

*Full Length Research Paper*

# Assessing the driving forces of environmental degradation in Northern Ghana: Community truthing approach

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**This article employs community truthing approach to interpret local peoples understanding and knowledge concerning the driving forces of environmental degradation in Northern Ghana. Through a wide range of participatory rural appraisal techniques, such as key informant interviews, focus group discussion and participants' observation, selected people from the study community were given the chance to critically review, identify issues and add meanings in terms of the nature and causes of environmental degradation in their area of abode. Results revealed that the current state of the natural environment in the study area is as a result of complex interactions among several direct and indirect forces, the most important of which are small-scale legal and illegal mining and indiscriminate grazing which are driven indirectly by socio-economic and cultural forces such as poverty, high population growth, migration and loose tenure system.**

**Key words:** Community truthing, environmental degradation, driving forces, Northern Ghana.

## INTRODUCTION

Community truthing was first proposed by Agyemang et al. (2007) to mean the empowerment and involvement of local people to review and comment on issues of importance to them. As a synonym to ground truthing, community truthing is the validation of secondary data sources by local people in terms of its accuracy and meanings to any observed environmental changes. The term originated from the GIS and Society concept to mean the recognition of the fundamental importance of involving local people in environmental policy formulation. Community truthing, in the context of this study, is an attempt to make use of local ecological knowledge, to assess and evaluate the driving forces of environmental degradation in the study area. It is based on an interpretative philosophy of examination of the meaning and symbol content of primary data (Seidel and Kelle, 1995). The approach makes use of reality probability statements instead of real accurate description statements by participants, meaning that the views, opinions and comments of participants are taken seriously, despite sometimes being triangulated with theories, secondary

evidence and statistical data sources. The tool is based on the 'hermeneutic approach' which is conceived as the philosophy of understanding and interpretation of qualitative data, devoid of detailed statistical analysis and margins of error and based purely on participants' perceptions, views and opinions of issues of interest (Glaser and Strauss, 1967; Gadamer, 1989).

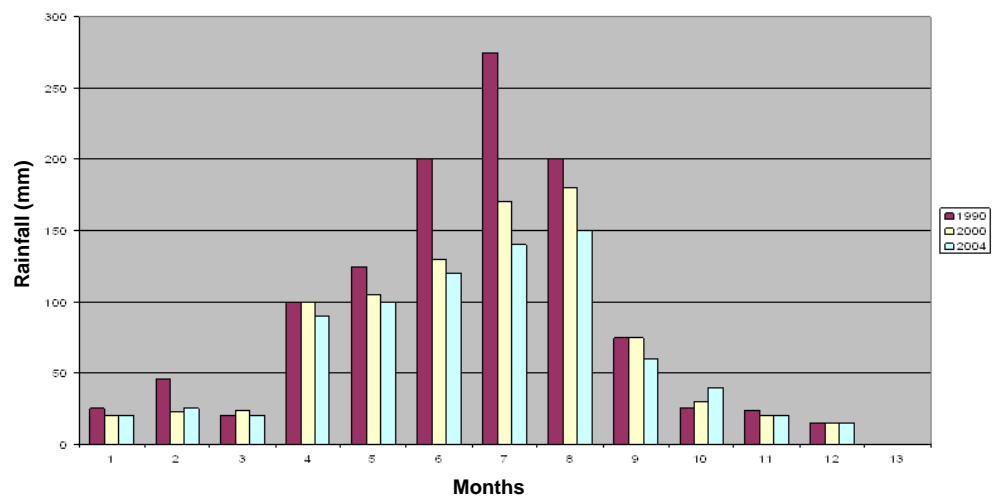
### The study area

The area of this study consists of the Bolgatanga and Talensi-Nabdam districts of the Upper East Region of northern Ghana are described as one of the most deprived and degraded areas of Ghana. They are located on the North-Eastern corridor of the country between longitude 1°W and 0°E and 10°N and 11°N and cover an area of 1,509 km<sup>2</sup> or 16.7% of the 8,842 km<sup>2</sup> of the Upper East Region.

The study's area population has risen from 183,800 in 1990 to 229,768 in 2000 with 20,416 houses and average household size of 5.8 compared to the 1990 of 5,432 houses with average household size of 3.7. According to the Bolgatanga District Assembly Report (2002), the area received its highest proportion of Ghanaian

**Table 1.** Community truthing to driving forces of environmental degradation.

Participants	Climate	Macroeconomic polices	Population and migration	Urbanization	Poverty	Tenure system	Community level institutions (cultures and beliefs)
Environmental protection agency	√	√	√	√		√	√
Mineral commission	√	√	√	Not sure	√	√	√
Lands commission	√	√	√	Not sure	Not sure	√	√
Regional house of chiefs	√	Not sure	√	Not sure	√	√	√
Talensi-Nabdam district assembly	√	√	√	Not sure	√	√	√
Bolgatanga municipal assembly	√	√	√	Not sure	√	√	√
Regional surveying department	√	√	√	Not sure	√	√	√
Regional coordinating council	√	√	√	Not sure	√	√	√
Concerned youth group	√	√	√	Not sure	√	√	√
Women association	√	√	√	Not sure	√	√	√
Farmers association	√	Not sure	√	Not sure	√	√	√
Heterogeneous community focus group	√	Not sure	√	Not sure	√	√	√
Heterogeneous organization focus group	√	Not sure	√	Not sure	√	√	√
Representatives from Pwalugu and Tongo	√	√	√	Not sure	√	√	√
Small-scale Illegal miners	√	Not sure	Not sure	Not sure	√	Not sure	Not sure
Small-scale Legal Miners	√	Not sure	Not sure	Not sure	√	Not sure	Not sure



**Figure 1.** Monthly rainfall distribution in the study area for 1990, 2000 and 2004. Source: Meteorological Service, Bolgatanga, Ghana (2003).

migrants during late 1990s; most of them were between 20 to 55 years and mostly from the south.

The area is predominantly rural (with about 85% of the indigenous population concentrated in the rural areas in 2000 compared to 97% in the early 1990s) with less economic and infrastructural development. Most of the rural communities are found in the Talensi-Nabdam district which, over the years, has received less infrastructural and developmental projects and attracted very few migrant populations. In essence, the rate of urbanization in the Bolgatanga districts far exceeds that of the Talensi-Nabdam district (Bolgatanga District Assembly Report, 2002).

Land ownership, rights and tenures were originally administered under the traditional customary law under the care of the spiritual head of a clan or community. The system was later replaced with a plural legal environment with customary laws and norms operating alongside statutory government land-use policy. Land disagreements have prevailed in many communities in the study area due to lack of comprehensive data on land ownership and well defined boundaries but the situation has changed recently as a result of state government land demarcation scheme under the Survey Department of the Ministry of Lands and Natural resources (Kasanga, 1997).

The level of poverty has not changed much during the last decade as poverty is still endemic in communities in northern Ghana (Boateng et al., 1992). The FAO/IFAD (1989) described the area as one of the most drought prone, resources poor and poverty stricken areas of the country. The Population and Housing Census for 2000 (Ghana Statistical Service, 2000) gave an estimation that 9 out of 10 inhabitants are poor in the Upper East Region (location of study area) compared to 7 out of 10 in the northern Region and 8 out of 10 in the Upper West Region.

### Community truthing data sourcing

With the population estimate of over 230,000 (Ghana Statistical Service, 2000) it becomes virtually impossible in social science research of this type to involve the entire population for interviewing and discussion. As such, it became sensible to sample a number of individuals and groups of people such that their views, opinions and perceptions would represent the larger population group from which they were selected. To achieve this, purposive sampling technique (Cameron, 2000) was used based on participants' local ecological knowledge and knowledge on the causes and effects of environmental degradation in northern Ghana.

Eight key informants were selected to include representatives from the following organization and agencies: Regional coordinating council (RCC), Bolgatanga, Environmental Protection Agency, Mining and Mineral Commission, Bolgatanga, Lands Commission, Upper East Regional House of Chiefs, Talensi-Nabdam District Assembly, Bolgatanga Municipal Assembly and Surveying Department in Bolgatanga.

Eight focus groups were purposefully selected as follows: Concern Youth Group (Bolgatanga), Women's Association (Bolgatanga), Farmers Association (Bolgatanga, Talensi-Nabdam Communities), representatives from Pwalugu and Tongo communities, heterogeneous community focus group, heterogeneous organizations focus group, small-scale legal underground miners at Duusi in the Talensi Nabdam District and small-scale illegal surface miners at Nangodi near Tilli of the Bawku West District.

To gain in-depth understanding of the social and institutional realities in the field and to validate some of the issues raised during the focus group discussions and the key informants interviews, it was deemed necessary to directly experience the practical situation and dynamics in the field. The practical involvement in some of the daily activities in the area especially the operations of small-scale

mining helped to verify, indirectly, some of the issues raised during the key informants interviews and focus group discussions.

## RESULTS AND DISCUSSION

Interviews and discussion were done to identify the driving forces of the observed environmental degradation in the study area. Participants' views and perceptions were triangulated with existing literature and secondary data. Responses to the driving forces of the observed environmental changes were noted, not in order of importance, to include the direct causes such as small-scale illegal mining, small-scale legal mining, grazing, bush burning, quarrying and sand winning and the and indirect causes such as climatic factors, macroeconomic policies, demographic factors, urbanization, poverty, changing tenure system and community level institutions. Table 1 is a summarized presentation of the responses to driving forces perceived to have contributed to the changes on the environment in the study area.

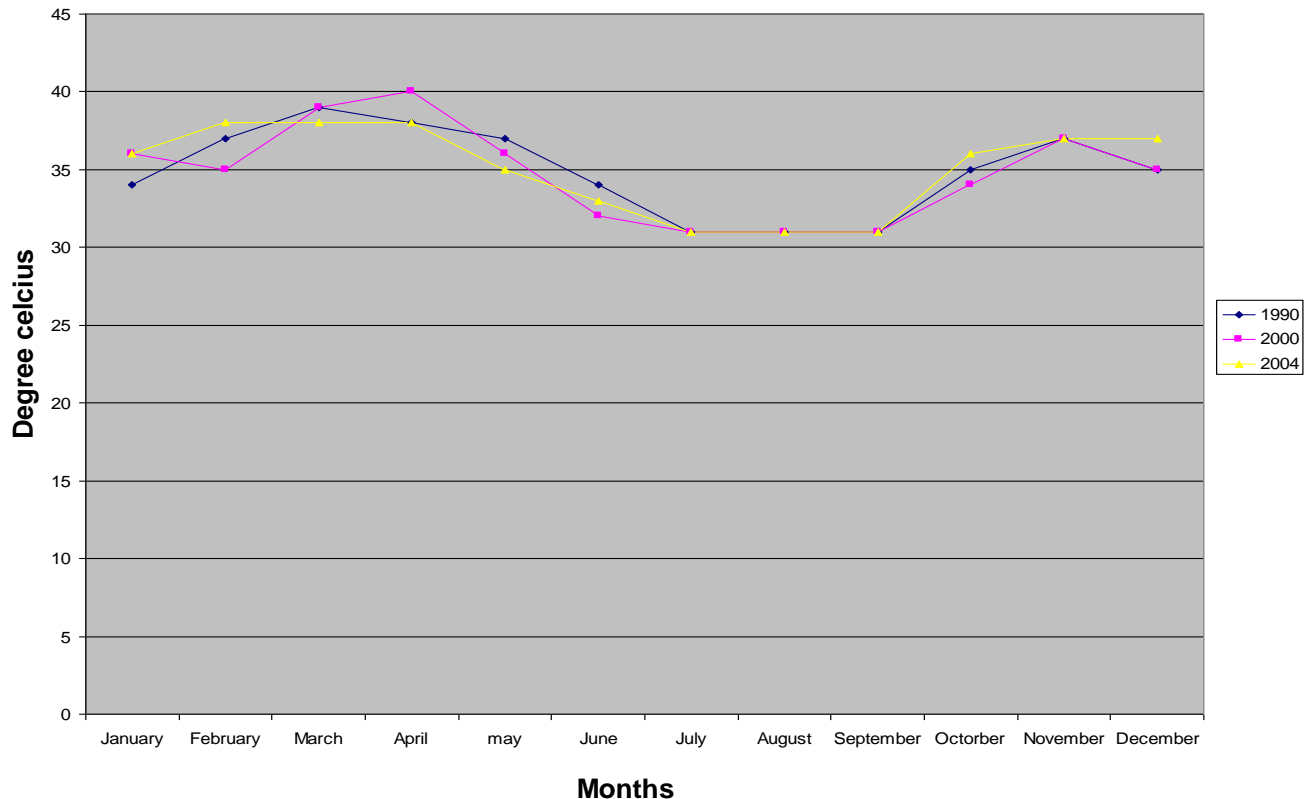
### Climatic variability

Even though detailed analysis of climatic variability and their impacts on the environment falls beyond the scope of this article, participants expressed concern on the prevailing changing climatic variability in the study and how it has negatively affected the natural environment in recent years. Climatic variables noted by participants included rainfall, temperature and relative humidity. They were of the view that the prevailing climatic conditions in the study area, such erratic rainfall, high temperatures, low relative humidity and frequent flooding in the rainy season, might have played a major role in the degradation of savannah vegetative cover which, according to them, do normally succumb to extreme high climatic conditions.

To substantiate their claims, meteorological data were collected from the Bolgatanga Meteorological Station to truth participants' observations. The aim was not to disregard issues raised by participants but to observe how such issues correspond to existing data. Figure 1 is graphical presentations of rainfall distribution (mm), in the study area, for the periods of 1990, 2000 and 2004.

It shows a uni-modal rainfall pattern with maximum rainfall occurring in the months of May to August and long dry season from September to April. Observation of the rainfall pattern seems to suggest that, even though the study area had experienced a decline in rainfall distribution over the years, it is not enough to conclude that the phenomenal degradation of the natural environment can be attributed solely to that phenomenon without other possible driving forces. However, one cannot rule out the possibility that climatic variability can influence vegetative cover of an area.

Figure 2 is a graphical presentation of temperature



**Figure 2.** Mean monthly temperature in the study area in 1990, 2000 and 2004. Source: Meteorological Service, Bolgatanga, Ghana (2003).

figures for 1990, 2000 and 2004. Temperatures regimes have been very high, with very little variations, throughout the observed periods (mean minimum of 32°C and mean maximum of 40°C). Contrary to the inference made by Jakubaukan (1999) and Sternberg et al. (2000) that temperature variation is a determinant factor of vegetative cover changes in most savannah environments that cannot be said of the study area where the observed variations are insignificant.

Relative humidity is the measure of the moisture content in the atmosphere and is directly related to temperature and rainfall. As a measure in percentages, low relative humidity is an indication of low atmospheric moisture content and high relative humidity is an expression of high moisture content in the atmosphere. Figure 3 is a graphical representation of monthly relative humidity in 1990, 2000 and 2004.

Relative humidity had been constantly low during the months of January, February, March, November and December. Like the observed variations of rainfall and temperature, variations in the relative humidity figures is insignificant for the three periods to have contributed to the phenomenal environmental degradation in the study area. These findings seem to refute what could have been anticipated by Tucker et al. (1991) and Hulme (2001) that climatic variables are major determinant of

most land-cover changes in savannah environments. Other forces might have played significantly to the observed environmental changes in the study area.

### Macroeconomic policies

The key informants interviewed argued that, despite achievements in boosting up the Ghanaian economy and alleviating poverty, the country's economic transformations in the mid-1980s had a disastrous impact on the natural environment, especially in northern Ghana. The promulgation of the Minerals and Mining Law, 1986 (PNDCL 153) was given as an example of these measures. As noted by a participant, prior to the Minerals and Mining Law, local people had been involved in illegal small-scale mining since the 1930s, restricted to a secluded area in the Nangodi environs, with insignificant environmental impacts. However, the national legalization relating to the small-scale mining industry, attracted many migrants into the area in search of gold and other precious minerals, increasing the environmental impacts of the activity. Most of the participants agreed that the Mining and Mineral Commission of the Ministry of Mines and Forestry did not address their concern and plight, but rather worsened the already fragile environment.

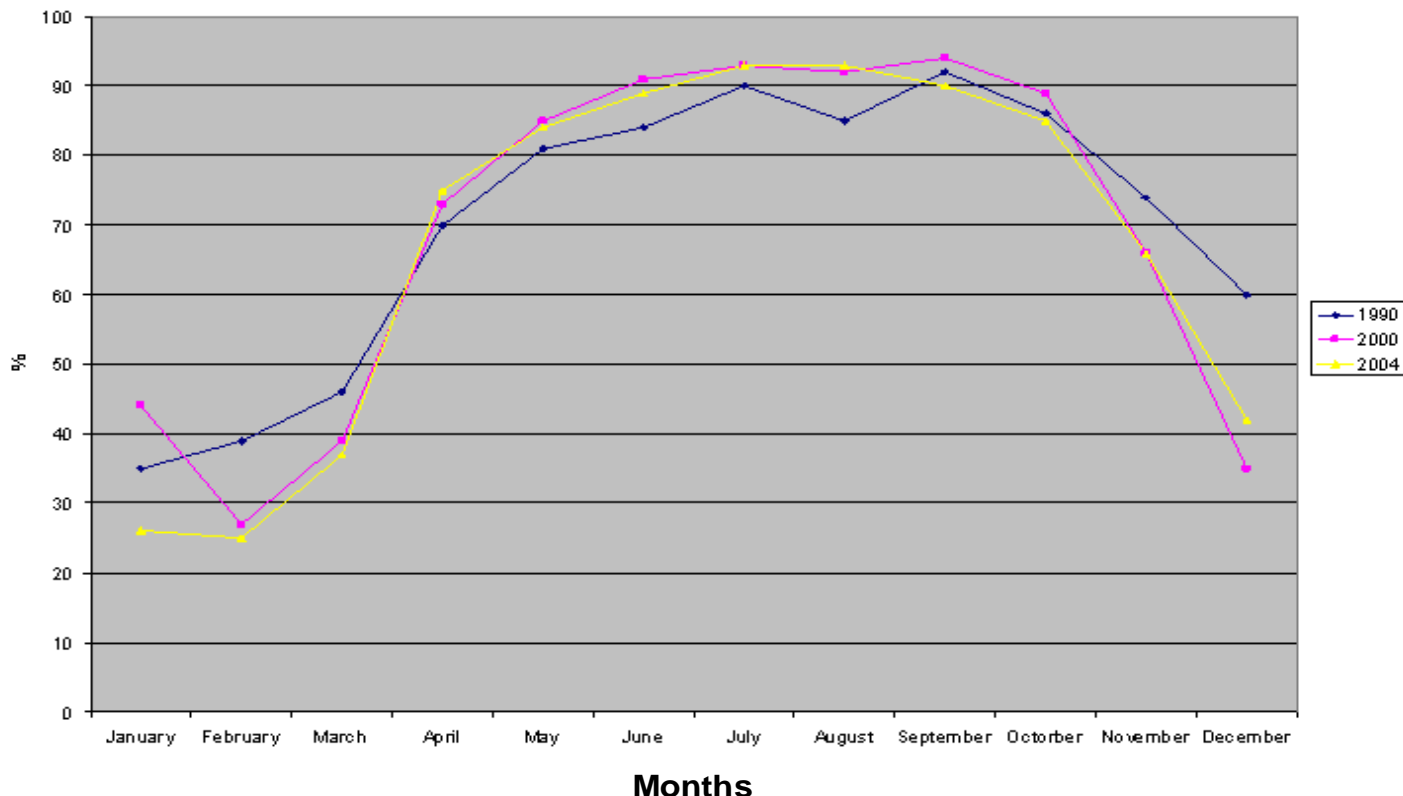


Figure 3. Monthly relative humidity in the study area in 1990, 2000 and 2004, Source: Meteorological Service, Bolgatanga, Ghana (2003).

Table 2. Population growth and density in the study area.

Year	Population growth	Area (km <sup>2</sup> )	Population density/km <sup>2</sup>
1960	34,275	1509	26.1
1970	95,010	1509	72.4
1984	146,658	1509	111.7
1990	183,800	1509	140.1
2000	229,768	1509	174.0
2010*	303,332	1509	231.0

\*Projected population growth and population density for 2010. Source: Population and Housing Census for 2000 of the Ghana Statistical Services (2000).

In contrast, most of the focus groups participants attributed environmental degradation to internal politics and indifferent attitudes of the District Assemblies, the Regional Coordinating Council and the Government Environmental Agencies which were disputed by the officials from the Mining and Minerals Commission and the District Assemblies.

**Population growth and migration**

Participants perceived the increasing population numbers and density in the study area (Table 2) as a driving force

to environmental degradation in Northern Ghana. However, they differ in their views concerning the underlying causes of population growth in the study area. Most of the key informants attributed population hikes to both birth rates and the influx of migrants. In contrast most of the focus group participants attributed population growth only to the influx of migrants, especially from the southern According to the latter, their communities have been flooded by outsiders who, because of free movement, internal politics and weak tenure systems, have recently come from other areas in the north, from the south and other neighboring countries to engage in various illegal activities that disregard the fragility of the

ecosystem. Most of the key informants interviewed, accepted the problem of the migrant populace but they were convinced that high birth rates (natural increment) are largely responsible for increases in population growth in the study area.

One interviewer was of the opinion that the current strong traditional cultural beliefs in most of the rural communities in the study area encourage child birth as children are seen as wealth to the parents, especially to the father as one of the achievements in life is partially measured by the number of wives and children one possesses. In most communities studied, personal observations revealed that it is a taboo to be barren and couples without children are not given any respect and are sometimes treated as outcasts. It was revealed, through the heterogeneous communities' focus group discussions, that the continual increase in population growth in the study area, especially in the Nabte and Talensi communities, is as a result of the practice of early marriage as most parents usually offer their daughters for early marriages.

The focus groups, except for the miners, cited several instances where people who have migrated from the south mining communities, especially from Tarkwa, Prestea, Nsuta and Obuasi, first settled in the regional capital of Bolgatanga and later on moved to the peri-urban, rural communities in search of gold and other precious minerals. Few key informants interviewed raised the issue of permanent return migrants as one of the major contributing factors of population growth and thus environmental degradation in the study area. They commented that after living and working for several years in most mining communities in the south, some miners have returned home with their families and have engaged in small-scale mining to make a living. Others cited temporary returnee farmers who usually migrate to the south (Techiman, Kintampo, Wenchi and Atebubu) during the dry season and return to the north during the rainy season for farming and other extractive activities.

The population and Housing Census for 2000 (GSS, 2000) of the Upper East Region estimated the increasing trend of population growth in the study area to be 183,800 in 1990 to 229,768 in 2000 with a projected figure of 303,332 in 2010 (Table 2). This trend of population growth, as perceived by most of the research participants has led to increased pressure on land resources for farming, mining and settlement that have all contributed, in one way or the other, to the observed land-cover changes. Population density, calculated as the number of people per square kilometer, was 26.1 in 1960, 140.1 in 1990, and 174.0 in 2000 and estimated to 231.0 in 2010.

Some focus group participants brought up the issue concerning recent migration of Fulani herdsmen who, they commented, usually move to the area in search for greener pastures for their herds. They observed that the current population size and environmental degradation

can partly be attributed to the Fulani herdsmen. Basset (1993) observed that the Fulani herdsmen from Burkina Faso and Mali are usually attracted to the study area due to accessibility of market centers and veterinary care that are difficult to come by in their places of origin.

Other participants, mostly focus groups, commented on the migration of small-scale miners who, when faced with the downsizing and closure of their previous mining stations in the south, migrate northward, sometimes with their families, and engage in similar mining operations they are used to in the study area. Other participants cited temporary migrant traders for various petty trading activities (buying and selling).

One of the key informants interviewed gave a contrasting view concerning the south-north migration. According to him, the government's economic policy agenda cannot be realized if people are not encouraged to migrate to the north to help in the building-up of the socio-economic and developmental processes envisaged in the economic recovery program. Notwithstanding his view, other participants who responded to the migration-environmental degradation nexus felt that, despite the economic advantage of migrant workers, the uncontrolled movements in recent years has contributed to the environmental pressures and have brought about intense degradation of the environment. This is in line with previous studies that have examined the migration-environment nexus and concluded that changes in the environment have mainly occurred due to population increases at destination areas (Amacher et al., 1998; IUCN, 2000).

In response to the nature of migration, most participants noted that migrant mining workers are permanently staying in some of the study communities without any thought of returning to their place of origin. In addition, they cited some small-scale miners who have originated from the south mostly from the Ashanti and the Western region, and have permanently acquired land, through unscrupulous means, for mining activities. Most of the miners interviewed explained that they moved because of depressed social conditions at their place of origin. According to them, moving away from home would somehow earn them respect and social recognition especially when they later return home with capital. Others had migrated in response to recent economic opportunities in the north. Key informants disclosed that the influx of mining workers is partly due to the promulgation and legalization of the small-scale mining industry that has attracted most migrants to the study area. Most women working in the surface and underground mining sites are wives and concubines of small-scale miners who have migrated to join their partners. Others are merely pay day mining workers and are local women. None of the participants interviewed pointed out the issue of community neglect in their places of origin as a motivation of movement to the north.

Participants also made comments on the direction of

movements and commuting. Some migrants initially move directly to the mining areas while others initially get settled at Bolgatanga and later move to other areas in search of menial jobs. Movements have also been observed from other parts of the Upper East regions, such as Bawku West, East Mamprusi, West Mamprusi, Bongo and Kasena Nankana to the study area for trading purposes. Others migrate from neighboring Upper West and Northern Regions but according to participants, such movements are temporary as migrants usually return to their places of origin. It was also observed that some migrants from the south initially settled at Tamale in the northern Region and later migrated to the Upper East Region in search of menial jobs. The same is true of the Fulani herdsmen who migrate seasonally from their places of origin to northern Ghana for pasture. Participants, mostly focus groups, also discussed the issue of internal migration or commuting especially from the densely populated Bolgatanga community to peripheries of the study area. As most of them observed, such movements are temporary and for petty trading, firewood collection, hunting and farming. The same is not true of the migrant mining workers who, after settling in the Bolgatanga community, later move permanently to the mining communities. This was validated during interactions with the miners' focus groups. It is not the usual case of the migrant small-scale mining workers, who have migrated from the Bolgatanga community and have permanently settled in the mining sites. Reactions from most of the participants revealed that these internal migrants and their activities, apart from the small-scale miners, have minor effects on the natural and social environment as their numbers are few and most of them are farmers.

### Poverty

All those involved in farming activities, cattle rearing and other small-scale economic ventures are perceived, by most of the key informants, as poor people in the study area. This, according to key informants, has resulted in the degradation of the environment. However, they suspect that migrant Fulani herdsmen and small-scale miners do not come to the area because they are poor but with the intention to "make more money". According to them greed, carelessness and lack of environmental awareness, rather than poverty, drives such migrants to engage in various activities, disregarding the natural environment they are dependent on. Most of the focus group participants, especially the local ones, asserted that poverty drives local people, especially youth and women, to take up employment on a "pay day basis" to earn some income for living. Most participants agreed that cases of early marriage and pregnancy, school drop-out, theft and other anti-social behaviors are the results of poverty in the area.

Few key informants related the poverty-environment nexus to economic disparity between northern and southern Ghana. They attributed the prevailing poverty in the north as result of the unequal sharing of the country's resources to the disadvantaged of the north that has brought about continual exploitation of the natural environment. These sentiments were in line with similar observations made by Songsore (1989) and Boateng et al. (1992) that the underdevelopment of the north is not only due to the physical environment or lack of resources but to the inequitable distribution of the national wealth that has created untold poverty among the people and has allowed them to cultivate or work on marginal lands for survival.

Even though participants held the general view that poverty is the prime factor of environmental degradation, discussions with the miners' focus groups brought in other views. Many of them held the notion that they are not poor but rather, as young men who want to lead more decent lives, have decided to go in for lucrative business, thus, contrasting with the earlier hypothesis that the small-scale mining is the hope for the poor, unemployed and poorly educated people of society (Heemskerk, 2001). It was observed during the interactions with the miners' focus groups that most of them are bread winners and had no alternative but to work hard to feed their dependants.

However, mounting evidence suggests that poverty has been one of the driving forces that have led many young people into small-scale mining. Notwithstanding the negative implications of human activities on the environment the impression created by many in the area is that the exploitation of the environment through small-scale mining and other extractive activities is the surest way of reducing poverty and improving standards of living. Another perception gathered during interactions with research participants was that poverty has been the most direct force of environmental degradation in the study area.

### Land tenure

Most participants observed the complexity of land ownership in most of the study communities, even for family members. According to them there exist various land acquisition systems that are contrary to the normal community ownership where land is acquired by virtue of one being a member of a landowning community. As one participant commented, there exist many unscrupulous land acquisitions by individuals who have direct links with the spiritual leaders. Such observations were seen as untrue during interactions with the community leaders in one of the focus group discussions. As noted, there are laid down procedures for the acquisition of land titles with no changes during the last decade. As one elder commented "we cannot change what our ancestors have

laid down for our welfare, it is abomination to do that”.

Some Key informants noted that despite the social value of land in the society, its acquisition and use has contributed to environmental degradation and subsequently created many intra-and inter-community conflicts. They cited instances of misunderstandings between traditional leaders and state agencies, especially when land is acquired for economic and infrastructural developments. Most traditional leaders interviewed, were of the opinion that, more often than not, government interferes in their tenure issues without passing through the customary procedures. This, according to the key informant from the Land Commission, is as a result of false interpretation by the current land-use policy where traditional authorities are entitled to 78% of the total land area under their jurisdiction with the remaining 22% in the hands of the state government for infrastructural activities.

It was observed that the recent tension between the Government and customary landowners was about the legitimate right to transfer land ownership to small-scale mining operators under the Mining and Mineral law (PNDCL, 153) which implies that the occupier of any land has the authority to exploit such land for mining purposes and can use his or her discretion as to how best to conserve its natural resources. This is where many conflicts exist as community members feel that their land tenure security is threatened by the Government through the miners' presence.

Most focus group participants, with the exception of the miners, complained about the enforced and poorly compensated acquisition of land by the state government for economic and infrastructural purposes that usually lead to environmental degradation. They blamed the government agencies' inability to control the influx of illegal miners and their mining operations that have contributed to the observed environmental degradation. According to them, the gold extracted by the illegal miners is sold to the precious mineral commission under the Mining and Mineral law (PNDCL, 153) without royalties paid to the communities where such gold were extracted.

Most of the illegal small-scale miners interviewed indicated that regardless of community members perceptions they are not outsiders and that as Ghanaians they have the right to indulge in any economic activity of their choice anywhere in their country. They reiterated that the community leaders and the district assemblies are all aware of their presence in the community and the activities they are embarking on. The sentiments of the miners were acknowledged by the other focus group participants but, there again, criticized the mining and mineral policy that failed to outline conditions for mining to prevent or reduce environmental degradation. Most of the focus participants were suspicious of the miners as they found it difficult to read their intentions in the various communities.

Other tenure concerns raised by the participants from the farmers association, the concern youth group, representatives from Pwalugu, from the women's association and the small-scale miners was the threat to the people, the property and the environment by the Fulani herdsmen who periodically migrate to the area. According to them, the Fulani herdsmen had been degrading the environment, burning down residences, thatch houses and farms and destroying water bodies and other state property. They complained about their possession of fire arms and their stealing of property and local cows. They attributed the free entrance of the Fulani herdsmen to the communities to the failure of authorities to tighten up security on the borders to check inflow of the herdsmen and to enforce regulations on the movement of such herdsmen into Ghana or to institute an appropriate form of taxation as many of the herdsmen are usually free from taxation in their home. Community leaders were also blamed for harboring and encouraging the entry of the herdsmen.

On the issue of sand and stone winning in areas such as Nangodi, Tongo and Kongo, participants of the women's focus group were of the opinion that the activity is mostly carried on by peasant women in the society, mostly widows, who, through tradition, have no title to the land. They noted that the marginalization of women in the society in terms of resource allocation should be looked at if the degradation of the environment is to be prevented or reduced.

### **Community level institutions**

The assertions made by Appiah-Opoku, (1997) and Rival, (2001) that environmental problems are usually shaped by community level institutions through different belief systems, religious, political ideologies and cultural knowledge seem not to be different from what is pertaining in the study area as observed by most research participants as they are continually and dynamically updated. Impression has been created that the recent attitudinal and behavioral changes in local tradition and culture in the study area have contributed to environmental degradation.

Most participants commented that the cultural dimension of the study area has been altered in recent years due to the influence of lifestyles of outsiders which have, indirectly, affected the intrinsic values and respect of the natural environment by the local people. Some focus group participants, that is, the women, traditional leaders, heterogeneous community focus group and the concern youth group, noted the observed environmental degradation is indirectly a linked to changing morals and values associated with changing lifestyle of the local people, especially the youth.

As observed by focus group participants, land resources are valuable assets believed to be tied to the



dead, the living and the unborn in permanent relationships. The obligation of the living is therefore, to honor the ancestral property through preservation and proper maintenance. Discussions with one of the focus groups revealed that in the past some communities have punished offenders caught either cutting or planting of trees as such activities were reserved for nature as the sole propagator of trees. Tree planting, in such communities, mostly in the Talensi-Nabdam district, was regarded as an abomination and the offenders were believed to die immediately when the planted tree started to bear fruits. Such practices, according to participants, were aimed to preserve and conserve the savannah forest.

It was also observed during interviews and focus group interactions that in other communities, of the Talensi-Nabdam district, individuals, were in the past, forbidden to visit certain savannah forest reserves set apart for the traditional gods. According to Benneh et al. (1990) and re-emphasized by the community leaders, such practices lead to the conservation and preservation of the savannah forest which has recently changed due to the influx of people of different ethnic backgrounds. These were not accepted by the small-scale miners' focus groups as they view them as things of the past and mere superstitions.

Most of the participants agreed that the recent proliferation of various human activities in the study area, notably indiscriminate grazing, uncontrolled bush burning, indiscriminate firewood cutting, intensive small-scale mining, quarrying, sand and stone winning and environmental unfriendly farming practices are all signs of diminishing community level institutions and lack of environmental awareness, values and ethics.

### **Urbanization and infrastructural development**

In contrast to the more popular assertion that urban growth is directly linked to environmental degradation (Nsiah-Gyabaah, 2004), most participants during interviews and focus group discussions downplayed the possible consequences of urbanization and current developmental structures on the environment. Their reactions seem to suggest that the recent rate of urbanization and infrastructure development in the area, even though they have contributed immensely to the depletion of most of the savannah trees and grasses over the period of study, had brought about an improved standard of living, especially in areas such as Bolgatanga, Tongo, Pwalugu and Winkogo. Their comments follow an earlier assertion made by Bryan (1995) and Martin (1998) that the benefits from expansion of cities and urbanization usually outweigh the negative impacts on the environment. One key informant commented: "one cannot eat his cake and keep it at the same time". Nevertheless, very few key informants and focus group participants regretted that some

developmental projects such as construction of roads, rehabilitation and expansion of market facility, settlements expansion etc. were executed without prior thought of their serious impacts on the environment.

Discussions with some officials in the Environmental Protection Agency revealed that most of the developmental projects were carried out without the approval of the Agency who usually authorizes permits for such projects. Two main factors accounted for participants' perception of urbanization and the observed environmental degradation in the study area. The first is that; most participants anticipated that their comments on the possible/negative effects of infrastructural projects would lead to redirection of government plans for such developmental activities and are therefore not prepared to voice any comment to undermine Government efforts in bringing "sanity" to the study area. Secondly most of them found it hard to relate the positive and negative aspects of those development projects in terms of increasing standards of living and environmental impacts. The general conclusion is that whilst participants knew of the negative consequences of such activities on the environment they felt they were an inevitable consequence.

### **Conclusion**

In this article, emphasis is placed on the use of community truthing to evaluate the driving forces of the observed changes on the environment. Using the approach, driving forces behind the observed environmental degradation in the study area, were observed to include factors such as microclimate, macroeconomic transformation, population growth, migration, poverty, land tenure system and traditional and cultural factors. Most of these driving forces, deduced from research participants' observations, have acted in a complex interplay to contribute to the observed changes on the environment even though poverty, population growth, climatic variability and macro-economic policies seem to have contributed immensely to the observed environmental deterioration in the study area. The findings of the study will help policy makers to come to the realization that a healthier environment cannot be achieved without adequate involvement of local people who are agents and sufferers of environmental problems.

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