in Northern Ghana*, Edinburgh University Press, Edinburgh.
- Litchfield, J., and H. Waddington
2003 "Migration and poverty in Ghana: evidence from the Ghana living standard survey", paper presented at the International Workshop on Migration and Poverty in West Africa, University of Sussex, Brighton, 13-14 March.
- Massey, D.S., J. Arango, G. Hugo, A. Kouaouci, A. Pellegrino, and J.E. Taylor
1993 "Theories of international migration: a review and appraisal", *Population and Development Review*, 19(3): 431–66.
- Mazzucato, V., Bart Van Den Boom, and N.N.N. Nsowah-Nuamah
2008 "Remittances in Ghana: origin, destination and issues of measurement", *International Migration*, 46(1): 103–122.
- Mortimore, M.
1989 *Adapting to Drought: Farmers, Famines and Desertification in West Africa*, University Press, Cambridge.
- Plange, N.K.
1979 "Underdevelopment in northern Ghana: natural causes or colonial capitalism?" *Review of African Political Economy*, 6(15): 4–14.
- Portes, A.
1978 "Migration and underdevelopment", *Politics and Society*, 8(1): 1–48.
- Renaud, F., J.J. Bogardi, O. Dun, and K. Warmer
2007 "Control, adapt or flee: how to face environmental migration", *Intersections Paper No. 5*, UNU Institute for Environment and Human Security, Bonn.
- Smith, L.
2007 *Tied to Migrants: Transnational Influences on the Economy of Accra, Ghana*, African Studies Centre, Leiden.

- Stark, O.
2003 "Tales of migration without wage differentials: individual, family, and community context", *ZEF-Discussion Papers on Development Policy*, No. 73, Center for Development Research, Bonn.
- Sutton, I.
1989 "Colonial agricultural policy: the non-development of the northern territories of the Gold Coast", *The International Journal of African Historical Studies*, 22(4): 637–69.
- Van der Geest, K.
2004 "*We are Managing!*" *Climate Change and Livelihood Vulnerability in Northwest Ghana*, Afrika-Studie Centrum, Leiden.
2009 "Migration and natural resources scarcity in Ghana", Case study report for the Environmental Change and Forced Migration Scenarios project (EACH-FOR), <http://www.each-for.eu>.
2010 "Local perceptions of migration from northwest Ghana", *Africa*, 80(4).
2011 *The Dagara farmer at home and away: Migration, environment and development in Ghana*, PhD thesis, University of Amsterdam. African Studies Collection, No. 32., African Studies Centre, Leiden.
- Van Dijk, H., D. Foeken, and K. van Til
2001 "Population mobility in Africa: an overview", in M. de Bruijn, R. van Dijk, and D. Foeken (Eds), *Mobile Africa: Changing Patterns of Mobility in Africa and Beyond*, Brill, Leiden: 9–26.
- Varley, W.J., and H.P. White
1958 *The Geography of Ghana*, Longman, London.