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University of the Witwatersrand

DESERTIFICATION AND RURAL LIVELIHOODS

THE CASE OF GURSULU VILLAGE, YOBE STATE, NIGERIA

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A research report submitted to the Faculty of Humanities, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Masters of Arts, Johannesburg, 2011

DECLARATION

I declare that this is my own, unaided work. It is being submitted for the Degree of Masters of Arts in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other university.

Terfa Percy Gbahabo

Name

Signature

15 day of September 2011

ABSTRACT

Rural households in the semi-arid region of northern Nigeria have to contend with the problems of low rainfall and desertification in their agricultural practices. They have also to contend with the loss (or non-availability) of natural resources, with inadequate capital and with large household sizes. The research uses the case study of Gursulu village, Yobe State, and was undertaken through review of documentary analysis, of personal observations and of interviews with peasants in Gursulu village, Yobe State as well as with government officials as they design, formulate and implement policies on desertification and livelihoods.

The aim of the Research Report was to understand the livelihood strategies of peasant households in desertified northern Nigeria. The literature review on desertification seems to consider desertification as the severest problem that northern Nigeria faces. However, field work data in Gursulu village reveal that peasant households are more concerned with the problem of low and erratic rainfall.

Furthermore, the research findings show that rural households have evolved livelihoods strategies in the face of their precarious environment. They do not rely solely on farming for their livelihoods, because farming alone is increasingly becoming incapable of providing adequate livelihoods for households in the Sahel. Hence, they are engaged in an array of livelihood activities to enable them realize their livelihoods. They grow different crops and livestock, and engage in off-farm and on farm livelihoods engagements. More so, they innovate in their farming, with methods such as integrating crop and livestock, and draw upon rich local or indigenous knowledge, such as soil management techniques that tackle the problem of soil decline as a result of land degradation. Lastly they rely on migrant remittances, and favour rearing small ruminants because of their advantages over large ruminants.

The people of Gursulu do receive some government assistance, but it is arguably inadequate, Field data show that the state creates livelihoods enabling policies and intervention programmes such as the followings: provision of farm inputs and implements, linking rural communities with financial service providers, establishment of the Youth in Farming programme, and the provision of extension services for peasants' farmers. Yet peasants do not have adequate access to extension services, finances, subsidies and equipment. The report concludes with some suggestions for improvements in state policy.

DEDICATION

This thesis is dedicated to Family and Love, to Friendship and Laughter, and to Generosity and Service, the true purpose of education.

It is also dedicated to my late parents, Mr. Simon Shikaan Gbahabo and Mrs. Georgina Gbahabo, seen no more but always remembered

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In the course of my MA, I was assigned two supervisors. I am heartily thankful to the ever-patient and supportive Rev. Paul Germond, who was more than a supervisor, for guiding me through my confusion, and for his wise advice. Thanks also to Prof. Lucien Van Der Walt, who guided me to the end. Thanks also to the staff and students of the Sociology Department of the University of the Witwatersrand, Johannesburg. As a stranger to Yobe State, Hassan, my field guide, made my life easier and ensured that I did not miss my way around Yobe State.

Serequeberhan (1994:9), the Eritrean African Philosopher, was right, "nothing could be done without friends and loyal companions, and such men were not easy to find ready at hand". And it is to these people from whom, in the course of my studies, alone with dry and boring literature, I found humour and sanity. Thank you to Tony Essen, Kojo Antobam, Joestanis Okoye, Eliagwu Ameh, Jake Dan Azumi, Gilbert Munyemana, Gideon Fareo, Kela Iiyambo, Prisca Ndlovu, and Leon Okonye, Frank Obazu, Chris Idibie, for their love for laughter.

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Terfa Percy Gbahabo, 2011

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CHAPTER ONE

INTRODUCTION

1.1. INTRODUCTION

Northern Nigeria is prone to desertification and land degradation because of its ecological location. These environmental problems affect 10 of the 11 northern states and are is seen by the Government as the most serious environmental problem northern Nigeria faces. According to current estimate by the Federal Ministry of Environment (2001: 10; hereafter referred to as FMEnv), Nigeria loses "about 350,000 square meters of its land mass to desert condition which is advancing southwards at an estimated rate of 0.6 kilometres a year". This environmental problem has severe economic repercussions on the entire nation as it impacts on the socio-economic life of rural households (reduction in crop and animal production, death of livestock, high prices for food stuffs) and leads to widespread poverty. Desertification mostly affects rural households who are forced to depend on natural resources for their livelihoods. More so, drought and desertification lead to the migration of people to urban or other areas to engage in economic activities such as farming, grazing and fishing. Other impacts of desertification are that it could lead to economic and social strife. It leads to the destruction and loss of biodiversity and impact on water resources.

The topic of this Research Report is "Desertification and Rural Livelihoods". Specifically, it examines how rural households that are dependent on rain-fed agriculture negotiate their livelihoods in the face of desertification and land degradation. The study sought to know if there were enabling policies that could assist rural farmers in desertification-prone northern Nigeria to enhance their livelihoods. Gursulu village in Yunusari Local Government Area of Yobe State, Nigeria, was used as a case study for this research.

The research employed the Sustainable Livelihoods Approach (SLA) as its conceptual framework for understanding the livelihoods strategies of rural households in Gursulu village in the face of desertification and land degradation. SLA emerged as an alternative to mainstream development practice after decades of limited progress in eradicating global poverty, and the declining support for theories linked with integrated rural development. SLA was helpful in both bringing together existing concepts and developing newer insights into the nature of poverty. It also served to provide an efficient strategy for dealing with poverty-related issues, with a view to achieving the Millennium Development Goal of halving poverty by 2015.

The concept, desertification[1], is controversial. There are disagreements among desertification scholars about the nature, causes, extent, assessment methodology for desertification and the best way to tackle the phenomenon. This research examined some of the aforementioned disagreements through a review of literature on the subject. For instance, it evaluated the following topical questions in desertification studies: Should desertification be conceived solely as land degradation? Does the desert advance linearly or does it occur in patches? Are dryland ecosystems fragile or resilient? Is land degradation reversible or not? The glaring disagreements on issues of desertification have grave consequences for state and national policies aimed at combating desertification.

CLARIFYING SOME TERMS ASSOCIATED WITH THE STUDY

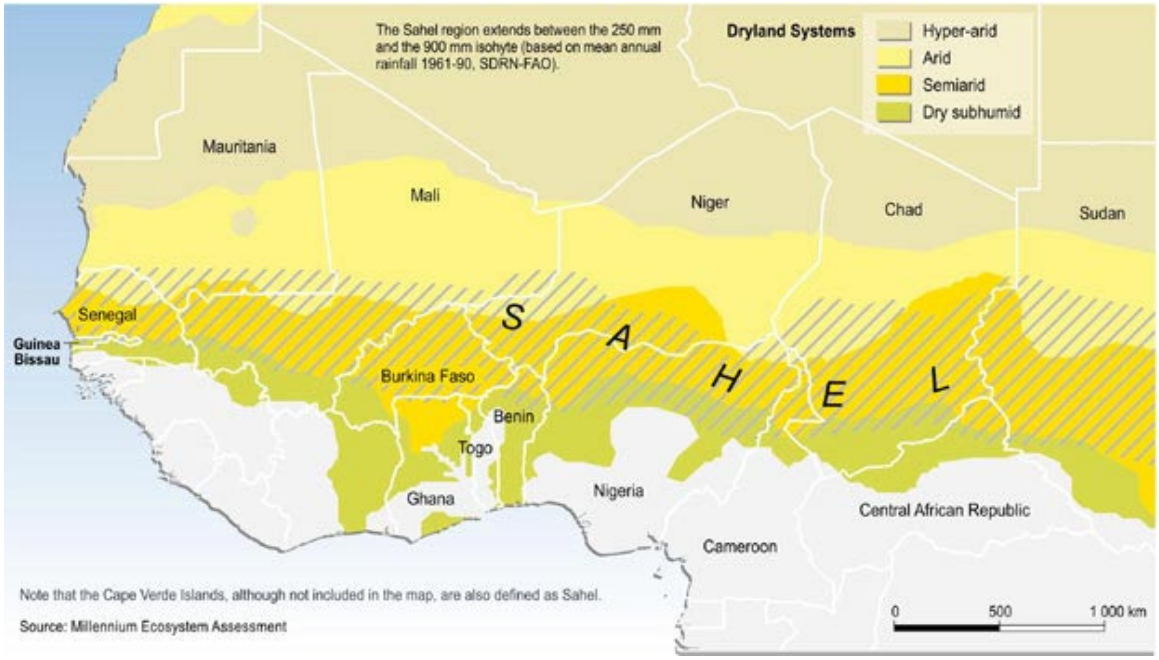
This section clarifies some terms that are used in the study. These are the terms "peasant," "peasantry," "farming households," "peasant economy," "Sahelian," "Hausaland," and northern Nigeria. The term Sahel[2] is used to refer to the semi-arid region bordering the Sahara desert to the south and includes parts of Chad, Nigeria, Niger, Burkina Faso, Mali, Senegal, Mauritania and the Gambia (some authors include Sudan, Somalia, Ethiopia and Eritrea in the Sahel). The term Hausaland[3] is used to refer to the area that is inhabited by the Hausa people, and it is a largely homogenous area (Apeldoorn, 1981:90).

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[1] This research report adopts the United Nation Conference on Environment and Development (UNCED) (1992) definition of desertification: desertification is 'land degradation in arid, semi-arid and dry-sub-humid areas resulting from various factors, including climatic variations and human activities'.

[2] The terms Sahel, Hausaland and northern Nigeria have been used, at different times, as though they can be used interchangeably, yet the three terms do not mean one and the same thing. The Sahel is an Arabic word for "shore". According to Butterbury and Warren (2001), while the eco-climatic limits of the Sahel and the Sudano-Sahelian region can best be defined by the spatial distributions of plant species and communities, which are relatively stable over years, it can also be defined with reference to biomass or pure rainfall, but these measures are not reliable because biomass and rainfall may fluctuate seasonally. Hence, it is difficult to demarcate, exactly, the boundary defining the southernmost limits of the Sahel, and the Sudano-Sahel that lies to its southern boundary. In terms of the climate, the boundary between the Sahel and Sudano-Sahel eco-climatic zones lies between 500mm and 700mm of rainfall per year. The Sahel receives about three months of rainfall (Butterbury and Warren (2001). Furthermore, the ecosystems of the Sahel is different from that of the humid and sub-humid regions of Africa in both rainfall, temperature and the adaptive challenges which they pose for the human communities (Mortimore and Adams, 1999). The term "Sahelian" is used to refer to dwellers of the Sahel region.

[3] Hausas are a Sahelian people mainly situated in the West Africa regions of northern Nigeria and southeastern Niger, and some significant numbers of Hausas can be found in the regions of Sudan, Cameroun, Ghana, Cote d'Ivoire and Chad, and in small scattered communities all over West Africa. They can also be found in areas around the Sahara desert and in the Sahel in small numbers. The point of this commentary is that Hausaland does not encompass the whole of the Sahel and that other peoples and cultures are located within the Sahel; Hausa people are one among the many people one finds in the Sahel. Thus, in terms of culture, there may be a difference in cultural practices which can have an effect on livelihoods and adaptive responses. Yet, the paper can be generalized to the whole of Hausaland, which includes northern Nigeria but is not limited to it.



Map 1: Sahel in North Africa. (Source: *Desertification in Africa*)

PEASANT AND PEASANTRY (*Talakawa*)

In this Research Report, whereas the term "peasant" is used in reference to small-scale holders who rely mostly on family labour to produce for their households' needs, the term "peasantry" (in Hausa, "*talakawa"*) is a class situated between capitalist and non-capitalist economic production, and social and political relations. The major features of peasants are "the use of simple technology and family labour; some degree of household control of land; a satisfier rather than a maximizer attitude towards production, but implying some participation in markets; and obligation in form of rent, interest or tax to power holders outside the household" (Hesselberg, 1985: 49).

Hesselberg further differentiates the peasant category from "traditional" agriculturalists and "modern" agricultural producers, necessary because these groups share some of the key features of peasants. For Hesselberg (1985: 49), peasants are different from traditional agriculturalists because they take part, occasionally, in a market economy. In other words, they buy and sell inputs of agriculture. On the other hand, the difference between modern agricultural producers and the peasants lie in the proportion of subsistence to commodity production. Thus, according to Hesselberg (1985: 50) "a peasant is a cultivator or herdsman who sells less than 50% of his production… if, on the other hand, 50% or more is sold, the production is commercial and the cultivator is called farmer and the herdsman rancher" (Hesselberg, 1985, 50).

"FARMING HOUSEHOLDS"

Farming households are difficult to define because of the prevalence of extended and, often polygamous, family systems. Another reason farming households are difficult to define is because of the "seasonal mobility of labour responding to off-farm employment opportunities" (Moock, 1986: 3). Households manage resources to produce food, feed, fibre, shelter and other vital products. The main aim of agricultural activity is to produce for subsistence, and more so today, for cash. In Africa, according to Okigbo (1986: x), a farm may either be owned or managed by a single or farming family. If the farm is owned by a family, more than one family member is usually involved in farm work. Also, since the farm activities engaged by members of the farm community may be part-time activities, their farming activities may be supplemented with a variety of other activities such as cotton weaving, drumming, marketing of farm products or consumer goods (Okigbo 1986: x), weaving, and local farm tool production.

PEASANT ECONOMY

African peasants operate within a type of economy that is different from either capitalism or socialism, according to Hyden (1986: 23). The "peasant economy" refers to modes of rural economic activities with certain defined features. The basic unit of production in peasant society is the household. Therefore, the demographic composition of the households is of vital importance in determining the volume of output, the percentage of output consumed by the household, and thus, the remaining volume for investment or savings. Also, most of the household income is derived from agricultural production upon which the household is dependent. Furthermore, there is a tendency for mutual support among the group defined by blood, kin community or other affinities like religion (Hyden, 1986: 23).

1.2. SELECTION OF GURSULU VILLAGE

Gursulu was selected as case study for this research because it is located in one of the most affected Local Government Areas by desertification in Yobe State. The research question, which is "How do households in Gursulu village, Yobe State, cope with desertification and land degradation?," is relevant given that Gursulu village is located in the northernmost part of Nigeria and at the Maine Soroa border of Niger republic. As one goes northward, there is a decline in rainfall availability. Given the researcher's observation of drought and

desertification in Gursulu village, the research question took on life and became more than an academic exercise.

1.3. RESEARCH QUESTION AND OBJECTIVE

The Research Report develops a research question to enable it achieve its aims. The main research question of this project is:

- How do households in Gursulu village, Yobe State, Nigeria, cope with desertification and land degradation?

The research poses some subsidiary questions to help in addressing the main research question. These are:

- What is the nature of desertification in northern Nigeria?
- What are State and National Government policies in Nigeria on desertification?
- What is desertification and what are its causes?
- What are the coping patterns of rural villages in northern Nigeria since the return of democracy in Nigeria in 1999?

The principal objective of the Research Report is to answer the research question.

1.4. THE RATIONALE OF THE STUDY

The scope of the debates in desertification literatures is widely documented (Batterbury and Warren, 2001; Thomas and Middleton, 1994). In fact, some scholars have questioned whether the phenomenon exists at all (Thomas and Middleton, 1994). The causes and impacts of desertification and land degradation in Nigeria have also been noted (NAP, 2000; Medugu, Majid and Choji, 2008; Mortimore, 1989). In the aftermath of the droughts of the 1970s and 1980s, popular beliefs presented the Sahel as a disaster zone, where people suffered from the impact of land degradation and desertification. Some scholars also contended that humans' misuse, overuse and abuse of the environment led to a Malthusian crisis, in which development interventions themselves failed to yield results. Against these portrayals of the Sahel and Sahelians, Mortimore (1989) in *Adapting to Drought* described the adaptive behaviour among the Hausa, Ful'be and Manga communities in response to the drought of the 1970s and 1980s. In *Working the Sahel*, Mortimore and Adams (1999) further pursued this theme, arguing that the crisis of degradation in the Sahel could be contained and that, in fact, it was *already* being contained in some communities. For Mortimore and Adams, the

critical attributes of Sahelian rural households include: diversity, flexibility and adaptability. More so, Watts (1983a; 1983b; 1984) has documented the adaptive capability of pre-capitalist societies, arguing that famine and hazards took on a different significance in the British colonial and African post-colonial eras. Through the policies of taxation, monetization and cash crop production, Sahelian rural farmers were not only thrown off-guard but were also thrown "permanently up to the neck in water, [in such a position that] even a ripple is sufficient to drown [them]" (cited in Scott, 1976:1)[4].

Despite the large number of studies that have been carried out on desertification and livelihoods, this research have found no study conducted in Gursulu village or indeed the Yunusari Local Government Area as a whole. Also, the researcher is not aware of any study on desertification, which has attempted a historical analysis of rural households' adaptive strategy that covers the pre-colonial, British colonial and African post-colonial eras up to the contemporary period. Pertinently, the researcher applied literature on famine and hazards resulting from droughts to this study, because of the unavailability of data on the adaptive strategies of rural households in pre-colonial era.

Secondly, this study is of relevance because, according to official sources (NAP 2000), about 35% of Nigeria's landmass is considered arable, with 15% being utilized for pastures, 10% for forest reserve, and 10% for settlement. The same report also reveals that 30% of the country's landmass is regarded uncultivable. Notably, reports from the Federal Ministry of Environment show that Nigeria is annually losing about 350,000 square meters to desertification, which is regarded as the gravest environmental problem affecting 10 of the 11 northern states (NAP, 2000: v). Yet, rural households, especially inhabitants of drylands like those of Gursulu village, depend on arable land for their livelihoods.

With the impact of drought and desertification, there could be social change in the livelihood pattern of inhabitants of arid, semi-arid and sub-humid regions. Yet, desertification and land degradation are viewed by some solely as an environmental crisis, without much consideration to the social dimension of the problem. Thomas and Middleton (1994: 11) put the matter well:

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[4] The quotation was Tawney's and it was in reference to China in 1931, but this condition very well fits with the Sahelian dry zones of northern Nigeria (see Scott, 1976:1).

> ...The lack of a real social component in many considerations of desertification may be important, perhaps even in explaining why the problem may have been accelerating in the post-UNCOD period. There are also major potential conflicts between the environmental and social components of and solutions to desertification. At one extreme this boils down to the survival of the physical environment, the ecological viewpoint, and the survival of individual people, the social component.

Desertification can lead to widespread poverty, and mostly affects rural households who are forced to depend on natural resources for their livelihoods. Therefore, the study is relevant in seeking to understand how rural households dependent on rain-fed agriculture develop livelihood strategies to cope with land degradation. It also seeks to understand whether there are enabling policies to enhance the livelihoods of peasants in marginal environments since the return of democracy in Nigeria in 1999. This Research Report argues that understanding the livelihood strategies of rural households in the face of constraints will enable government to initiate policies that are geared towards removing constraints and expanding the opportunities of the rural poor (Ellis, 1998).

1.5. METHODOLOGY

The researcher developed and employed an outline of open-ended questions to generate data on the impact of desertification, demographic data, socio-economic data, and livelihoods constraints and livelihoods strategies of rural households in Gursulu village. The aim was to investigate the livelihoods and adaptive strategies of rural households in the face of desertification and land degradation.

This study involved open-ended interviews with heads of households because they are better placed, in Gursulu, to provide information on desertification, its impacts on livelihoods and the livelihoods and adaptive strategies that have been evolved to cope with the problem posed by the phenomenon in question. This is because they are involved in the day-to-day decision-making about livelihood options in their households. In-depth interviews were also used to generate data. In-depth interviews are suitable for this study because they are vital in understanding and gaining detailed knowledge (Weiss, 1995: 3).

Government officials were also interviewed to understand the measures that are being taken by the government to tackle the problem of desertification and land degradation vis-à-vis the livelihoods of households in rural areas of northern Nigeria. These interviews were aimed at

investigating the thinking that shapes desertification and drought policies in the country, especially as these relate to rural livelihoods and peasant households in northern Nigeria. Observations made over a period of about four weeks served to complement the aforesaid interviews Government policy documents and reports on desertification and livelihoods were also analyzed to help in the understanding of the nature and effects of government policy.

Finally, the research employed documentary data and secondary literature such as journals, books, government reports, unpublished reports and the internet. The use of documentary data and secondary literature served to situate the research within existing literature and further help to verify or falsify research findings.

STUDY DESIGN

Using a case study of households in Gursulu village, Yobe State, the research seeks to understand, not to generalize, the livelihood strategies of rural communities. It also seeks to ascertain whether or not these livelihood strategies have changed or have been enhanced since the return of democracy in Nigeria in 1999. In-depth interviews were conducted with eleven heads of households (of farmers and pastoralists) in Gursulu village.

Some decision-makers in Gursulu village and Kanamma such as the chief (*mai gari*) of Gursulu village, and some Yunusari Local Government Area officials, were interviewed. Interviews were conducted with the following government officials: Director of Drought and Desertification Control of the Yobe State Ministry of Environment and the Director and Deputy Director of Community Development of the Yobe State Ministry of Integrated Rural Development. At the Federal level, interviews were conducted with officials of the Ministry of Agriculture and Water Resources and officials of the Drought and Desertification Department of the Federal Ministry of Environment. All these interviews were designed to provide information on Federal and State policies on desertification and the livelihood strategies in Gursulu village.

The interview questions covered areas such as the constraints that challenged the capacity of rural households to realize or enhance their livelihoods; the community's norms of social solidarity and support network of households; the coping strategies of rural households in Gursulu village; and the enabling state and national government policies on desertification.

The interviews began with the preliminary exercises such as self-introduction, and the unveiling of the purpose of the interview in the hearing of the respondents. The interviews investigated how rural households in Gursulu village coped with desertification and land degradation. The terms and conditions of the interviews were made clear to the respondents. The respondents all understood that they could decide the venue for the interviews. Also, they knew that they could withdraw from the interview exercise any time they wanted. There were variations in the length of the interview sessions: some lasted for 45 minutes and others lasted for one hour, depending on the responses of the informants and the flow of the interviews.

Almost all the respondents accepted participating in the study on the condition that they would not sign the consent form presented to them. This was because they did not want to commit themselves to any agreement on paper that could implicate them.

The questions proceeded from the broad (general) to the specific (particular). This was suitable to establish at the onset the depth of the data needed from the informants. Hence, the biographical and demographical data were placed at the end of the schedule, since these require specific responses. The questions were framed to fit the broad framework of livelihood strategies: intensification, diversification and migration. Other aspects of the sustainable rural livelihoods framework were also investigated. These comprised household composition and the resources endowment of rural households such as the natural, social, technical and economic resources.

SAMPLING

Purposive sampling was employed to generate the village and households interviewed. Purposive sampling was suitable because the research targeted rural households in Gursulu village that were confronted with making livelihood decisions in the face of desertification. Respondents were selected based on their ability to provide relevant information to the study. The impact of desertification in Gursulu village was obvious. There were sand dunes almost everywhere in and around Yunusari Local Government Area. Moreover, Yunusari Local Government Area was—and is still—considered to be one of the territories most impacted upon by desertification in Yobe State.

RATIONALE FOR CHOICE OF METHOD AND DATA ANALYSIS

Qualitative approach is suitable because this research topic required an in-depth understanding of the particular experience of the phenomenon (Strauss and Corbin, 1990). More specifically, it sought to understand the phenomenon of desertification and how rural households negotiate their livelihoods in the face of desertification-related constraints.

Data in qualitative content analysis is seen as emergent. In this research, whereas some initial understanding of the relevant literature was seen as important, great care was taken to ensure that the literature did not constrain the process of coding and recording. Hence, literature was accessed as it became relevant. This research employed the nominal measurement to code and analyze qualitative data. Analysis consisted in developing codes, labels and categories to find patterns in the responses of informants. Similar patterns of responses were grouped under the same themes. This is to determine the patterns in the livelihood strategies or other responses. This is in line with the philosophical assumption underpinning this research, which is constructivism (that is, that reality is constructed by people, or that by reflecting on human experiences, we construct our own understanding of the world).

The general aim of the first interview was to find out how rural households in Gursulu village pursued their livelihoods in the face of the constraints identified in this study: desertification and land degradation; rainfall (decline, variability and scarcity); and large household size, inadequate access to natural resources, and inadequate financial capital. Therefore, the participants' initial responses were important for the categories that were suggested by their responses. Subsequent interviews were then coded with the first interview, and the emerging patterns, in mind. In the same vein, this research made an extensive use of policy documents as part of its data.

Government Policy: This study analyzed some key policy documents on desertification in Nigeria. These documents include: The National Action Programme to Combat Desertification and Mitigate the Effect of Drought (2000), the National Drought and Desertification Policy (2007) and the National Drought Preparedness Plan (2007). The research also analysed the 1999 and the 2005 policy documents on Combating Desertification and Mitigating the Effects of Drought in Nigeria, which are national reports on the implementation of the United Nations Convention to Combat Desertification. The Federal Ministry of Environment prepared these documents. All three documents were collected at

the Department of Drought and Desertification Amelioration, Federal Ministry of Environment, Abuja. Also analyzed were: the National Agricultural Policy, the National Energy Policy, the National Policy on Environment, the National Forestry Policy and Action Plan, the National Environmental Action and the Yobe State Environmental Action Plan.

The research also made use of some secondary data from journals, published books, government reports, unpublished reports and the internet. The use of secondary data was to help situate the research within existing literature.

PROBLEMS ENCOUNTERED IN THE FIELD

This study is limited in a number of ways. First, Gursulu village, the community under study, is comprised of a number of ethnic groups: Fulani, Kanuri, Hausa, Kare Kare and the Shuarabs, and these different groups speak different languages. During the fieldwork, most of the villagers chose to speak in their particular ethnic languages. This was probably because they felt more comfortable speaking in their respective languages. Since the researcher has a some understanding of Hausa, but does not speak any of the other languages spoken in Gursulu village, he decided to employ the services of an interpreter in order not to misinterpret and misrepresent the data being gathered from the interviews. The researcher much effort into the selection of respondents to ensure that there was some level of representivity.

Of particular importance is the issue of local culture. According to custom (probably Islamic culture), a stranger is not allowed into a man's house immediately, unless a cordial relationship is established during the course of his stay in the community. As a result, a few of the interviews were conducted in a group under a tree or in the village square, and this may have limited the respondents' freedom of expression. Also women were not interviewed because Gursulu village is an Islamic village, and normally prohibits their women from talking to strangers.

Another problem encountered in the field was that of accessibility. There was no accessible road linking Kanamma and the rest of the villages. The researcher had to use a motorbike for 5 hours from Damaturu to Kanamma because the road from Geidam to Kanamma was bad and there were few vehicles travelling to Kanamma. The road from Geidam to Kanamma was

under construction. Sand dunes on the road from Kanamma to Gursulu village slowed down movement.

As in most research studies in rural Nigeria, there were limiting factors in data collection. These comprised the non-availability of the GDP of the villages under study, the paucity or lack of rainfall data, and the non-availability of maps and population figures. These factors, no doubt, served as limitations to the results.

More so, most interviewees expected some financial rewards from the researcher for simply participating in the research. In the Yobe State Ministry of Agriculture, the researcher was not allowed to conduct interviews because of his refusal to offer monetary compensation to an official of the said Ministry. As a consequence, the researcher was informed that desertification was a matter of "national security" and that since the study was to be submitted to a foreign university, the researcher should get a written permission from the Federal Ministry of Environment in Abuja before he would be allowed to interview any personnel from the Yobe State Ministry of Agriculture.

Lastly, it is important to point out here that there are methodological challenges and inherent weaknesses with oral testimony. In relying partly on oral data from field interviews, this study is not without its limitations. There are several reasons for these limitations. One is linked to the challenge of human memory, which simply has to do with the problem of the politics of selective memory, and how much of historical events respondents can remember and report accurately. Another reason concerns the propensity in humans to impose a narrative structure on events that sometimes are not closely connected. A third reason is connected to the fact that an informant's oral testimony is sometimes biased because of the self-serving interests of the informant which may affect the data presented. Likewise, the power relationships between the interviewees and the interviewer, in many instances, affect what is reported and how it is reported. Further still, there is also the challenge of the difference between what is spoken and written, thereby leading to inaccuracies in meanings when trying to transcribe conversations. For example, when transcribing speeches, the researcher may encounter problems relating to punctuations and clarity of speech.

In the same vein, the researcher was constantly aware of the limitations of oral testimony and constantly assessed the accuracy of the data collected. One way in which the research dealt

with these challenges inherent in oral testimony was to constantly compare the oral data with scientific and policy documents.

The analyses of the research data show that Gursulu households are centrally concerned with the problem of rainfall shortage/scarcity; and they see rainfall shortage/ scarcity as the severest problem that plagues northern Nigeria. This finding is contrary to literature on desertification, which tends then to overemphasize the issue of desertification. Field data also indicate that peasants have a wealth of indigenous soil management skills. They also possess some knowledge of their local environment, soil types, and the different crops that they grow. Also, they have knowledge of the prevalence of weeds and rainfall patterns.
Given the problem of rainfall shortage, desertification, land degradation and inadequate capital, the Sahelian peasants of northern Nigeria have devised adaptive responses to their environmental changes. Firstly, Gursulu peasants are engaged in an array of livelihood activities. They do not only diversify their crops and livestock, but also diversify their income sources through both on-farm and off-farm endeavours. Rearing different livestock serves as insurance against crop failures, and as an investment to be used in the purchase of farm inputs so as to solve family problems. Secondly, households integrate livestock and crops; livestock serves as assets, provides opportunity to recycle both crop residues and manure, and serves the households' labour needs in the form of animal traction. Likewise, households have devised soil management and conservation practices which enable them to improve their soil fertility and thus improve crop yield. Thirdly, most households rely on migrant remittances in times of household difficulty, and these remittances are sometimes invested in some assets for livelihood activities. Finally, there is a shift from large ruminants to small ruminants. This is mainly because small ruminants have comparative advantage over large ruminants.

The research further gives evidence to the fact that the people of Gursulu are not left to their fate by the state. In fact, field data show that the state creates a livelihoods enabling environment, for instance, by creating policies and institutions and intervention programmes such as providing peasants communities with farm inputs and implements; by linking rural communities with financial service providers; by establishing intervention programmes like the Youth in Farming Programme; and by providing extension services for peasant farmers.

Despite these government efforts and intervention programmes, many peasants of Gursulu village insisted that they did not benefit in any direct way from some of these interventions

from the government. Many of these peasants spoke of a lack, or inadequacy, of access to financial assistance, fertilizers and other farm inputs, expertise and irrigation services. It is possible that the peasants' assertion that they did not benefit in any direct way from the state was connected to their self-serving interest, i.e. it was intended to lessen tax claims by the state and/or increase the state assistance towards them.

Research data from the historical analysis of peasants' livelihoods and development strategies in Chapter 3 reveal the strengths and weaknesses of socio-political and economic systems to cope with environmental crisis. Pre-capitalist Sahelian societies, it is shown, devised in-built strategies at the household, village and state levels to respond to the incessant environmental perturbations they encountered. By integrating Sahelian peasant societies into the capitalist economy, European colonialism eroded their adaptive flexibility, that is, their capacity to cope with the unstable environment of the semi-arid region. The neo-liberal policies of the post-colonial, neo-liberal Structural Adjustment Programme further impacted, negatively, on the livelihoods of smallholder farmers. In the contemporary scenario, the prices of farm inputs and implements have sky-rocketed because there is little (or no) subsidy, plus trade liberalization. As a result, many peasants can no longer compete with foreign, imported, agricultural products. One of impact on the peasant of the adaptive and livelihood strategies of British colonial policies, and the neo-liberal policies of Structural Adjustment, is that these weakened the community practice of social solidarity and support network. As Ibrahim, one of the informants, pointed out, "in this village, we have a *sarkin noma*, but we do not receive any assistance" (the informant emphasized this point). "We have a *sarkin noma*; we do not get any assistance from the local government".

Thus, on the basis of the findings, understanding the livelihood strategies of rural households in the face of constraints will enable government to initiate policies that are geared towards removing constraints and expanding the opportunities of the rural poor (Ellis, 1998).

ETHICAL CONSIDERATIONS

Anonymity

All the names of informants interviewed and presented in this study are pseudonyms for the sake of anonymity. Care was taken to ensure the confidentiality of the informants for this study. More so, care was taken to ensure that the information included in the Research Report did not identify the informants directly.

Use of consent and information forms (see appendices 4 and 5)

The informants were provided with information concerning the study and nature of their participation. Also, the informants were told that they could withdraw from the interviews at any time without penalty. Many of the informants refused to sign the consent form; they did not want to commit themselves on paper to anything. Lastly, permission was sought from the informants before the interview sessions were recorded.

The University of the Witwatersrand's Ethics Clearance

The University of the Witwatersrand's Ethics Committee gave approval for this research. (See Appendix 3 for the attached letter of approval)

CONTENTS OF THE DIFFERENT CHAPTERS

Chapter 1 deals with research questions, objective and methodology.

Chapter 2 presents a review of the literature on desertification and livelihoods. Relevant literature on the research questions is covered in this chapter. This chapter also includes a critical examination of the controversies in desertification studies; on the nature, causes, and impacts of desertification in the Sahel and northern Nigeria in particular; and also the conceptual framework underpinning this Research Report. Also, it comprises an examination of the development and propositions of the sustainable livelihood approach, and its application to Gursulu village, which experiences desertification and land degradation.

Chapter 3 of the research examines the complex relationships between the environmental crises of drought and desertification, and the essential strengths and weaknesses of existing socio-political and economic systems. Specifically, the chapter examines the livelihood strategy of peasant households in pre-colonial Sahelian society, and argues that the British colonial integration of Sahelian peasant societies into the capitalist economy eroded their adaptive flexibility. It further argues that the neo-liberal policies of independent Nigeria's Structural Adjustment Programme impacted negatively upon the livelihoods of smallholder farmers. Chapter 3 is divided into three parts: the Pre-colonial era: Peasant Vulnerability and Adaptive Strategies; the European Colonial era: the Disintegration of the Moral Economy in Hausaland; and Contemporary Nigeria: Nigerian Agricultural Policy and the Structural

Adjustment Programme. The chapter then narrows down the research on Nigeria, and looks at desertification in northern Nigeria. Finally, this chapter also analyzes some policy documents of the Nigerian government on desertification.

Chapter 4 presents households' narratives from the data collected and analyzed. It also describes households' demography as well as socio-cultural and economic characteristics. The vulnerability context of Gursulu is also discussed

Chapter 5 evaluates the livelihood strategies of Gursulu peasants, enabling institutions and policy.

Chapter 6 presents the conclusion of the Research Report.

CHAPTER TWO

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1. DESERTIFICATION

INTRODUCTION

This literature review critically examines the concept, causes and impact of desertification in the Sahel of northern Nigeria in particular.

The concept of desertification is fraught with controversy not only over the nature, causes, severity and extent of desertification, but also in the assessment methodology of the phenomenon and the proper way to tackle it. Even though desertification is an age-old phenomenon (Thomas and Middleton, 1994: 17-19) and it affects countries and people the world over either directly or indirectly, what seems certain about desertification is its effect on social, economic and political dimensions of existence. The literature on the nature and causes of desertification is full of contradictions, and illogical generalizations from insufficient data (Thomas and Middleton, 1994:1).

The lack of agreement in desertification studies has given birth to a number of contradictory definitions of desertification. Glantz and Orlovsky (1983) have exposed the ambiguity and uncertainty that characterized desertification studies in the 1980s in their work, in which they reviewed a hundred definitions found in desertification literature. As Glantz and Orlovsky (1983) suggested, the existence of various definitions of desertification could be attributed to the fact that different disciplines emphasize different aspects of the phenomenon. For example, climate experts, through the Climate Programme of the World Meteorological Organization (WMO) and the World Climate Impacts Programme of the United Nations Environment Programme (UNEP), have in their considerations of desertification, emphasized its climatological and meteorological aspects. Even within the 1977 United Nations Conference on Desertification's (UNCOD) documents[5] (Warren and Maizels, 1977: 173; Garduno, 1977: 320), numerous definitions co-exist which have generated some debates around some of the concepts used. For example, the following definitions can be found in the UNCOD 1977 documents:

- Desertification is "the diminution or destruction of the biological potential of the land", and

[5] Whereas, the UNCOD of 1977 was to respond to a specific regional crisis, it succeeded in bringing desertification to the fore of global environmental issues.

- Desertification is: “the intensification or extension of desert conditions… leading to reduced biological productivity, with consequent reduction in plant biomass, in the land’s carrying capacity for livestock, in crop yields and human wellbeing” (World Map of Desertification, UNCOD 1977).

Warren and Maizels (1977:173) define desertification as “the development of desert-like landscapes in areas which were once green. Its practical meaning….is a sustained decline in the yield of useful crops from a dry area accompanying certain kinds of environmental change, both natural and induced”.

Garduno (1977: 320), within the same UNCOD document, disagrees with Warren and Maizels (1977) in their perception of the cause of desertification. For him, desertification is “the impoverishment of arid, semi-arid and some sub-humid ecosystems by the impact of man’s activities”.

The lack of consensus on the definition of desertification, noted above, shows itself in the unresolved themes in desertification studies. Batterbury and Warren (2001) have identified six unresolved themes in the desertification debate. These include advance of the desert; the resilience of dryland ecosystems and land-use systems; the influence of grazing and livestock; the effects of increased population in rain-fed dryland agricultural systems; soil erosion and fertility decline; and climate change. Mortimore (1989: 17), in addition to discussing some of the above-mentioned themes, questions the idea that desertification is irreversible. Also, Le Houérou (1996:146) has distinguished between desertification and land degradation, thus bringing another dimension to the desertification controversy: should desertification be conceived of and understood as land degradation?

In what follows, this research examines the 1992 United Nations Conference on Environment and Development (UNCED; also called Rio Conference) definition of desertification as a starting point in discussing the environmental problem of desertification and land degradation. In order to achieve this aim (i.e. to review the unresolved themes in desertification studies), the nature, causes and impacts of desertification are discussed.

DESERTIFICATION VERSUS LAND DEGRADATION

Desertification is "land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors including climate variation and human activities" (UNCED[6], 1992: 111). This definition is regarded as the most current and least problematic definition of desertification. Whereas Le Houérou (1996: 137) sees a confirmation of the UNCOD's 1977 definition of desertification in the 1992 Rio Conference, the two conferences understood desertification slightly differently. According to Le Houérou (1996: 137), "many experts are of the opinion that the definition adopted by UNCED 1992[7] is the result of political compromise whose aims were not scientific". Le Houérou goes on: "these scientists would have preferred to have connotations to irreversibility and desert landscapes included in the definition". Notwithstanding this, desertification is generally agreed to be a form of change. Whether it is a process of change or an end-state of change is highly debatable (Thomas and Middleton, 1994: 9). However, land degradation is defined by the UNCCD as a

> reduction or loss, in arid, semi-arid, and dry sub-humid areas, of the biological or economic productivity and complexity of rain-fed croplands, or range, pasture, forest, and woodlands resulting from land uses or from a process or combination of processes arising from human activities and habitation patterns, such as: (i) soil erosion caused by wind and/ or water; (ii) deterioration of the physical, chemical, and biological or economic properties of the soil; and (iii) long-term loss of natural vegetation (UN, 1994:5).

Hence, under the UNCCD conception, desertification is comparable with land degradation in arid, semi-arid and dry sub-humid climates. In fact, the terms desertification and degradation have been used interchangeably, yet there is a distinction between the two. This is partly the reason for the conflicting conceptions of desertification. If desertification is a form of land degradation, what other forms of land degradation can be placed in the same category as desertification? Certainly not salinization, overgrazing, erosion, deforestation etc. because these are all drivers of both desertification and land degradation. While desertification is a long-term process of loss of land and soil productivity whose reversibility is an equally long-term process given time, favourable climatic conditions, the right technology and appropriate land use practice, degradation, on the other hand, is a short term process of land impoverishment whose reversibility can be affected when the drivers of land degradation are

[6] Sometimes referred to as the Rio Conference.
[7] Note: the United Nations Convention to Combat Desertification held in 1994 adopted the definition of the Rio Conference of 1992.

removed given favourable climatic factors. Furthermore, whereas in the Rio Conference's conception of desertification, desertification is land degradation under arid, semi-arid and dry sub-humid climates, land degradation actually happens in all kinds of climate (Le Houérou, 1996:146), and this idea is contrary to the United Nations Convention to Combat Desertification's (UNCCD) conception of land degradation as defined above.

Le Houérou, for instance, concedes that not all kinds of erosion and degradation are particular to arid and semi-arid lands and that, for example, dune formation does occur in humid climates under particular situations. And although land degradation resulting from salinity, water logging and poor irrigation practices are common in dry lands and developing countries, they are not restricted to these countries. For example, land degradation could occur in tropical rainforest. Yet, according to Le Houérou (1996: 137), a number of experts favour the term land degradation as opposed to desertification because "the expression 'land degradation' does not have emotional connotations". This distinction is important, yet what is of more significance is that rural households suffer the effects of *both* land degradation and desertification as they both lead to the reduction of soil and land bioproductivity.

The Sahel has been presented as a fragile ecosystem whose fragility is compounded by the mismanagement of local productive practices. According to this view, "the Sahel has overshot its limits imposed on its productivity by natural constraints and that smallholders are destructive consumers of biological resources—necessarily so, owing either to an ignorance of better methods or to an inability to change those methods" (Batterbuty and Warren, 2001). However, according to Batterbury and Warren (2001), studies have shown that semi-arid ecosystems are not fragile as often presumed, and exist in various semi-permanent states dictated by disturbance, drought, fire; these regions are adapted to these forces. Also many indigenous management systems create enriched patches in the landscape because they redistribute nutrients, plants, grazing pressure and water (Batterbury and Warren, 2001).

Furthermore, the phrase "the biological potential" is only comparable with a presumed prior state whose approximation is however debatable. Furthermore, the Food and Agriculture Organisation (FAO)/ UNEP (1983) posit that "only experienced range scientists can make reasonably reliable estimates of the productivity of the present plant community compared to what is possible using the best management practices" (Mortimore, 1989: 17). Thus the Rio Conference and UNCCD 1994 avoided contentious terms like "diminution of the biological

potential of the land", "desert-like conditions" by referring to desertification as land degradation.

More so, previous definitions of desertification have presented the phenomenon as an irreversible process, yet deserts are reversible given favourable conditions. Hence, Mortimore (1989: 17-18) says, phrases like "the destruction of the biological potential" and "exceptionally fragile ecosystems" used in some of the definitions of desertification are not only vague; they also do not add clarity to the concept of desertification because they imply that arid and semi-arid regions are easily destructible.

ADVANCEMENT OF THE DESERT VERSUS THE PERIODIC EXPANSION AND CONTRACTION OF THE SAHARA BECAUSE OF RAINFALL VARIABILITY

The idea of the desert-edge advancement was based on the observations of some European foresters in European-ruled colonial West Africa. These foresters' view was so influential that later works on desertification were either unable to break free from its almost-magnetic force or were drawn into it as they attempted to define and assess and recommend policies on desertification for governments and international institutions. Among the most powerful campaigners for the desert-advancement paradigm were Stebbing (1935, 1937a, b, 1938a, b, 1953); Aubreville, (1949); Bovill (1921); Smith (1986); Vinogradov (1988); Winslow, Shapiro, Thomas and Shetty (2004); Mortimore (1989); William and Balling (1996); and Thomas and Middleton (1994: 5).

The early works of Stebbing, Aubreville and Bovill proposed that the Sahara was creeping southwards, from their limited observation of bush burning, tree felling and soil erosion in West Africa. For example, Aubreville asserted: "true deserts are being born in front of us at the present time, in regions where the rainfall ranges from 700mm to more than 1500mm per year" (Balling and William, 1996: 15).

However, Jones (1938), Stamp (1940), the Anglo-French Forestry Commission (1937), and more recently, Mortimore (1989) and Helldén (1991) have criticized the foresters' conceptualization of desertification (Mortimore, 1989; Winslow, Shapiro, Thomas and Shetty, 2004). The Anglo-French Forestry Commission explored the borders between Nigeria and Niger, and concluded that there was no obvious danger of desertification. Further studies could not confirm the occurrence of an advancing Sahara. For example, Helldén

(1991) through her examination of satellite imageries, settlement histories, sand movements, and degradation conditions around boreholes, could not confirm the occurrence of an advancing Sahara (Batterbury and Warren, 2001). The current position is that the Sahara shrinks and expands periodically according to rainfall variability. Citing the severe drought of 1984 as an instance, Tucker et al. (1991) and Nicholson et al. (1998) argue that desert advance and "localised degradation is usually short-term" (Batterbury and Warren, 2001). Thus, it is possible, according to Mortimore (1989: 13), that the earlier perceptions of the creeping Sahel were based on the droughts of between 1905 and 1920, which led to famine in most of West Africa.

Working under the forester's concept of desertification, Hugh Lamprey (1975) attempted to measure the rate of advancement of the Sahara. Lamprey compared the southern boundary of the Sahara at two different times: whereas the 1958 study was based on a vegetative map designed by Harrison and Jackson (1958), the 1975 study was based on an aerial and terrestrial inspection of the same boundary. Lamprey reported a 90-100 km displacement and submitted that the desert edges were advancing at ca. 5.5 km per year (Verón et al., 2006; Mortimore, 1989: 15; Helldén, 1988).

Lamprey's comparative study has been subject to criticisms. For one, it was seen as mistaken because it was based on an application of the established paradigm of desertification: the foresters' view (Verón et al., 2006). Also, Lamprey's work has been faulted for ignoring the key role of climate variability in desertification. In fact, it has been shown by Helldén (1991) and Tucker et al. (1991) "through the use of a combination of field work and satellite remote sensing that desert boundaries were very dynamic, their locations being tightly linked to annual rainfall" (Verón et al., 2006). Furthermore, thorough rainfall analysis has shown that Lamprey compared a successive wet period and a successive dry period culminating in 1975 (Verón et al., 2006). The earlier simplistic conception of desertification was considered inadequate (Thomas, 1997) because of the criticisms it received from scholars like Helldén (1984); Olsson (1985); and Ahlcrona (1988); who argued that the idea of the ever-advancing desert lacked convincing evidence (Verón et al., 2006; Winslow, Shapiro, Thomas and Shetty, 2004: 4).

Whereas recent works in desertification studies suggest that the Sahara advances and contracts periodically because of rainfall variability (Batterbury and Warren, 2001; Helldén,

1988), the people of the Gursulu experience desertification differently. Much of the data from interview conducted in Gursulu shows that for the peasants of Gursulu, the desert *is* advancing southward, thus corroborating earlier suggestions that desertification advances.

CAUSES OF DESERTIFICATION

In this section of the study, the debate on the causes of desertification is examined. The Rio Conference unequivocally attributed the cause of desertification to various factors including climate variation and human activities. In what follows, the climatic and anthropogenic factor causing desertification is discussed, and then the charge that increase in population inevitably results in land degradation and desertification is discussed next.

CLIMATE CHANGE AND VARIABILITY VERSUS AN ANTHROPOGENIC DRIVER OF DESERTIFICATION

In the aftermath of the drought of the late 1960s and early 1970s, desertification received renewed interest, and human actions such as deforestation, over-cultivation, overgrazing and irrigation-induced salinization, more than climatic factors, were now perceived to be the chief drivers of desertification and land degradation. The idea that desertification is caused by human action takes its roots from Stebbing, Aubreville and Bovill, who posited that anthropogenic forces were steadily transforming the savannah woodland into a human-induced savannah (Mortimore, 1989: 13; William and Balling, 1996). Even though Stebbing conceded that intermittent rainfall and the decrease in rainy season was a contributory factor to desertification, "man with his 'misutilization of the soils' was the chief culprit" (Mortimore, 1989: 13).

Although it was obvious that drought played a major part in the disasters of the 1960s and 1970s, the organizers of UNCOD identified the continual process of human-induced land degradation as the major problem. Despite the debate on the relative importance of human action and a lack of rainfall, drought was seen mainly as a catalyst which exposed the detrimental impacts of long-term degradation by people. Recent works, for example, Dodd (1994: 28; IPCC, 2001: 490), have recognized the two factors as being co-responsible for desertification. For Dodd (1994): 28), "humans, or at least humans in concert with drought, are the driving force behind the process" of desertification. It is the IPPC's (2001: 490) report that has stressed the intricate interaction between human actions and climatic forces that causes desertification and land degradation. According to this report, by altering the spatial

and temporal patterns in temperature, rainfall, solar isolation, and winds, climate change might worsen desertification; and conversely, "desertification aggravates carbon dioxide (CO2)-induced climate change through the release of CO2 from cleared and dead vegetation and reduction of the carbon sequestration potential of desertified land". Nevertheless, the comparative importance of the climate and human factors which cause desertification remains unresolved.

GLOBAL CLIMATE CHANGE

Climate change, according to the Intergovernmental Panel on Climate Change (IPCC), "refers to any change in climate over time, whether due to natural variability or as a result of human activity" (IPCC, 2007: 27). Ponting (2007: 385) notes that carbon dioxide, methane, nitrous oxide (from fertilizers and vehicles) and the various forms of CFCs emitted by humans are responsible for global warming, and they are warming the temperature of the planet at an alarming rate. Deforestation is another factor forcing global warming. Climate change is cumulative and, as Ponting (2007: 386) says, about 300 billion tonnes of carbon dioxide[8] have been emitted to the atmosphere through human activities since 1750, and half of that number has been emitted since 1975 from energy sources like coal and fossil oil.

Climate change causes an increase in greenhouse gases, ozone layer depletion, drought and desertification, a rise in sea level, a reduction in agricultural productivity, a loss of biodiversity, and impacts on water resources. Other factors causing desertification also impact on climate change. These include wood extraction for fuel and construction, bush

[8] This increase of carbon dioxide in the atmosphere corresponds with the Industrial Revolution, and coal production is today 350 times more than in 1800, with oil production now 350 times more than in 1900. Prior to the Industrial Revolution, humankind had little impact on the environment and the population was low and comparatively stable. The transition to sedentary agriculture that began from 10,000 produced surpluses that contributed to the expansion of civilization with its positive impact on technological advancement. The animal-drawn plough was invented during this period (Clapp and Dauvergne, 2008:46). With the Industrial Revolution, humanity used its rational capacity to develop sophisticated technology, with an impact on the global environment on a scale never known before. The advancement of science and technology fuelled the increase in the global population, because of the food surpluses that agricultural technology was able to produce. Not only that, improvements in medical science also ensured longevity. Thus, the harmony between the human community and the natural community was severed even further, thus causing ecological imbalances.

According to the IPCC (2007: 98), the present stock of greenhouse gases currently in the atmosphere will cause global temperature to continue to increase even if all emissions of these gases were stopped immediately. Furthermore, the report notes that two per cent increase of global temperature is in general agreed to be a dangerous 'tipping' point, above which dangerous climate change becomes increasingly likely. This is a major problem because global warming destabilizes the delicate balance that makes life on this planet possible.

burning which emits carbon dioxide, overgrazing, poor irrigation, poverty and over-cultivation of marginal land. One of the impacts of climate change is the increasing incidence of drought and desertification.

POPULATION DYNAMICS, DESERTIFICATION AND SOIL AND LAND DEGRADATION

The human factors causing desertification are often attributed to inappropriate methods of land use and overpopulation. For example, after the 1960s and 1974 drought, it was posited that the production practices of the Sahelian dwellers might have caused irreversible damages to the environment, which would require a long-term recovery process.

Another charge is that the rapid population increase in the dry zone applies human pressure on the land by increasing demands for food, water, fuel, raw material, and other natural resources beyond the carrying capacity of the land in many situations. But, according to Thomas and Middleton (1994: 67), "some of these classic desertification causes are by no means conclusive when subject to close scrutiny of the evidence, and areas deemed to be desertified due to a particular cause are all too often thought to be in such a state through the subjective, though in some cases experienced, eyes of a single expert or at best a group of experts".

The idea that population pressure causes a decline in soil and land bioproductivity has its roots in the work of Thomas Malthus. Malthus hinged his argument on two provisos: that is the necessity of food for the existence of humankind, and the continual necessity of "the passion between the sexes", that is the act of reproduction between man and woman (Malthus, 1793: 4). He argues that population increase beyond the land's carrying capacity would lead to the elimination of the surplus population, either by direct starvation or by other positive checks such as famine, disease, and environmental disasters (Malthus, 1793: 4, 23-26).

Neo-Malthusians argue *ála* Malthus that population pressure forces an increased demand for food by peasants and urban consumers, which results in the degradation of land which in turn leads to migration to other lands and "reduction in fallow intervals without compensating inputs" (Adams and Mortimore, 1997: 150). The neo-Malthusians argue that the ultimate end result of this process is land degradation and desertification.

Camp (1992) and Tolba[9] (1986) can be taken as representatives of this deterministic neo-Malthusian view. They make the same point somewhat differently: that population growth clearly worsens "the grinding poverty and, in some cases, the environmental destruction that has kept people from growing or getting enough to eat" (Mortimore, 1993: 15). This is because, as Tolba puts it, "Each piece of land has what we call its carrying capacity (for humans and animals)… When that number is exceeded, the whole piece of land will quickly degenerate from overgrazing or overuse by human beings" (Mortimore, 1993: 16).

Finally, Camp (1992) argues that the relationship between population growth and environmental degradation reveals itself mostly among poor people in marginal environments. He contends that poor households in Africa, Asia and Latin America are increasingly both victims of and (unwittingly) the cause of, land degradation in these regions, because an increasing number of poor households "can only stay alive by destroying their own natural resource base" (Mortimore, 1993:16).

The consequences include a decline in crop productivity per hectare and food scarcity for peasants. To support this claim, neo-Malthusians assemble instances of mismanagement of land to argue that population increase is "pressing against a food potential which not only is incapable of increase but is even gradually reduced by the action of these growing populations" (Boserup, 1965: 14).

[9] Mustapha Tolba was formerly head of the United Nations Environment Programme.

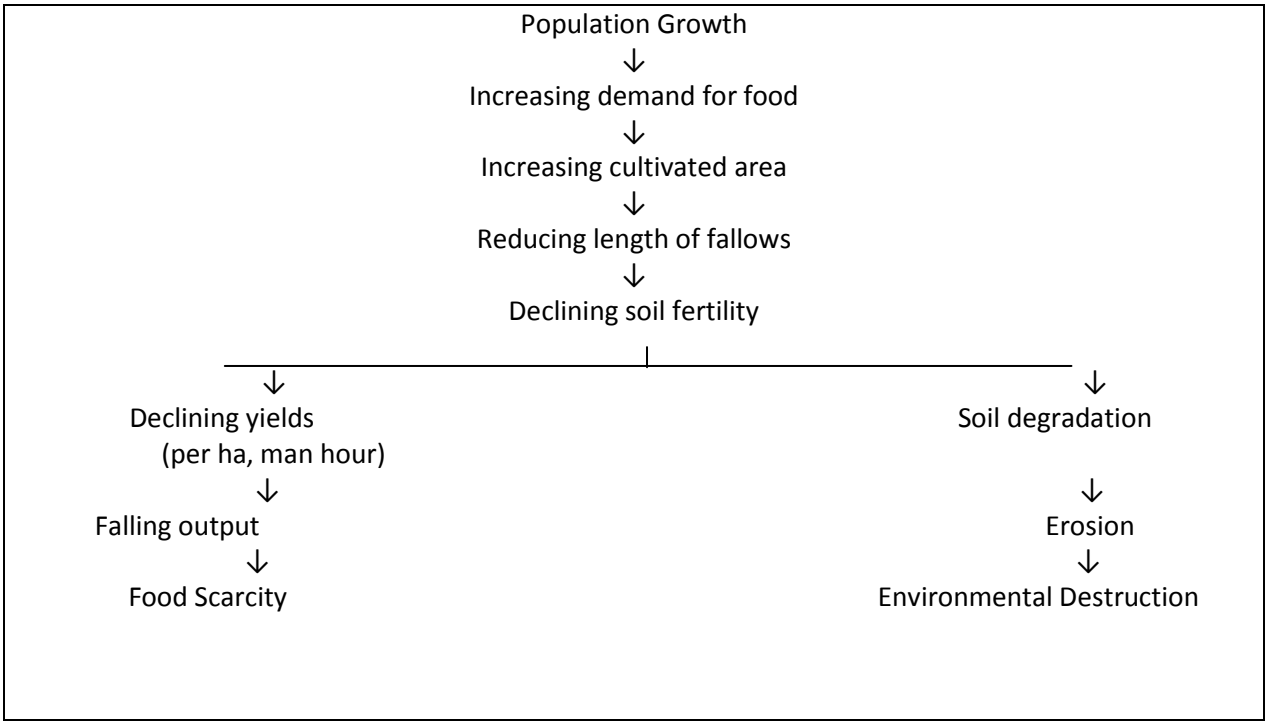


Figure 1: The Malthusian view of the linkages between population growth and environmental degradation as presented by Mortimore (1993:16)

Boserup (1965) has since challenged the neo-Malthusian doctrine in her pioneering and seminal book, *The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure*. Boserup argues that population growth propels technological change in agriculture, and determines agricultural methods. In other words, population pressure leads to innovations, hence maximizing agricultural productivity by increasing labour, machinery, manure, etc. Thus, she argues in contrariety to the neo-Malthusians, that population increase, rather than impacting negatively on agrarian communities, leads to intensification in agriculture which is an increase in output per additional input of labour. She concludes:

> It is more sensible to regard the process of agricultural change in primitive communities as an adaptation to gradually increasing population densities, brought about by changes in the rates of natural population growth or by immigration. ...population increase leads to the adoption of more intensive systems of agriculture in primitive communities and an increase of total agricultural output (Boserup, 1965:105).

Boserup, though, concedes that this is not the case for communities with a high population growth rate and which are already densely populated, *and* which are incapable of investing in more intensive methods of agriculture. Other works have since been influenced by Boserup's ideas (Spooner, 1972; Cohen, 1977, Netting, 1977: 62, 70-71; Netting, 1993: 105; Grigg, 1974: 72-72).

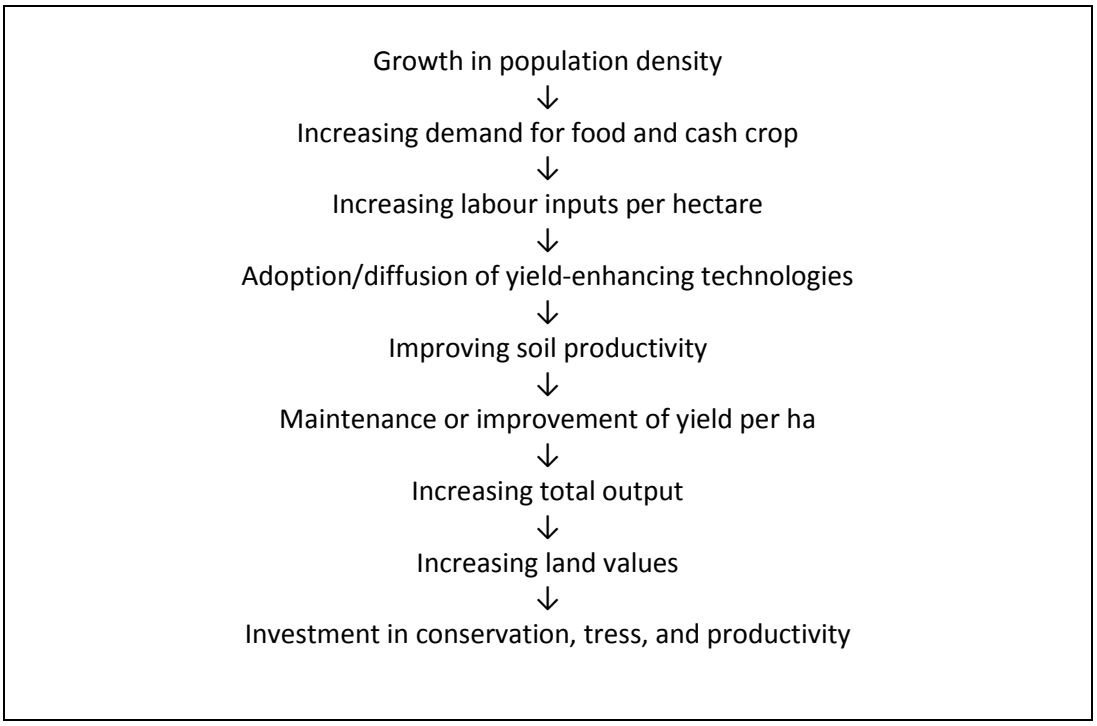


Figure 2: The relationship between an increasing population density and environmental conservation from the Boseruptian perspective. Culled from Mortimore (1993:18).

The human factors causing desertification and land degradation (i.e. overgrazing, over-cultivation, deforestation and salinization on irrigated cropland) are presented and discussed below.

OVERGRAZING/OVERSTOCKING

The traditional patterns of land use in the dryland by herders, more especially by nomadic herders, have in many instances been thought of as a poor use of the environment that results in land and soil degradation. It is argued that this occurs when the herd sizes "are allowed to increase in an almost uncontrollable and seemingly irresponsible manner" (Thomas and Middleton, 1994: 69). Overstocking in the dryland has been regarded as the chief cause of desertification. Overgrazing results when the potential carrying capacity (PCC) of a piece of land has been exceeded. For Thomas and Middleton, overstocking is expressed in terms of the potential carrying capacity, and it is an expression of the way in which herders misuse the environment. The concept of the potential carrying capacity is defined here as "the number of

livestock a unit of land in a given environment can support without detrimental impacts to the environmental system and without density-dependent mortalities in the livestock system" (Thomas and Middleton, 1994:71).

This concept of a PCC, and its use in determining the optimal stocking levels for a given piece of land, is problematic for several reasons. First, it is now being realized that while the idea of PCC may be applicable to stable environments, it is not useful when thinking about dry rangelands, "in which the only thing of which one can be sure of is environmental diversity and climatic uncertainties" (Scoones and Graham, 1994: 188). Hence, Scoones and Graham (1994:188) differentiate between "equilibrium" and "non-equilibrium" environments. An equilibrium environment is one in which patterns of rainfall and vegetation change are fairly predictable, and one in which there is availability of forage for herds. In this environment "if livestock numbers increase above a certain level and are not checked, then the ability of the vegetation to recover is likely to be damaged, and range degradation may occur" (Scoones and Graham, 1994: 188—189). On the other hand, a non-equilibrium environment is one in which, because rainfall is sparse, vegetation production, and livestock production by implication, are kept very low such that livestock do not have a long-lasting destructive effect. Arid and semi-arid regions fall within this category of non-equilibrium environments, and most pastoralists in Africa are located in these zones.

In view of this distinction, it is seen that dry rangelands are non-equilibrium environments, and as such rainfall and the state of the vegetation are determined by external factors like rainfall. Grazing in such an environment has little or no effect on pasture productivity in the long run. Within this environment, herders employ a grazing strategy, which is "opportunistic" and hence least wasteful. Such a grazing strategy utilizes resources, "and then matches animal numbers to food needs by such strategies as moving to where food or water is available" (Scoones and Graham, 1994:189). Thus, being able to move livestock around to different areas is important because different areas have different things to offer. Finally, Scoones and Graham (1994: 189) suggest that "Flexibility is the key to planning in these environments. Allowing for mobility of animals and people is essential to ensure that animals make best use of available forage". In showing the controversial issue of overstocking, Thomas and Middleton (1994: 70) argue that in places where traditional pastoral nomadism has been replaced by organized ranching, like in the Middle belt of Nigeria, or where ranches have spread to previously virgin potential pasturelands, for example, the Kalahari, the

environment is not any different from those grazed by traditional pastoralists. Finally, it has been shown that traditional systems of livestock production are likely to be ten times more efficient than ranching (Thomas and Middleton, 1994: 69).

OVER-CULTIVATION

Over-cultivation has also been blamed for causing desertification and land degradation. Over-cultivation results when the length of fallow periods is reduced which leads to nutrient depletion, thus impacting on the potential for production and on the yields of crops. Also, the increasing use of mechanized agriculture in the drylands also contributes to land degradation and desertification. Since mechanized agriculture utilizes large fields, and has the ability to plough very deep, it damages soil structure. Hence, soil erosion from wind and water "may result from the weaker soil structure" (Thomas and Middleton, 1994: 74). Surface compaction by machinery also causes a high rate of soil erosion. Thomas and Middleton (1994: 74) blame over-cultivation on the changes from the use of traditional dryland rain-fed agricultural methods of farming, to inappropriate methods of farming developed in, and for, other types of environment.

MISMANAGEMENT OF IRRIGATION

Irrigation is a common practice in drylands because it has the potential for overcoming some of the problems that the scarcity of rainfall in the drylands causes for crop production. Irrigation has the potential to increase crop yields, and makes it possible for a variety of crops to be produced in the dryland. *Fadama* farming is small-scale irrigation farming which emerged in one of the World Bank assisted programmes with the launching of the National *Fadama* Development Project (NFDP) in the early 1990s. The *Fadama* concept is not new to Hausaland as seasonal floodplains avail the opportunity for farming a variety of crops under small-scale irrigation farming system (Kudi, Usman, Akpoko and Banta, 2008: 10). The implementation of the National *Fadama* Development Project is in its third phase of implementation: *Fadama* I project, *Fadama* II project and the *Fadama* III project. The major aims of the *Fadama* programme are to increase the income of farmers, promote employment and reduce poverty.

The problem with irrigation schemes is that they waste water and, sometimes, their application exceeds possible plant intake and leads to problems like salinization and alkalinisation, the excess accumulation of sodium (Thomas and Middleton, 1994: 78). Since

the salt tolerance of most cultivated crops is low, productivity in salinized areas decreases. Additionally, irrigated cropping can lead to water-logging if not properly managed (NAP, 2000: 18). Similarly, irrigation poses environmental problems in irrigated lands, and mismanagement and misuse of irrigation is one of the causes of desertification. According to official sources (NAP 2000:18), the problem of mismanagement of irrigation is being experienced in Nigeria, for example in the Bakolori, South Chad and Kano River irrigation projects.

DEFORESTATION

The demand for fuel wood in the Sahel zone is very high because of the increasing population and rapid urbanization. Wood collection for domestic use is the main cause of deforestation, and this leads to desertification (Thomas and Middleton, 1994, 79; NAP, 2000: 16). This is despite the Felling of Trees (Control) Edict (NAP, 2000: 16) in northern Nigeria. In the Sahel countries, fuel wood and charcoal account for over 90 per cent of all energy use (Thomas and Middleton, 1994: 81). Wood is also used for construction, building, arts, and crafts. The sale of wood by peasants in northern Nigeria to urban people helps augment the small cash incomes of rural households. For example, estimates show that almost three-quarters of Kano city's yearly requirement is about 75,000 tonnes of firewood (NAP, 2000: 16). Lastly, modern methods of agriculture, for instance mechanized ploughing and irrigation schemes, have also increased the scale of deforestation.

BUSH BURNING

Bush burning also causes deforestation. There is a high incidence of bush fires every season because of both the low relative humidity of the semi-arid region, and the very dry *harmattan* wind. According to official sources NAP (2000: 17), bush burning is most likely to result in the Sahel due to peasants clearing for agriculture during dryland; hunters in search of game, set fire onto vegetation; and cattle herdsmen setting fires to dry up grass to stimulate growth of dormant grass buds.

In conclusion, the human factors that cause desertification are complicated. Sahelian peasants are forced by hopeless circumstances to deplete the few trees in the Sahel as fuel wood so as to make a living.

THE IMPACTS OF DESERTIFICATION AND DROUGHT IN NORTHERN NIGERIA

The Sahel zone is exposed to the two related hazards of drought and desertification. Desertification and persistent droughts constitute the gravest environmental problems that northern Nigeria faces, and these problems have serious economic implications for the whole country. Estimates show that between 1960 and 1968, a 900,000km^2 area of former savannah grassland in the Sahel was degraded or displaced by desert (Oladipo, 1993). According to the official sources, "Nigeria is at present losing about 350 square metres of its land mass to desert conditions which are advancing southwards at an estimated rate of 0.6 kilometres a year" (NAP, 2000: v). For the most part, inhabitants of arid and semi-arid zones are smallholders – agriculturalists or pastoralists. In years of good rainfall, agricultural produce was bountiful, sustaining rural livelihood. Studies have shown that northern Nigeria and Niger attained its peak in agricultural production during the 1952 to 1966 (Mortimore, 1989). The groundnut pyramid of the 1960s attests to this fact.

LAND AND WATER RESOURCES

Severe drought and desertification also impact upon water resources. For instance, long-term drought does not only impact on upper ground water, on stream flow and on underground water, but also impacts on the level of large lakes, "thereby affecting riparian access as in Lake Chad, which has receded beyond the borders of Nigeria" (UNCOD, 1977; NAP, 2000: 20). More so, a consequence of the drought of the 1970s was that croplands were left "unwatered and barren" as the Niger and Senegal rivers failed to flood. Water stores became exhausted, and in the northern Sahel, there was a loss of "valuable annual pastures" and the "widespread death of sustaining shrubs and trees" (UNCOD, 1977: 4-5). In fact, there was a collapse in the livelihoods system in the affected communities (UNCOD, 1977). To relate the foregoing discussion to Gursulu, its people rely on the limited rainfall, the river Yobe which is a seasonal river, and the declining groundwater sources for their water needs, both domestic and economic. Declining water availability is typical of the Sahel savannah belt of the arid and the semi- arid region of West Africa.

DESTRUCTION OF HABITAT AND LOSS OF BIODIVERSITY

Land degradation and desertification have impacted on the flora and fauna of the Sudano-Sahelian zone. According to official sources (NAP 2000: 20), some animal species like the *Sitatunga* antelope, cheetah, lion, giraffe and elephants, crown crane, the bustard, *palearctic* migrants, ostriches, and *fulvov* tree ducks are all endangered. Most of the indigenous plant

species, especially those with medicinal value and edible qualities that were identified in the 1960s, are now difficult to locate, for example, *Khaya senegalisis* and *Mitrogina spp*. (NAP, 2000: 20).

SOCIO-ECONOMIC IMPACT OF DESERTIFICATION

The agricultural and human impacts of desertification and drought are severe, as exemplified in their deleterious impacts on the environment, food production and quality of life in northern Nigeria. Drought and desertification cause crop failures and high mortality among livestock. They also impact negatively on food security and livelihood, thereby affecting the socio-economic and cultural lives of rural communities. Drought, for example, led to the reduction in the GDP growth of Nigeria from 18.4 per cent in 1971-1972 to 7.3 per cent in 1972-1973 (Oladipo, 1993). Desertification and drought were also responsible for the rapid increase in price indices of foodstuff and other non-oil exports. In his influential book, *Adapting to Drought*, Mortimore (1989: 36) reports the socio-economic impact of drought in 1972—1973 in Dambatta District of Kano:

> Guinea corn [sorghum] was affected worse than millet, but some farmers harvested little of neither; from less than half, down to as little as 10 per cent of the expected yields... As for livestock, the village head estimated that there had been losses by death of 4,400 cattle, 6,400 sheep, 5,000 goats, 500 donkeys and most of the fowls... Mortality in some herds was reported to be 30-50 per cent, and hardly any young had been bred during this year. Almost everywhere, groundwater levels had fallen, leaving dry wells and necessitating repeated deepening. Prices of foodstuffs had risen by 400 per cent and smaller markets were sometimes without grain. Only by selling their goods or animals could most people afford to buy. Yet it was said that even the richer farmers were in difficulties. No deaths or epidemics were reported, but people were leaner and weaker than in a normal 'hungry season'.

From the above quotation, we see that drought and desertification impact on the socio-economic life of rural households by triggering a reduction in crop and animal production, as well as causing livestock deaths and a rise in the prices of food stuffs.

MIGRATION

People migrate as a consequence of drought and desertification to urban areas or to other rural areas, in order to engage in economic activities such as farming, grazing, and fishing (Oladikpo, 1993). Migration impacts on family life. It leads to separation within families—wives and children—and ultimately to the destruction of family patterns (NAP, 2000: 19;

Oladikpo, 1993) as women, children and the elderly are often left with the burden of agricultural activities. According to UNCOD (1977), the drought of 1973 in the Sahel resulted in a vast migration of people, and a rise in the number of refugee camps in the region.

RESOURCES—RELATED CONFLICTS

According to some studies (NAP 2000), desertification and land degradation breed economic and social strife. The wars of the Sahel and the Horn of Africa in the last 20 years attest to this. As sand dunes spread around villages and farmlands, large number of people and livestock were forced to move southwards to other marginal productive areas such Gashua, Nguru, Kukawa and Munguno, therefore putting pressure on the already marginal environment (Oladikpo, 1993). In many cases, rapid population increase in the arid zones and a diminishing environmental resource base, as well as lack of proper natural resources planning and management, generated conflicts (NAP, 2000: 20).

Conflicts in the drylands of Nigeria are usually concentrated around areas of high productivity such as wetlands which provide seasonal resources. These cause competition among rural land users like farmers, herders, fishermen and hunters (NAP, 200: 20). For example, Oladikpo (1993: 240) says that "as natural pastoral rangelands become more scarce, the relationship between the Fulani pastoralists and Hausa cultivators… is now frequently that of conflict, especially along the movement routes of the pastoralists and their cattle, resulting from invasion of the crop farms by desperate cattle".

2.2. LIVELIHOOD AND DEVELOPMENT STRATEGIES

The study uses the Sustainable Livelihoods Approach (SLA) as its conceptual framework for understanding how rural households in Gursulu village respond to desertification and land degradation. The SLA emerged as an alternative to mainstream development practice after decades of limited progress in eradicating global poverty and the declining support for theories linked with integrated rural development. The SLA approach is helpful in bringing together existing concepts and developing new insights into the nature of poverty and the best way to deal with it so as to achieve the Millennium Development Goals: that is, to halve poverty by 2015. This chapter examines the development and propositions of the sustainable livelihood approach and its application to Gursulu village which experiences desertification and land degradation.

SUSTAINABLE LIVELIHOODS FRAMEWORK

The concept of sustainable livelihoods was first introduced in the 1987 report of the World Commission on Environment and Development (WCED). Subsequently, it was developed by research institutes such as Institute for Development Studies (IDS); by Non-Governmental Organisations (NGOs) like CARE and Oxfam; and by international aid agencies such as the UK Department for International Development (DFID) and the United Nations Development Programme (UNDP) (Ashley and Carney, 1999).

The WCED report proposed "sustainable livelihoods" as an integrating concept, capturing the diverse objectives that were being promoted under the umbrella of human development (WCED, 1987). The Brundtland report argued, *inter alia*, that achieving sustainable development required the following: a political system that secures for its citizens the access to participate effectively in governance; an economic system capable of generating surpluses and technical knowledge on an independent and continuous basis; a social system that is capable of resolving social tensions arising from disharmonious development; and a production system that respects the obligation to preserve the ecological basis for development (Krantz, 2001; Solesbury, 2003). According to Ashley and Carney (1999), SLA gained global acceptance in part because the paradigm is able to capture and synthesize the different thread of evolving thoughts and action. Conceptually, SLA benefited from the changing views of poverty, recognizing the diversity of aspirations, the importance of assets and communities, and the constraints and opportunities provided by institutional structures and processes (Solesbury, 2003; Krantz, 2001).

Chambers and Conway (1992:3-5) extended the discussion on sustainable livelihoods to include capabilities, equity and sustainability, which for them, were both ends and means. Thus:

> A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: A livelihood is sustainable when it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contribute net benefit to other livelihood at the local or global levels and in the short and long-term (Chambers and Conway, 1992:6; Scoones, 1998:5; Solesbury, 2003; Krantz, 2001:18).

The sustainable livelihood framework (SLF) indicates how sustainable livelihoods can be achieved through access to a range of livelihood resources which are combined in the pursuit of diverse livelihood strategies. It also analyses the conditions under which people are vulnerable (Scoones, 1998:6). In connection with the above, communities are faced with four major constraints, according to Mortimore and Adams (1999: 14). These are rainfall, bioproductivity, labour and capital.

Rainfall

Rainfall is a constraint outside the influence of households, and it affects the productivity of smallholder farmers who are dependent upon it for their productive practices. The importance of rainfall for agriculture, especially smallholder agriculture, cannot be overemphasized, as its variability and scarcity affects, sharply, the yields and livelihoods of farmers. Located within the semi-arid zone of northern Nigeria, Gursulu, like other locations in the Sahel region, is characterized by rainfall variability and scarcity. In other words, it is characterized by aridity, variable rainfall, declining rainfall, and scarcity of surface water. Even though the Yobe River passes through the southern part of the village, it dries up during the dry season.

Bioproductivity

Bioproductivity is the state of the soil and plant bioproductivity. It is a factor within the control of smallholders, and depends on the use of sustainable management practice. Rain-fed agriculture and animal husbandry are the principal economic activities in Gursulu, with the Kanuris and the Hausas practicing sedentary agriculture and the Fulanis and Shuarabs being nomads. Gursulu is also prone to drought, desertification, and suffers from the scarcity of surface water. These factors lead to soil and land degradation, which reduces the bioproductivity of the soil and land.

Labour

Labour is a constraint which households have control over through their fertility behaviour. Labour can also be hired or shared through membership of cooperative and other organisations at the village level. Another factor that influences the increase in population is the early marriage practice prevalent in the villages. In fact, for most contemporary rural Nigerian communities, the “growth in population could only be a blessing, whether at the level of the household, the community or the state. More people [mean] more crop production, more time for tending livestock, and more opportunities for diversifying activities

outside primary production" (Mortimore and Adams, 1999: 11). However, while the increase of population has implications for labour and natural resource utilisation, as noted, it also leads to shortage in available land for farming activities, since land does not increase with the population.

Capital

Rural smallholders are mostly poor and have limited capital. This limits their ability to embrace technical change in their productive practices. Poverty is prevalent in Gursulu village. More so, farmers use hand or simple animal-powered technologies.

FIVE DIMENSIONS OF CAPITAL RESOURCES ENDOWNMENT OF HOUSEHOLDS

The SLA identifies five key "capital" resources available to households –physical, human, social, natural and financial capitals – (Carney, 1998; DFID 1999). Similarly, Mortimore and Adams (1999) identity four resources endowments available to Sahelian households: natural, economic, technical resources and social resources, which are available to households at any point in time (see Adams and Mortimore, 1997:151). These constitute the following:

Natural capital: This includes both tangible assets such as land, minerals and water and intangible assets such as the atmosphere and biodiversity, which people combine to produce and accumulate other capital assets (DFID, 1999). The natural capital, or natural resource endowment of a household, according to Mortimore and Adams (1999), "is the productive capacity of soil and other living resources to which members of the household enjoy rights of access, both to work and to enjoy the benefits". It is evident that natural capital is paramount to the lives of people whose livelihoods depend on resource-based activities like fishing and farming. In order to deal with the constraint of natural capital, Sahelian producers diversify their farming portfolio so as to spread the risks of their vulnerable context and broaden their opportunities (Mortimore and Adams, 1999). The SLA also argues that the manner in which natural capital is used in combination with other assets should be the focus of development efforts. It focuses on people and the impact of processes and structures on the utilization of natural assets.

Financial capital: This refers to the monetary resources households use to achieve their livelihood objectives. Financial capital is the least available asset to the poor (DFID, 1999). This capital can either be accumulated by Sahelian households through savings which can be

in the form of cash and assets such as livestock and farm produce or through transfers such as pensions, other forms of benefits provided by the state, and migrant labour remittances. Financial capital is the most flexible of the livelihood assets available to the poor. For example, savings in the form of livestock can be converted into cash in order to purchase farm equipment. Financial capital can also be used directly in achieving livelihood outcomes, such as medical expenditure that improve the health conditions (human capital) of the sick.

The SLA argues that access to financial capital can be improved through developing effective and tailored financial services organizations, which are trustworthy and accessible to the poor. Examples of such organizations are Microfinance Institutions (MFIs). SLA stresses the need to put in place proper structure and processes in order for poor people to achieve financial sustainability. In order to secure access to financial resources, efforts must be made to develop financial services organizations such as savings, insurance and credit institutions; access needs to be extended to such organizations (DFID, 1999). Financial sector regulations must be transformed and support be given in the area of market development.

Social capital: this is made up of the social resources that people draw upon in order to achieve their objectives. It can be developed through networks and connectedness, which increase people's trust and ability to work together and enhances their access to wider institutions; it includes membership of formal organizations and relationship of trusts, reciprocity and exchange (Carney, 1998; DFID, 1999). Social capital reduces the effects of shocks such as famine, and also compensates for lack of other livelihood assets.

Physical capital: this consists of the basic infrastructure and capital goods and services upon which people draw in order to sustain their livelihoods. These include socio-economic infrastructure such as accessible roads, clean and affordable energy, adequate water supply, effective waste management and sanitation, secure accommodation, access to useful information, and affordable transport (DFID, 1999).

Different communities, social groups and households have differential access to these assets discussed above (DFID, 1999). According to the SLA, in order to construct livelihoods, the asset endowments that rural people have access to, and control over, must be combined effectively. The more access people have to assets, the greater are the chances of securing their livelihoods and therefore escaping poverty and lack. Scoones (1998:7-8), in supporting

this argument, posits that the ability of people to adopt different livelihood strategies is a function of the basic material and social, tangible and intangible assets which they have in their possession.

The poor lack the capacity to protect themselves against shocks (i.e. an immense, occasional and unpredictable disturbance with immediate impacts) and seasonality (over which they have little or no control) (DFID, 1999). The SLA argues that the contexts under which people are vulnerable have a direct impact on their assets and the livelihood strategy they adopt. Shocks such as drought, land and soil degradation, desertification or flood displace people and destroy their livelihood assets (DFID, 1999). Thus, SLA argues that the analysis of the vulnerability context will reveal that they are responsible for many of the sufferings experienced by the poor.

The approach establishes a relationship between livelihoods and the policies, institutions and processes (PIPs) that determine access to assets. For example, governments, through policies, for instance, can determine access to human capital assets.

SLA also employs participatory methods in understanding the priorities and needs of the poor, in order to provide access to the right kind of development infrastructure (DFID, 1999). It also stresses the importance of providing services that do not only meet the present needs of people, but also take into cognizance the long-term sustainability of such investments. Sustainable livelihoods can be achieved through the provision of services and infrastructure such as intermediate means of transport, bore holes and motorable roads that link local producers to markets.

In order to achieve sustainable livelihoods by those whose livelihoods are largely dependent on resource-based activities, the SLA recommends that direct support be made through technology, and direct action geared towards providing services that will ensure that natural resources and biodiversity are protected. Sustainability can also be achieved through the re-organization of institutions whose responsibility it is to govern and manage access to natural resources (DFID, 1999). Environmental laws and enforcement capabilities must also be strengthened.

LIVELIHOOD STRATEGIES

According to Tiffen et al. (1994), three main livelihood strategies are available to rural people: livelihood diversification, agricultural intensification, and migration (Mortimore and Adams, 1999; Herrmann and Hutchinson, 2005; Scoones, 1998:9-10). This study now looks at each of them in turn.

Agricultural Intensification: In her pioneering book, *The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure*, Boserup (1965: 7) argued (in contrariety to the neo-Malthusians) that population increase, rather than impacting negatively on agrarian communities, leads to intensification in agriculture which is an increase in output per additional input of labour. Boserup concedes, though, that this is not the case for communities with high population growth rate and which are already densely populated, and which are incapable of investing in more intensive methods of agriculture. Other works have since been nourished by Boserup's idea. Agricultural intensification is the additional units of labour or capital onto smallholdings in order to improve productivity. Mortimore and Adams (1999) extend the definition of agricultural intensification to include additional input of labour per hectare; the creation of capital like "water management structures or irrigation systems"; and the alteration of land management systems.

Diversification: According to Ellis (1998: 4), diversification refers to 'the process by which rural families construct a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their standards of living'. Livelihood diversification involves engaging in an array of off-farm and non-farm income-earning, activities such as vending and wage labour. Ellis argued that livelihood diversification can help alleviate the impact of seasonal fluctuations on the income security of rural households, if policies are focused towards removing constraints to diversification (Ellis, 1999). Diversification can also create more opportunities for women to make independent economic decisions (invariably also thereby improving the nutritional status of children); and, finally, the resources generated from the process of diversification can be used to improve the quality of capital assets such as human capital (e.g. sending children to school) and physical capital such as investing in farm implements (Ellis, 1999). Apart from keeping livestock and practicing agriculture, a few of the villagers of Gursulu are artisans who trade in wood carving, net making and blacksmithing.

Furthermore, Scoones (1998) argues that the degree to which people diversify depends on the level of access they have to capital assets and the level of risks related to alternative options. For Ellis (1998), migration is one of the most important methods of diversifying rural livelihoods. Research has shown that migrant remittances relieve rural credit constraints and mitigate their risks (Ellis, 1998).

Migration: Lastly, migration is a case where one or more household members move away temporarily or permanently either due to seasonal variations or higher income-earning opportunities in urban centres. It has been argued that migration may lead to decline in agricultural outputs in rural areas. For example, if there are better income-earning opportunities in distant labour markets, this will divert labour resources away from agriculture and, hence, a depletion of the labour force required to prepare the land and harvest farm produce (Ellis, 1999).

All of these livelihoods strategies are pursued in order to achieve livelihood outcomes which may include an addition to household incomes; an enhanced livelihood resilience; improved wellbeing and capabilities which can be in terms of social inclusion, access to affordable health care and education; opening up of the political space and security of lives and property; more sustainable and efficient use of non-renewable natural resources; and improved food security for the poor (Scoones 1998, DFID 1999). The points mentioned above are important because they broaden the understanding of the purpose of peasants to pursue an array of livelihood strategies. In Gursulu, peasant households pursue a range of livelihood strategies which do not only increase their incomes and enhance their livelihoods but also facilitate their access to health care, social inclusion, education, etc. For example, many households in Gursulu have children in various stages of their education.

CHAPTER THREE

PEASANT LIVELIHOOD AND DEVELOPMENT IN NORTHERN NIGERIA

3.1. HISTORICAL OVERVIEW

This chapter of the Research Report examines the complex relationships between the environmental crises of drought and desertification, and the essential strengths and weaknesses of socio-political and economic systems. Environmental crises are much more than natural events: though they may have natural causes and can be human-induced, they also reveal the nature of the productive activities of a given community and the strengths and weaknesses of socio-political and economic systems to cope with the crisis (Apeldoorn, 1981:73).

In other words, hazards resulting from drought and desertification provide us a window through which to study the way in which the community (so stricken) functions. As Watts (1983b: 352) points out: an environmental crisis reveals the adaptive capacity, or lack of it, of communities, in dealing with these hazards. Thus, it reflects the capacity of a society to cope with the environmental crisis and its effects, and so, the social systems in place. For example, as will be shown, pre-capitalist Sahelian societies devised in-built strategies at the household, village, and larger state levels, to respond to the incessant environmental perturbations they encountered.

This section examines the livelihood strategy of peasant households of these pre-capitalist communities. It also shows the impact of the European colonial integration of Sahelian peasant societies into the capitalist economy. Furthermore, this chapter shows how Sahelian peasants construct their livelihoods in the contemporary period, and how the neo-liberal policies of the Structural Adjustment Programme era impacted negatively upon the livelihoods of smallholder farmers. In short, it discusses the pre-colonial, colonial and contemporary eras.

A. PRE-COLONIAL: PEASANT VULNERABILITY AND ADAPTIVE STRATEGIES

> There are districts in which the position of the rural population is that of a man standing permanently up to the neck in water, so that even a ripple is sufficient to drown him (Scott, 1976:1)[10]

[10] The quotation was Tawney's and it was in reference to China in 1931, but this condition very well fits with the Sahelian dry zones of northern Nigeria (see Scott, 1976:1).

Drought and desertification are recursive phenomena in the Sahelio-Sudanic region. The semi-arid region of northern Nigeria, for example, has since the pre-colonial era experienced variation in rainfall patterns, desertification and land degradation, with their attendant effects on soil and land bioproductivity. Watts (1983a: 82) notes that climate variability is a historical phenomenon, and so, it would be mistaken and simplistic to presume that Sahelian farmers were (or are) totally unprepared for climatic variability like drought, to which one could add desertification.

Oguntoyinbo (1981) has traced the impact of human activities on climate variability in Africa. He notes that it was not until the time of the Roman occupation of North Africa in about 100 BC that we began to notice successively drier climates in the Sahara, though this period was not as dry as it is today. Citing Sikes, Oguntoyinbo (1981:141) argues that the fluctuations in the levels of the Lake Chad reveal the nature of climate variation in the Sahara. He therefore concludes that if the rise and fall of the Lake Chad can be taken to represent climate variability in the arid zone in the period before "instrumental records", it is possible that rainfall in the arid zone has similarly shown dramatic variability which, it is possible, impacted on land use practices periodically. The areas receiving less than 1000 mm of annual rainfall are those mostly affected (Oguntoyinbo, 1981: 141).

The report of the United Nations Conference on Desertification (1977:4) rightly points out that Sahelian peasant households developed over the years a cropping system that was adapted to a wet season, which became increasingly shorter and unreliable as one moved northward. The region experienced an intensive rainy season which lasted for about 3-4 months. The region also experienced 7-8 months of intensely dry, hot and windy periods. Hence, abnormal rainfall characterizes the semi-arid region.

The main feature of rainfall in the Sahel is its variability, so that the often used criterion of long-term average rainfall has almost no meaning there at all (Apeldoorn, 1981: 22). Yet Watts (1983b: 354) reports that the average annual rainfall for the Katsina station for the periods 1922-1969 was 29.6 inches [751.8 mm] (standard deviation 4.9 inches [120.1 mm]). Since households in northern Nigeria are heavily dependent on rain-fed agriculture, agricultural activities are concentrated on the short period of rainfall; and this factor makes households vulnerable to persistent drought and desertification in this region. Hence,

Apeldoorn (1981: 22) is right to say that the characteristics of rainfall are a key factor in determining the economic activities in this region.

The availability of water for dryland cropping, domestic use and livestock rearing was, and is, very important for households, especially for the arid and semi-arid regions. The nature of the predominant soil type in the Sahel, Aeolian—which carries "a large water deficit at the beginning of the planting season" (Watts: 1983b:354)—makes the distribution and variability of precipitation a very important factor for agricultural practices. Another important constraint that households faced was that their farming system was marked by simple hand tool technology; they used little or no technologically improved inputs. Lastly, households in the marginal region also had to contend with disease, pest and weed invasion, and erosion. But, rainfall variability and their attendant impacts on soil and land bioproductivity were the most important constraints that Sahelian households faced. These constraints impacted, in various ways, solely, or in concert, on the livelihoods and adaptive capacities of Sahelian peasants.

THE LEVEL OF RESPONSE TO HARZARDS AND FAMINE IN 19TH CENTURY SAHELIAN SOCIETIES

To understand the adaptive strategy of peasant communities faced with drought and desertification in pre-colonial Sahelian societies, and to enable one appreciate the nature of the European colonial erosion of the adaptive strategies of the livelihoods of Sahelian societies, it is important to examine the way in which the political economy functioned. The basic unit of the social system was the extended household (*gida*), and it functioned as the basic unit of production and consumption of food and other crops in pre-colonial northern Nigeria and elsewhere in Africa. This comprised of the families of married junior brothers and their sons, the household head's family, married sons, clients and slaves. The social relationships within the *gida* primarily took the form of *gandu* in which the *maigida*, a male figure (who could be both husband and father) was the head of the household.

Gandu were not only concerned with agricultural and pastoral production; craft production like wood carving, net making and blacksmithing was commonly practiced by households. More so, they produced from locally generated cotton handicrafts like textiles. While the surplus from these activities were used for local and regional trade, the majority of

agricultural and handicraft production was used primarily for subsistence. There was enough surplus for local and regional trade (U.S. Congress, 1986: 32).

Writing about Climatic Variability and Food Crop Production in West Africa, Oguntoyinbo (1981: 143; see also Apeldoorn, 1981:90-92) writes of the several roles of the *maigida*. He notes that within the extended household, the function of assigning labour and sharing land "between cultivated and fallow areas" rested with the *maigida*. After harvest, the *maigida* also apportioned food between immediate consumption and food to be preserved and consumed during the dry season, and also between that to be "exchanged with pastoralists for animal products" and that to be stored as "an insurance against the possibility of harvest failure due to drought or plagues". In addition to organizing its members for production and distribution, the *maigida* oversaw the payment of taxes. Oguntoyinbo sums up the role of the *maigida* in pre-colonial times: "This organisation of the extended family thus provided for the maintenance of resources via controlled cultivation and regular fallowing, and for the protection of people from the effects of droughts and plagues through controlled use and storage of food" (1981: 143). Therefore, the peasant household in pre-colonial Hausaland formed the first line of defence against hazards resulting from drought and desertification.

The second level of response to environmental hazards in pre-colonial northern Nigeria was the village. Communities were made up of several households under the direction of village heads whose functions included "land sales and village adjudication" (Watts, 1983b: 354). The ruling class (the *masu sarauta*) was given a portion of the surplus produced by the peasants as labour, grains or cash, and the grains were (partially) redistributed in periods of food shortages. Taxation was collected by the agents (*jakadu*) of the *masu sarauta*, or of the emir directly, and there were different forms of taxation such as grain tax, land tax, etc. Watts says, "The office holders had tenure over 'fiefs' given by the Emir, though they usually resided on private estates worked by slave, client and hired laboUr; they could also demand *corvee* labour from villages within their territorial jurisdiction" (1983b:354).

The state was the final level of response to environmental hazards, a point to which I will return. But what was the nature of the state and what were its functions in nineteenth century pre-colonial Sahelian societies? The Sokoto Caliphate was the state structure that encompassed the whole of Hausaland and that controlled what are now the north-west and north-central Nigeria, as well as territories to the west and south of this. Created by the Jihad

of 1804-1808, the Sokoto Caliphate quickly became the largest state in the region, with Kano as its commercial capital (Austin, 2004, no page number). This state had the power to control and coerce those under its jurisdiction, but it also provided protection for the peasants and travelling merchants, and "organised large-scale labour projects and acted as a guarantor in times of needs" (Watts, 1983b: 354). The state was not a static social structure, as it "possessed its own contradictions, methods of surplus extraction and ideological hegemony" (ibid). There were several states in West Africa with a similar nature and functions to the Sokoto Caliphate. An example was the Sultanate of Damagaram (in the present day Niger Republic), which came into existence around the year 1820: comprising Hausa, Kanuri, Fulfulde, and Tamacheg speakers, it was governed by the Kanuri elite (Arnould, 1986: 326).

LIVELIHOODS STRATEGIES: SUBSISTENCE AND ADAPTATION

Given the precariousness of the existential *throwness*[11] of Sahelian peasants in pre-colonial societies, where rainfall pattern was (as it still is) erratic, where harvest was (as it still is) variable, and where desertification constituted (as it still constitutes), a hazard, Sahelian peasants were preoccupied with subsistence and with the constant fear of crop failure that could lead to famine. Scott (1976:2) provides speaks of the evolution of a "subsistence ethic" in pre-capitalist peasant societies[12]. He argues that the impact of periodic food crises left a deep-seated mark on the fears, values and habits of peasant households, and gave birth to a "subsistence ethic". The subsistence ethic, he says, was the result of living close to the margin in a society with climatic unreliability, and which peasants, in order to survive, preferred, in their productive practices, to avoid failure which is ruinous to survivall. Watts (1983a: 16) makes this selfsame point: in their subsistence, peasants were concerned with

> …long-term sustainable income rather than short term maximization. There was little room for bourgeois calculus in peasant life; as risk-averse individuals, their goal was the achievement of low fluctuations in consumptions streams through time, regardless of fluctuations in income and production. The moral economy, then, was all about survival and simple reproduction (Watts, 1983a:16).

[11] By existential *throwness*, I mean that Sahelian peasants found themselves (without their own choosing) in their marginal environment , where rainfall is highly variable and unpredictable, and where desertification is a menace.

[12] The subsistence ethic is not only limited to pre-capitalist nineteenth-century Sahelian societies. Scotts says that Southeast Asian peasants shared this ethic with nineteen century France, Russia, and Italy (Scott, 1976:2).

Their continued existence was secured through rain-fed agriculture, adjusted and adapted for in the game of life in their marginal environment. Thus, these peasants acquired, over time, an "adaptive flexibility and adjustment capability" with regards to drought and desertification. A U.S. Congress report (1986) concurs with this view, when it writes that Sahelian peasants evolved a complex farming and herding system that was adapted to the environment. The selfsame point was made slightly differently by Oguntoyinbo (1981: 143): Before the advent of European colonialism in the Sudan Sahelian zone, he says, "the principal societies of the Sahel, that is, the nomads such as the Tuareg, the farmers such as the Hausa, and the pastoralists such as the Fulani, had developed social, economic, political, and land use systems which enhanced their survival within the constraints imposed by their local environment".

Writing about rebellion and subsistence in Southeast Asia, Scott (1976: 2) notes that though household agricultural productivity was, in part, dependent on fate, the "local tradition of seed varieties, planting techniques, and timing was designed over centuries of trial and error to produce the most stable and reliable yield possible under the circumstances". According to Scott, this was "adaptive flexibility," that is, the capacity to cope in a risky environment is inherent to peasant communities in general (Watts, 1983b: 356). He goes on to note that these pre-capitalist communities, to a large extent, were structured "around the problem of risk and the guarantee of a minimal subsistence, a margin of security" (Scott, as cited in Watts: 1983, 28). Scott (1979) and Watts (1983b) have, in their different ways, identified three dimensions of the pre-colonial "subsistence ethic," that are consistent with international literature on peasant livelihoods strategy.

RESPONSE TO DROUGHT AND DESERTIFICATION: SAFETY-FIRST; RISK AVERSION PRINCIPLE

Pre-colonial societies in northern Nigeria understood, to some extent, the functioning of their unstable environment, and thus had structured their subsistence ethic around what Scott, following Roumasset, called a "safety-first"[13] principle (Scott, 1976: 15; Watt, 1983b: 356). This subsistence ethic involved a number of activities geared towards environmental risk

[13] Scott adopted the term, "safety-first" from James Roumasset's "Risk and Choices of Technique for Peasant Agriculture: Safety First and Rice Production in the Philippines," Social Systems Research Institute, University of Wisconsin, *Economic Development and International Economics*, No 7118 (1971).

aversion. Given their knowledge of the fickleness of their environment, they favoured diverse cereal varieties that were locally adapted. They were more concerned in their productive practice, with growing consumption crops as opposed to those for the market.

This is *not* to suggest that commercial, markat activity and trading was foreign to these communities; in fact, in favourable climatic years, some of these communities engaged in both regional and trans-Saharan trade[14]. This Research Report argues that European colonialism did not introduce commercialization to the Sahelian peasants, but incorporated and integrated them into the global system of capitalism on an intense and unprecedented *scale*. Although peasants in Gursulu produced for the *gida*, they traded crops and livestock when in need of cash for household needs and for farm inputs. This strategy of selling crops and livestock is related to the livelihood strategy of diversification.

Peasant societies have engaged, over time, in advantageous land use practices such as diversifying cropping, either by intercropping or by rotational cropping. Other rationales for intercropping have been to safeguard against crop failure, erosion, soil infertility and weed encroachment. Thus, peasant households in pre-colonial northern Nigerian relied on "historically established planting and intercropping strategies" (Watts, 1983b: 356). Citing Fergusion (1973) and Usman (1974), Watts says further that just as it is the practice today, intercropping then involved intercropping sorghum and millet, because each has different moisture needs and shade requirements. Also, they favoured drought-resistant crops like cassava. They also resorted to collecting and hunting as an adaptive strategy. In so doing, Watts says "agricultural diversity and agronomic variation bred a systematic stability" (1983b: 356). Agronomists working in the Sahel, particularly in northern Nigeria, have since come to affirm the rightness of these ancient, indigenous planting methods, the intercropping

[14] For example, the Sokoto Caliphate did not only engage in the trans-Saharan Caravan trade with parts of North Africa, but also traded with regions that are now referred to as the Republics of Nigeria, Niger and Benin, and, Chad and Cameroun (Austin, 2004, no page number). Before British colonialism, the central emirates (Katsina, Kano and Zaria) of the Sokoto Caliphate provided the main market for salt from its neighbour, Bornu, and from the Sahel and the Desert region. Also, the Asante Kingdom (presently Ghana) "benefited from the growing purchasing power within the Caliphate, which increased effective demand for the one dietary stimulant available and permitted to its Muslim inhabitants: kola nuts. Of these Asante was a near-monopoly supplier for much of the century, importing in return slaves, cloth, salt, leather goods and other commodities" (Austin, 2004, no page number). A number of studies have documented the commercial engagements of pre-colonial societies (see for instance Roberts, 1980; Lovejoy and Baier, 1975).

and crop rotation patterns of traditional Sahelian peasants, as most appropriate to regions prone to desertification and droughts.

A GUARANTEE OF A MIMIMUM FOOD SUPPLY

Pre-colonial peasant societies were not only organized according to the precautionary principle of risk aversion, but were also geared towards responding to food shortages. Their livelihoods strategy, to guarantee a minimum food supply, included three vital strategies, listed here and discussed in the next paragraph: closure of the granaries for long-term preservation; migration during the dry season or the inbetween planting and harvesting season; and reliance on the social network of kinship ties to guarantee a minimum of food supply.

The pre-harvest period was largely characterized by hunger. In response to this, Sahelian peasant households engaged in the long-term preservation of grains and food, which operated as an insurance against the pre-harvest hunger period. It is this factor that managed to preserve a measure of self-sufficiency in pre-colonial societies (Watts: 1983b: 356). After the harvest, as was mentioned above, the householder apportioned food between that for immediate consumption and that to be preserved and consumed during the dry season, and between that to be "exchanged with pastoralists for animal products" and that to be stored as "an insurance against the possibility of harvest failure due to drought or plagues" (Oguntoyinbo, 1981: 143).

To these ends, household granaries were closed after the harvest period. The post-harvest granaries closure period coincided with the time when male adults of the household departed for dry season migration on *corvee* labour on state-sponsored projects. Male adult members of households often engaged in off-farm activities as a strategy in response to food shortages caused by drought and desertification. Seasonal food shortages, more intense at the start of the planting season, were eased by participating in communal work parties and short-distance migration by members of households (Watts, 1983b: 357).

Kinship and clan ties were very important social networks in peasant communities, as they were a way in which the subsistence ethic of pre-colonial communities was expressed through social activities and institutions (Watts, 1983b: 356). Pre-colonial societies drew upon social resources built around the logic of gift-giving, which was a tendency towards

mutual support. Watts (1983b: 357) says that the logic of gift-giving, characteristic of peasant societies, was central to the subsistence ethic. Hence, kinship here plays an important role as it serves to spread risk and to act as insurance for the security of households. Hence, Faulkingham (1971) has noted that the function of the clan among non-Muslim Hausa was that "when the grain stores of one household are exhausted, its head may borrow grain from another … household and repay the grain at harvest without interest" (Watts, 1983b: 367).

The institutional structure of the state was designed such that resources were partially redistributed, in times of environmental crisis, from the elite to the peasants. For example, Raulin (1964) has shown that foodstuffs were distributed in the pre-harvest period during the communal work group (Watts, 1983b: 357). The office of the *sarkin noma* (meaning "king of farming," who was elected because of his ability to produce grains in excess of 1,000 bundles), according to Nicolas (1966), also played an important function in the subsistence ethic of peasant societies (Watts, 1983b: 357). The office of the *sarkin noma* served as a redistributive mechanism whereby foodstuffs were distributed during the harvest festival, on the one hand, and on the other, it served as a defence against famine as households whose grains were exhausted obtained an interest-free loan of grain from the *sarkin noma*'s grain stores, to be repaid at harvest time (Watts, 1983b: 357).

At the state level, office holders ensured that this redistribution of accumulation was practiced at the village level. In this regard, the village head was obliged to see to this redistribution. And village heads took recourse to the next level of hierarchy (the fief holder) in instances when they were overwhelmed by severe environmental crises. According to Watts (1983b: 357, in the Katsina Emirate, the district heads maintained stores of grains in many centres of the district. Another level of response, often employed during instances of food shortages, was the state structure, which could resort to the grain it collected and stored in the central granaries from the grain tithe, for redistribution. In this fashion, responses to food shortages were graduated with respect to time and depth of commitment. The early responses tended to be shallow and reversible − perhaps the sale of livestock or familial loans—and the later ones less flexible, perhaps culminating in widespread dislocation through permanent out migration or even death.

The above-discussed adaptive arrangements developed by the Sahelian peasants (and their overlords) enabled them to "iron out the 'ripples that might drown a man'" (Scott, 1976:3).

To the examination of European colonialism's impacts on peasants' adaptive strategies this Research Report now turns.

B. EUROPEAN COLONIALISM: TAXATION, MONETIZATION AND CASH CROP PRODUCTION

> Any understanding of hunger in the colonial period must be grounded in a recognition of the gradual and selective transformation of peasants into small commodity producers and semiproletarians, and the logic of a retarded capitalism which did not revolutionize the productive forces (Watts, 1983a: 152).

This Research Report recognizes that "colonialism" comprises far more than European colonialism. Colonialism can be used to describe series of historical events characterized by the invasion and subjugation of a particular group, people, culture or nation by an outside hegemonic force, including that entailed in African state formation in the Sahel prior to the European annexation of territories in the 1800s and 1900s. However, within the purview of this study, the term "colonialism" is used primarily to refer to the invasion, subjugation and annexation of the African peoples and territory by Europeans.

With the introduction of European colonialism in the Sahel, principally in northern Nigeria, the hitherto discussed adaptive arrangements developed by the Sahelian peasants to enabled them "iron out the 'ripples that might drown a man'" were affected. Peasant households in rural Hausaland became more vulnerable to drought, desertification and famine. This was a novel experience for the Sahelian households, as it incorporated them into the global system of capitalist production.

With this development, British colonial rule resulted in a situation whereby relatively self-sufficient peasant communities lost their autonomy and became part of a highly integrated global network. When societies and economy expand, they "trade autarky for access to a wider range of goods and services, new and courser patterns of resource valuation and selection replace old, finer patterns. Specialization replaces diversity; economic risk is added to natural risk" (Watts, 1983b: 350; Watts, 1983a:14-151). This was achieved primarily through taxation, export commodity production, and monetization. Writing about the transformation of the Sudanese economy, Shepherd (1984: 81-82) says that the penetration

of the "market economy" and the creation of a "dual economy" has been the primary factor that influences land-use pattern in the peasant economy of the Sudan. He identifies taxation, the marketing of consumption goods, the prohibition of local cotton cultivation, as well as persuasion and forced recruitment, and even the restriction of development outside the Gezira Scheme, as mechanisms used by the colonial regime to achieve its aims. These were mechanisms that European colonialism introduced for the purposes of extracting surpluses from peasants, while simultaneously making cash crop production mandatory for peasants.

The Nigerian experience of European colonialism was somewhat different to the Sudan case, as only minimal technological change was introduced. There was no major, innovative, reorganization of the productive system. The means of production were left in the control of peasant producers (Blaikie and Brookfield, 1987: 103). This is not to say that the greater output demanded by the colonialists was not "achieved through new forms of agronomic and productive organization" Yet, it was the process of incorporation into the global capitalist system itself led to the transformation of the social relations of production (Watts, 1984: 133). As Shenton and Freud (1978) stated, "Colonialism wrought productive, political, and social change, and at the same time preserved some dimensions of pre-capitalist society in order to supply cheap commodities including labour power" (Watts, 1983a:152). With the conquest of northern Nigeria and the construction of the railway in the north, which reached Kano in 1911, the trans-Saharan trade declined, as trade was redirected to the coast. Hence, the Sahel lost its centrality as a major trade route with this development. This impacted on the revenue base of the elite, and on the trade outlets for local craft (Apeldoorn, 1996: 96).

We turn now to a discussion of the British introduction of taxation, monetization, and the colonial emphasis on cash crop production. This was achieved by integrating indigenous modes of production into the colonial and global economy. In northern Nigeria, European colonial rule succeeded in integrating the peasant Sahelian societies into colonial and global capitalist markets through three mechanisms for extracting surpluses: taxation, export commodity production, and monetization. Here, merchant capital supported by the colonial state played a big role.

TAXATION, MONETIZATION AND CASH PRODUCTION

In northern Nigeria, the British colonial government re-organized taxation to extract surpluses for the British economy, and to fund the government of the colony. Taxation was

used to either extract revenue in cash, or, in the case of a much-needed commodity for metropolitan capital, as an instrument for extracting commercial produce from peasant farmers, ensuring that peasants produced certain cash crops.

This was achieved by retaining the pre-colonial mode of taxation. Taxation was important for British governance. It was perceived as a "stimulus to production, as a source of revenue for the support of the British colonial administration… Without income from taxation they could not provide for development, let alone the payment of officials on a regular basis. Without a taxation there could be no treasury, and without a treasury no eventual measure of self rule" (Watts. 1983a: 160). This is not to suggest that pre-colonial administrators in northern Nigeria were not exploitative, as the use of slave labour, and the appropriation of peasant surplus attest.

But there was an important difference between pre-colonial and colonial taxation systems, which Watts (1984: 134) discusses. Whereas in pre-colonial time, a portion of the peasant surplus was appropriated by a ruling class of officeholders, the *masu sarauta*; in the colonial era, the European colonial administration reorganized taxation with the view to diverting the surpluses that were initially collected by the *masu sarauta* for their own purses. Whereas, taxes remained at the same rate as in pre-colonial times, in the British era, there was, from time to time, a sharp increase in taxes so as to compensate for the decline in the revenue of the *masu sarauta* who formerly received surpluses in cash or kind from the peasants. The problem was that, as opposed to the pre-colonial period where taxes "were regular, reasonable predictable, and rigid" (Watts, 1984: 134) and where pre-colonial system of taxation (the *Jekada* system) took cognizance of the existential circumstances of the peasant producers (like late and irregular rains, poor harvests, seasonal hunger, and a precarious environment that was subject to perturbations ranging from locust invasions to droughts and desertification) and adjusted taxation accordingly, the colonial system of taxation was inflexible and was unmindful of the aforementioned realities of Sahelian societies.

Moreover, British colonialists insisted that taxation be paid in cash as opposed to the pre-colonial era where taxation could be paid in the form of kind (grains), or as *corvee* labour. Lastly, to help facilitate the transition to the newly introduced monetary economy and cash crop production, the timing of tax collection became very important. It became customary to collect taxes before the harvest season, and sometimes during planting seasons, when the

grain reserves of the households were exhausted. In this way, advance payments for cash crops particularly cotton were provided by middlemen operating on behalf of merchant capital. This ensured that peasants continued to produce cash crops, which were sold to raise tax. Furthermore, by insisting on export crop production, the British colonial government downplayed grain production, as well as petty commodity trades and crafts. The insistence on cash crop production left grain reserves at the household level diminished. More so, the reserves of the rulers no longer existed, as this precautionary mechanism was discarded in the colonial reorganization of taxation.

The consequences of the European colonial era were enormous: the subsistence security of the traditional social structures, which enabled subsistence communities to absorb shocks, were affected. The impact of this phase saw the withering of integrative mechanisms based on kinship, locality and primary relations, to a new type of social order based on the market (Watts, 1983b: 351).

The table below, taken from Watts (1984: 133), shows the matrix of the effects of British colonial policy on peasants.

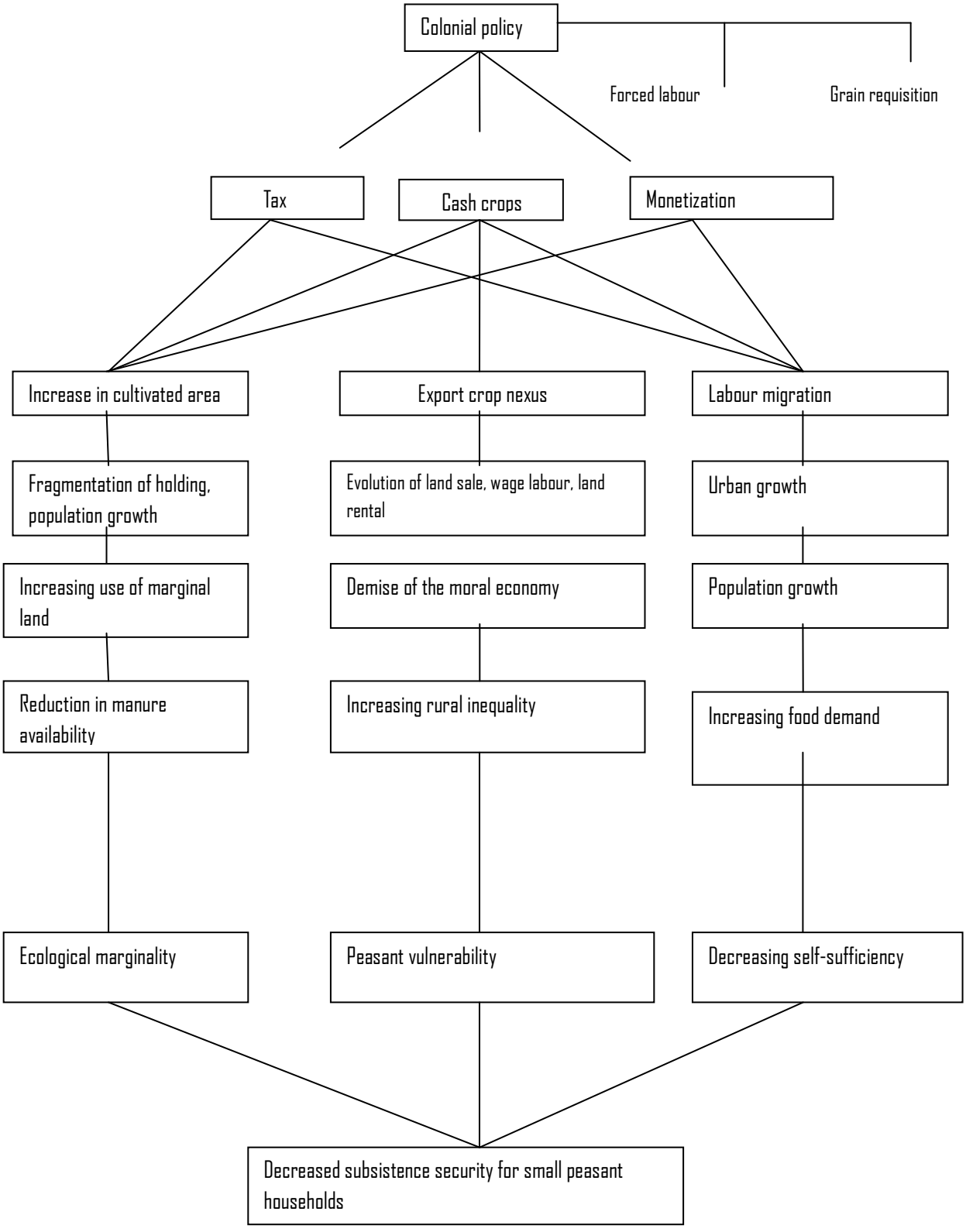


Figure 3: The impact of European colonialism on the subsistence security of peasant households in northern Nigeria. From Watts, M. (1984: 132).

DROUGHTS IN NORTHERN NIGERIA

Shortages of rainfall have been one of the major constraints in the Sahel, mainly because of the problem of drought in the Sahel region. In the Sahel, this has resulted in increasing incidences of drought and desertification. The increased vulnerability to hazards of the peasant was revealed in the major droughts and famines of the British colonial period: 1914, 1927, 1942 and 1951 (Watts, 1984: 135). The table below presents the characteristics of drought in West Africa from 1914 to 1968.

Period	Characteristics	Intensity
1913-1914	Famine Grand Brassee or Machete of Niger, Kunakura (Big Famine, Borne)	Severe drought and famine widespread. Mass migration of Tuaregs into Northern Nigeria; 4000 deaths reported north of Katsina, mostly migrants from Niger: compared in intensity and severity with 1972-1974 drought.
1914-1931	Localised scarcities	Famine but only a few deaths.
1931-1931	Sudan famine	Locust invasion complicated the effects of drought, which in itself was due to late rains. Deaths in three districts of Niamey numbered 26, 727; emigration to Nigeria numbered 29,311.
1942	Yar Gusau Sokoto, Katsina, Kano and Western Niger	Hit Sokoto, Katsina, Kano in Nigeria and Western Niger. Three successive years of rainfall failure resulted in poor harvest. This was aggravated by wartime economies and governmental measures both in Nigeria and Niger; again influx of migrants into Nigeria
1951-1954	Famines Borno and Kano	This was brought about by heavy rainfall which, on sandy soil, results in the sandy stratum covering the seeds. People lived on cassava meals, food prices rose very high. In Borno Guinea corn (sorghum) sold at £23 to £26 per ton as against £ 14 to £17 a year later; in Kano 105s. as against 50s. a year later.
1955-1968	Good harvests	No major reports of widespread famine.

Table 1: Characteristics of drought in West Africa between 1914 and 1968. (Source: Oguntoyinbo, 1981).

C. CONTEMPORARY NIGERIA: NIGERIAN AGRICULTURAL POLICY AND THE STRUCTURAL ADJUSTMENT POLICY

In both the colonial and the post-colonial eras, agriculture, particularly smallholder peasant cultivation, was the backbone of the Nigerian economy – at least until the discovery of oil. Yet this sector was largely neglected until the 1970s, when the Nigerian Government's efforts became directed towards improving agricultural productivity in Nigeria. However, despite the central role of agriculture in the Nigerian economy, agriculture remains largely underperforming. This section argues that the poor performance of agriculture in Nigeria is not solely because of its neglect, but also as a result of a series of misdirected policies. The World Bank (2000) rightly points out that the poor performance in Africa's agriculture should not be attributed solely to poor technology or to bad geography but also to policy failures. Yet, these were not only policies of African governments, but also of the IMF and World Bank in the 1980s. This Research Report now discusses the impact of the Structural Adjustment Programme (on agriculture) adopted by the Nigerian government.

In the colonial 1930s and early 1940s, Nigeria began to adopt the model of development termed import-substitution-industrialization. This shift in development outlook was because the major trading companies in Nigeria, which monopolized the colonial raw material economy, began restructuring their operations from a mainly commercial orientation to an import-substitution manufacturing-based industry.

Nigerian import-substitution industrialization was built on a simple logic. These companies used foreign exchange generated from the export of primary commodities like cocoa, cotton, ground nuts, palm produce, tin, and columbite, for importing inputs into Nigeria so as to produce, locally, consumer goods that were formerly imported into the country (Olukoshi, 1996b: 55). However, although import-substitution industrialization was used, no attempt was made by these firms to source these inputs locally. What this translated into was that peasant agricultural and mining activities continued to foster the industrialization process in Western nations, rather than supporting a thoroughgoing industrialization of Nigeria. (Olukoshi, 1996b: 55). In this fashion, the agricultural sector in Nigeria could not industrialize or expand in new directions, as the raw materials for industrial purposes were imported.

The limitations of this form of import-substitution-industrialization (which lasted until the 1970s) were multifaceted. First, the local value-added to commodities produced was very low, because the inputs for industrial purposes were sourced externally. Secondly, the balance of payments position of the Nigerian economy was almost always placed under stress by the increasing local demand for manufactured goods – and so, for imported inputs (Olukoshi, 1996b: 55).

The post-independence state left this path of import-substitution-industrialization from the 1970s onward, starting to rely solely on the exports of the rapidly expanding oil industry. The Nigerian economy enjoyed an unparalleled economic boom in the 1970s because of the global oil price rises of the time. The economic boom that Nigeria experienced in the 1970s was directly occasioned by the oil shocks of the 1970s. Olukoshi (1996a: 1) says that "from less than $4 a barrel in 1973, the price of the country's light grade crude oil rose in the world market to about $42 in the 1980s in the context of an increasing daily output for export". The oil boom had a positive impact on the Nigeria economy, as it protected it from the effects of the world capitalist recession of the 1970s: it was able to avoid most of the negative effects experienced by non-oil exporting African countries.

Hence, while most African states suffered economic stagnation at this time, the Nigerian economy soared. Its industries experienced ongoing growth in output, a rising per capita national income, a healthy balance of payments position, external reserves sufficient to cover the import needs of the economy for some months etc. Because of the huge increase in the foreign exchange earnings of Nigeria as a result of the petrodollar, the Nigerian government's expenditure was also enabled to soar, and between the years 1972 to 1974, the government's expenditure doubled (Colman and Okorie, 1998: 341-342). This was accompanied by huge public sector spending, by internal and external borrowing, by massive investment in the construction industries, and by a range of subsidies to different groups.

The boom of the 1980s came to a screeching stop by the early 1983-4, as the world oil price declined sharply by 45 per cent from the 1980 prices. With this oil price decline, Nigeria experienced a steady economic crisis, leading to a Structural Adjustment period that would force Nigeria to rethink its development path. The economic crisis spread to different sectors of the economy such as industry, agriculture, etc. Olukoshi (1996a:1) argues, "it is the crisis that provides the immediate domestic context for the adoption by the Nigerian state of an

orthodox programme of structural adjustment sponsored by the International Monetary Fund (IMF) and the World Bank".

With the economic crisis witnessed in Nigeria in the 1980s, the World Bank/ IMF argued against the government policies of price controls and of guaranteed minimum prices for grains, of input subsidies, of centralized marketing and of agricultural export monopolies. Instead the two bodies argued for reliance on market mechanisms in the conduct of economic activities. The objectives of the Structural Adjustment Programme, as officially expressed by the Nigerian government (presented by Olukoshi 1996b: 60), included:

- the restructuring and diversification of the Nigerian economy in order to reduce the country's dependence on the oil sector and on imports;
- the achievement of fiscal and balance payment viability for the country in the short- to medium-term;
- the establishment of the basis for a sustainable non-inflationary economy, or at least minimal inflationary growth; and
- the reduction of the dominance of unproductive investments in the public sector, the improvement of that sector's efficiency, as well as the enhancement and the growth potential of the private sector.

Olukoshi (1996b: 61) says that the objectives of SAP are to be achieved through:

- the strengthening of demand-management policies;
- the adoption of measures to stimulate domestic production and to broaden the supply base of the economy;
- the adoption of a realistic exchange rate policy through the establishment of a Second-tier Foreign Exchange Market (SFEM), later renamed the Foreign Exchange Market (FEM);
- the rationalization and restructuring of the country's tariff regime, in order to aid the promotion of industrial diversification;
- the progressive liberalization of trade and payments;
- the reduction of complex administrative controls, and the fostering of reliance on market forces;
- the adoption of appropriate pricing policies for public enterprises; and
- the rationalization and commercialization or privatization of state enterprises

In summary, from its inception, the main policies of the Structural Adjustment Programme of 1986 were the adoption of a realistic exchange rate, deregulation and greater reliance on market forces, trade liberalization, the removal of subsidies on public sector goods and services, the privatization of state enterprises, and the reduction of government sector generally (Mesike, Giroh and Owie, 2008).

In the agricultural sector, our focus, the Structural Adjustment Programme translated into the following policies: product price decontrol, the removal of subsidies on agricultural inputs and services, the abolition of commodity boards, and the privatization and commercialization of government agricultural and agro-industrial enterprises (Mesike, Giroh and Owie, 2008). Given that most Sehelian households are poor, the removal of agricultural subsidies and the liberalization of trade due to pressure from the IMF made it difficult for peasant households to afford agricultural inputs for their farming practices. More so, their commodities (for example, rice) were unable to compete in the global markets, in part because of the removal of various subsidies, and in part because of the liberalization of trade implemented by the Structural Adjustment Programme.

CONCLUSION TO SECTION

The implication of this discussion of Sahelian pre-capitalists societies' adaptive ability is that indigenous knowledge should be taken seriously, and incorporated into policies that are designed to enhance their livelihoods. Thus, understanding the livelihood strategies of the aforementioned rural households in the face of constraints will enable government to initiate policies that are geared towards removing constraints, and towards expanding opportunities for the rural poor (Ellis, 1998). This is because they are well aware of the functioning of their environment, and their farming techniques are well suited to their environment. This position obviously challenges the view that drought and desertification are simply caused by, and aggravated by, peasants' ignorance of better productive practices.

Secondly, development projects that are geared towards securing and enhancing the livelihoods of the poor should, as stressed by the livelihoods approach, employ participatory methods in articulating the priorities and needs of the poor, enabling access to the right kind of infrastructure i.e. infrastructure that does not only meet the need of the present generation, but that also take into cognizance the long-term sustenance of the peasants. It also advocates the provision of services and infrastructure such as intermediate means of transport, boreholes and motorable roads that link local producers to markets.

Lastly, the foregoing discussion has also shown that, although West African Sahelian pre-capitalist societies experienced environment hazards, they devised adaptive strategies at the household, community and state levels to cope with their precarious conditions; the global market economy introduced by colonial capitalists weakened the subsistence ethic that was

evolved by these communities. The result is that Sahelian peasant societies are no longer able to deal with drought and desertification as well as before. While postcolonial policies did provide some support through subsidies and controls, so mitigating these effects, the discussion on the contemporary era has also shown that, along with the previous constraints, peasants faced, the policies of the Structural Adjustment Programme again worsened the ability of peasants to deal with their precarious environment and eke out their livelihoods.

3.2. DESERTIFICATION IN NORTHERN NIGERIA

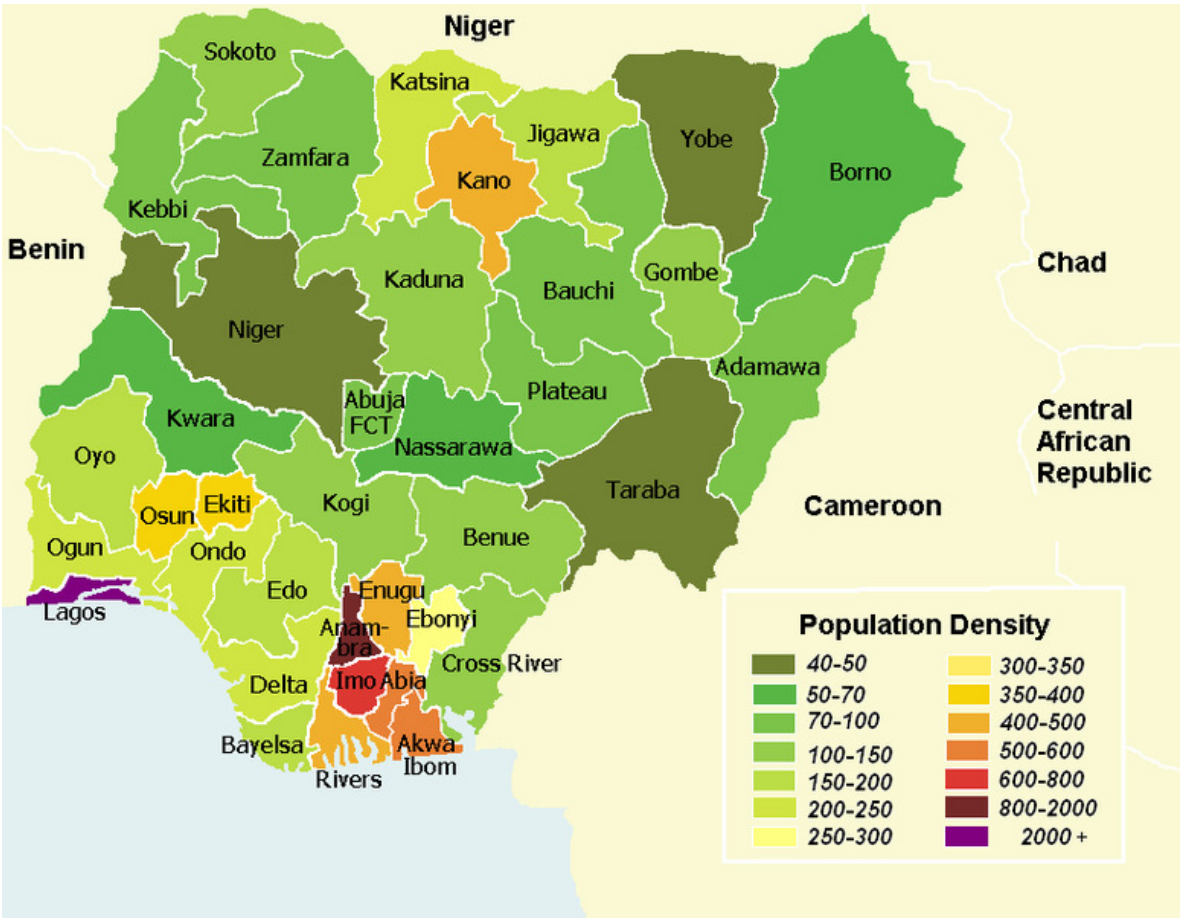
Northern Nigeria, by virtue of its ecological location, suffers from the environmental and climatic problems of desertification, land degradation and drought which have serious economic repercussions on Nigeria. However, the severity of the desertification has not been fully established, neither is its rate of progression in northern Nigeria properly documented. According to the Federal Ministry of Environment (2001), 35% of Nigeria's landmass is considered to be arable, 15% is believed to be used for pastures, 10% for forest reserves, 10% for settlements, and the remaining 30% is said to be uncultivable. In line with the above statistics, the Ministry reports that Nigeria is at present losing about 350,000 hectares to desertification, which is advancing southwards at an estimated rate of 0.6 kilometre a year (NAP, 2000: v; FMEnv 2001:10). This is regarded as the gravest environmental problem affecting northern Nigerian states (FMEnv 2001).

NIGERIA

Nigeria is situated in West Africa within the tropical region. It is located approximately between latitudes 4º and 14º north of the Equator, and between longitudes 2º 2' and 14º 30' east of the Greenwich Meridian. Nigeria is bordered by the Republic of Niger and Chad in the North, the Republic of Cameroun to the east, the Atlantic Ocean in the South, and the Republic of Benin in the West. The total land mass of Nigeria, according to the Federal Ministry of Environment, is approximately 923,770 km². The Nigerian population has been estimated to be 149,229,090 (July 2009 est.). Nigeria is divided into 36 states and the Federal Capital Territory, Abuja.

Not only does Nigeria have a diverse ecology and different climates, the country has varied biophysical characteristics, ethnic nationalities, agro-ecological zones and socio-economic conditions (Aregheore, n.d.). Nigeria has about 250 ethnic groups and about 500 spoken

languages. Nigeria has two main rivers, the Rivers Niger and Benue, which divide the country into two characteristic regions: a semi-arid zone to the north, and a wet zone to the south. While the climate of the south is equatorial, the central region is tropical and it is arid in the north. As noted, current statistics by the Federal Ministry of Environment show serious desert encroachment in the north (NAP, 2000).



Map 2: Map of Nigeria showing Yobe State in the North East

Nigeria got independence in 1960 and, since then, it has experienced a civil war and a series of military coup d'etats. In May 1999, democracy was restored in Nigeria with the president Obasanjo's administration, which introduced its Economic Policy for 1999 to 2003, and a National Economic Empowerment and Development Strategy (NEEDS) in 2004, both with the purpose of reforming the falling economy of Nigeria. NEEDS stressed the following sectors: agriculture and rural development, roads, education, health, water supply, and electricity (The NEEDS Secretariat, 2004).

3.3. NIGERIAN GOVERNMENT POLICY ON DESERTIFICATION

Has the advent of democracy in Nigeria in 1999 had any significant effect on the coping patterns of rural households, especially against the backdrop of the introduction of economic policies such as NEEDS?

The term policy refers to "a set of decisions and related actions to implement them. Policies are likely to include broad statements of goals, objectives and means" (Sandford and Ashley, 2008: 33). In this definition, important concepts of policy are included. For example, there is the concept of policy objectives ("what the policy is intending to achieve"), and policy instruments ("the methods by which the policy will achieve its objectives") (ibid). In evaluating policy documents, the Research Report examined past efforts by the Nigerian government, including sectoral policies, institutional and legal framework, building partnership and current national policies that are relevant in combating desertification and drought. Some of these policies include the National Agricultural Policy, the National Policy on Environment, the National Energy Policy, and the National Forestry Policy and Action Plan.

PAST ATTEMPTS BY THE NIGERIAN GOVERNMENT TO COMBAT DESERTIFIATION

The understanding of the nature and causes of desertification by researchers has informed the choice of official policies to combat the phenomenon. The Nigerian government, for example, embarked on tree planting as a policy response to the concerns raised in the 1930s about the southward advancement of the Sahara into Nigeria. According to Medugu, Majid and Choji (2008), seedlings were supplied at normal prices. On the other hand, the drought of 1972/1973, viewed as a national disaster, prompted vast responses which consisted of relief packages such as subsidized food, supply of water by tanks, bore holes and wells. Also seedlings were provided for the planting season.

Sustainable programs were also instituted such as the afforestation programs, the construction of dams for irrigation and the establishment of three River Basin Development Authorities: Chad Basin, Hadejia-Jama'are and Sokoto-Rima (Medugu, Majid and Choji 2008). Other past policy responses to combat desertification were: the 1977 establishment of a National Committee on Arid Zone Afforestation Project, which is responsible for studying the problem of desertification and designing a program of afforestation to combat desert advancement; and shelterbelt planting program for protecting adjacent agricultural lands from desiccating

wind. In what follows, Nigerian national plans and policies dealing with drought and desertification are examined.

NATIONAL PLANS AND POLICIES DEALING WITH DROUGHT AND DESERTIFICATION

Bearing in mind the progress in desertification studies, the Nigerian government has made further efforts in addressing its environmental and sustainable development problems in general, and desertification-related problems in particular. Recognizing that desertification is a complicated problem, the Federal government has developed policies and plans for issues ranging from agriculture to energy. The key policies for desertification control are presented below:

The National Policy on Environment

Launched in 1989 and reviewed in 1999, this policy indicates synergies with other sub-sectors that are associated with population, culture, housing and human settlements, biological diversity, conservation of natural resources, land-use and soil conservation, agriculture, water resources, forestry, wildlife and protected areas, mining and mineral resources, energy, education, science and technology, flood and erosion control and the cross-sectoral issues of public participation. This policy was reviewed in 1999 to promote inter-sectoral approaches to combat desertification and other environmental problems. In 2005, this policy was reviewed to identify and address drought and desertification; population growth and resources consumption; biodiversity management; land use and soil conservation; development of alternative energy sources; public awareness, environmental education; poverty reduction; gender and related issues; and climate change as it affects drought and desertification.

National Agricultural Policy

The National Agricultural Policy has subsectoral policies that cover livestock, forestry, food production, and land and water resources. The section of the policy related to desertification stressed the protection of agricultural lands from drought, desertification encroachment, soil erosion and floods, and the Protection and conservation of forests; forest regeneration/ afforestation; the promotion of alternative sources of energy (not wood energy); ensuring integrated water resources management approaches that promote conservation and protection of the ecosystem; and the promotion of appropriate farming systems.

The National Energy Policy (1987-2010)

The policy was designed to promote the use of renewable energy resources from wind and water, the most efficient use of domestic energy, and to mitigate the harmful practice of extracting energy from firewood.

National Environmental Action Plan and State Environmental Action Plans

The National Environmental Action Plan was developed to assist in the analysis, evaluation, and discussion of the interdependence between the environment and the economy in Nigeria. It seeks to provide an assessment of Nigeria's environmental priorities and to identify options for mitigating the impact of environmental degradation. The State Environmental Action Plan (SEAP) process started in 1995, and was completed in 1998, and was a relatively participatory process of planning and action. The SEAP aims at integrating the socioeconomic and ecological elements in state policies, plans and programmes. The action plan also seeks to involve environmental stakeholders and interests groups across the country, for optimal results. Policy objectives include: overall protection of the Nigerian environment; conservation of threatened flora and fauna species; environmental education and awareness promotion; and reduction of resource use conflict among land users.

The National Forestry Policy and Action Plan (1987-1998)

This was formulated with the assistance of the World Bank and the UNDP, and is an offshoot of Tropical Forestry Action Programme. The aim of this framework is to halt deforestation, and its associated destructive impacts. In other words, the National Forestry Policy and Action Plan was charged with protecting forest resources, and at achieving 25 percent forest coverage in Nigeria and promoting the sustainable use of forest products.

National Water Resources Master Plan (1995-2020)

A National Water Resources Master Plan for the period 1995 – 2020 was formulated with the assistance of the Japanese Government. The Master Plan aims at the sustainable use of water resources, mainly in the semi-arid drylands of Nigeria.

The "Green Agenda" of the Vision 2010 Report

The Vision 2010 Report is a comprehensive framework for achieving sustainable human development in Nigeria. It contains a chapter on the Green Agenda, which recognizes

desertification as a major environmental problem in Nigeria. The report contains specific mission/policy statements. The aspect of the report that contains the Green Agenda contains elements for the formulation of strategies for desertification control, with the objectives of sustainable human development, and the control and management of ecological problems, including drought and desertification.

National Agenda 21

The Nigerian National Agenda 21 identifies poverty alleviation, the promotion of afforestation programmes (mainly in the semi-arid zones), the fight to control desertification, and mitigating the effects of drought, as issues deserving urgent attention. The National Agenda 21 was basically devised to integrate environmental and developmental issues, with the aim of achieving sustainable development. It is concerned with remedying the major environmental problems that exist in Nigeria. Other areas of concern include: the control of soil erosion; the rational use and exploitation of mineral resources; the protection and management of water resources; conservation of biodiversity, sustainable human settlements, sustainable agriculture and rural development; and emphasis on issues of funding, management of environmental information, forging of viable partnership among stakeholders, and the promotion of environmental education and awareness. The core objectives included poverty reduction; the promotion of afforestation; drought mitigation and desertification control, and soil erosion control.

The National Action Programme to Combat Desertification

The Nigerian National Action Programme to Combat Desertification was prepared by the Federal Ministry of Environment as a major tool for the implementation of the Convention to Combat Desertification. The document describes the Nigerian environment's location and extent, the physical environment such as climate, geology, soil, and landform, drainage and hydrology, vegetation; socio-economic environment such as population and urbanization, agriculture, commerce and industry, poverty and health: pest and diseases. It then examines the state of desertification in Nigeria, including causes and impact. Past efforts to combat desertification are examined, with lessons from the previous experiences presented. Ongoing projects are identified, and programmes for future implementation are also included. The main objectives of the programme are poverty reduction; an integrated approach for drought mitigation and desertification control; and a participatory approach to the planning, implementation and monitoring of activities

National Economic Empowerment and Development Strategy (NEEDS)

NEEDS, as indicated previously, was a response of the development challenge in Nigeria in the democratic period. It centres on four key strategies: reorienting values, reducing poverty, creating wealth, and creating employment. The major objectives are reducing deforestation and increasing forest cover to the recommended 25%; the conservation of unique habitats, especially in wetlands; and the revision of the enforcement of environmental laws to conform to present day realities.

The National Policy on Women

This policy is aimed basically at addressing women's issues, with a range of objectives. These include ensuring women's participation in national ecosystem management and in the control of environmental degradation; promoting awareness of environmental issues and women's role in environmental improvement; the development of appropriate alternative and environmentally-friendly sources of energy; and the coordination of local efforts and collaboration with international agencies to control of desertification, combat erosion, and enable the sustainable development of water resources.

Institutional and Legislative Framework

The establishment by Decree 58 of 1988 of the Federal Environmental Protection Agency (FEPA) was a milestone in the efforts by the Federal Government to address the multifaceted environmental problems facing the Nigerian environment. Decree 59 of 1989 increased the powers of FEPA by providing legal backing to the agency. The agency was given the powers of sanction in the implementation of national environmental policy. By law, FEPA is the highest institution charged with environmental protection. FEPA contributed to the creation of the State Environmental Protection Agency (SEPA) in the 36 states and the Federal Capital Territory. It has the responsibility of addressing environmental problems, including drought and desertification, in the states. After Nigeria became party to the Convention to Combat Desertification (signed 1994; ratified 1997), a Department of Drought and Desertification Amelioration was created in the Federal Ministry of Environment. The creation of this department was helpful in strengthening the existing institutional arrangement for effective coordination of activities by government towards the implementation of the Convention.

Sectoral Programmes

This section presents a brief review of some of the sectoral programmes that have been put in place to tackle the problem of drought and desertification.

Agricultural Development Programme

With the assistance of the World Bank, the Federal Government has established Agricultural Development Programmes (ADPs) in all the 36 states and the Federal Capital Territory. The ADPs operate a unified extension system which encompasses issues such as crop production and protection, livestock production and animal health, fisheries, and agro-forestry, as well as gender-related issues in agriculture, popularly referred to as women-in-agriculture. The unified extension system is employed for the propagation of agricultural technologies, with the purpose of ensuring sustainable development to small-scale, resource-poor farmers. The existing extension structures in Nigeria can potentially play a key role in promoting sustainable agricultural practices, and in increasing awareness of the need for environmental protection, including desertification control.

Management of Water Resources

Nigeria established the River Basin Development Authorities (RBDAs) to enable it promote sustainable utilization of water resources in the drylands. RBDAs are under the direction of the Federal Ministry of Water Resources, and are actively involved in the development of water resources, mainly for irrigation. Efforts include the damming and diversion of rivers, and, in some places, the exploitation of underground water. They are also concerned with improving community water supplies, and the provision of watering points in rangelands. The RBDAs operating in the semi-arid zone of Nigeria are the Sokoto-Rima, Hadejia- Jama'are, Upper Benue, Niger River, and Chad Basin Development Authorities. With the assistance of the World Bank, the Federal Government has implemented a programme called the National *Fadama* Development Project. The aim of the project is the optimal use of the water resources of the wetlands of Nigeria for small-scale irrigation. It is under the supervision of the ADPs of the various states. The project provides gainful employment for the rural populace during the dry season, thereby cutting down on the number of peasants that engage in the off-season trade in firewood.

Forestry Programmes

In 1976, an Arid Zone Afforestation Project (AZAP) was established by the Federal Government, to tackle the problems of desertification. To achieve its aims, it establishes

woodlots, shelterbelts, and windbreaks. Between 1978 and 1984, more than 10 million seedlings were raised yearly. About 150 kilometres of shelterbelts, 3,680 hectares of woodlots, 24 boreholes, and 70 nurseries for trees, as well as Forestry Vocational Schools, have been established. The European Economic Community (EEC) supported a pilot project in Katsina State covering a total area of 1.6 million hectares. The World Bank also financed a similar project in the five arid-zone states. The emphasis has been on farmers' participation. Focus areas for the forestry programme include land use policy, fuel energy, a mass tree planting campaign, the prevention of bush fire, a silvo-pastoral system and sand dune fixation.

Integrated Programmes Targeted at Poverty Alleviation

Having argued that poverty alleviation is a key weapon for combating desertification, the Federal Government instituted a number of poverty alleviation programmes. These include the Northeast Arid Zone Development Programme (NEAZDP), the Federal Ministry of Environment / the University of Maiduguri Linkage model village project, the Katsina State Agricultural and Community Development Project and the Sokoto Environmental Protection Programme. The Programme involves water resources development and management (including irrigated agriculture), the provision of microcredit for off-season economic activities, cottage industries, livestock fattening, rural banking and the popularization of animal traction for land preparation for agricultural activities, among others.

Energy Resources

Nigeria relies heavily on fuel wood and fossil fuels. The use of fuel wood for domestic and commercial uses is a major cause of desertification in the arid-zone states of Nigeria. According to the Energy Commission of Nigeria, Nigeria consumes more than 50 million metric tonnes of fuel wood yearly, far more than the replenishment rate through afforestation programmes. The Federal Government, through the Energy Commission, has instituted a number of programmes aimed at promoting the optimal use of renewable energy resources, so as to reduce deforestation associated with fuel wood sourcing. Programmes instituted include training on renewable energy technology; biogas and biomass utilization projects; and solar photovoltaic electrification projects for remote areas. All energy-related environmental projects being implemented in Nigeria are guided by the National Policy Guidelines on Energy.

BUILDING PARTNERSHIPS

The Government of Nigeria has recognized that it cannot tackle the problem of desertification alone, hence, it has facilitated the involvement of other actors such as the private sector, Non-Governmental Organizations (NGOs) and Community-Based Organizations (CBOs), and Donors. Many NGOs are also involved in the implementation of the Convention to Combat Desertification, and some participated very actively in the negotiation process. The Regional Annexes of the Convention and the Resolution on Urgent Action for Africa outlines the expected roles for NGOs as the areas of Action Programmes, Co-ordination Mechanisms and Partnerships; Capacity Building, Education and Public Awareness; and Financial Resources and Mechanisms.

OTHER MEASURES TAKEN BY THE GOVERNMENT OF NIGERIA

In this section, other ongoing projects/ actions related for tackling desertification and mitigating the impact of drought, by the Government, are presented.

Adequate Diagnosis of Past Experience

An evaluation of past approaches was undertaken for the purpose of formulating the National Action Programme to Combat Desertification and Mitigate the Effect of Drought (2000). Some past approaches were identified as having hampered effective desertification control. Thus, in light of these the government, with the assistance of the UNDP, also formulated the National Drought Preparedness Plan and a National Drought and Desertification Policy.

ON-GOING PROJECTS INITIATED BY THE GOVERNMENT

Ongoing, planned interventions that are directed towards desertification control in Nigeria abound. These include efforts to alleviate poverty, to conserve biodiversity, to restore degraded lands, to and promote desertification awareness activities and environmental education. Other activities initiated by the government include the development of an environment information system; conducting research and surveys; promoting energy efficiency and renewable energy technologies; and supporting institution-strengthening and capacity-building measures. The projects listed below have been approved by the Federal Government:

The Greenbelt Programme

The Greenbelt Programme aims at combating desertification by increasing vegetative cover and soil productivity in the drylands. The programme includes the establishment of a shelterbelt across the extreme strip of the northern parts of Nigeria, from the Sokoto basin in the Northwest, to the Lake Chad Basin in the Northeast. The Federal, State and Local Governments are in charge of jointly executing the project, viewed as taking a period of 14 years. The project has commenced with 51 nurseries, established in the frontline and buffer states. Each of the nurseries will be able to produce one million seedlings yearly.

Model Village Development (an Integrated, Community-based Approach to Combating Desertification)

The Nigerian Government is also implementing a model village development project in 14 communities, spread over the frontline states affected by desertification. This project consists of the promoting rural water supplies through the provision of solar-powered boreholes; environmental education and awareness creation through the construction of viewing centres equipped with necessary facilities; sanitation through the provision of landfills and public conveniences; the popularization of Renewable Energy Technologies (RETs) such as biogas digesters and box-solar cookers, as well as fuel-efficient clay stoves and sawdust stoves; the establishment of community plant nurseries and of woodlots, wind breaks; and the establishment of botanical gardens for the conservation of threatened plant and fauna species.

Pilot Project on Sand-dune Fixation

This pilot project is aimed at raising awareness levels, and at demonstrating the appropriate technologies for sand-dune fixation, for communities' adoption. There are selected sites for the project in Borno, Jigawa, Kebbi, Kano, Katsina, Zamfara, Sokoto and Yobe States.

Pilot Project on Rangelands

This pilot project is aimed at demonstrating technologies for establishing rangelands, so as to improve the carrying capacity of the land for livestock (mainly cattle, goats and sheep which are also identified as contributing to land degradation). This project is also aimed at sedentarizing nomadic herdsmen. The project is being implemented in the states of Adamawa, Bauchi, Borno, Gombe, Jigawa, Katsina, Kano, Kebbi, Sokoto, Yobe and Zamfara.

Development of National Drought Forecasting and Early Warning System

Because of the importance of timely response to drought, the Federal Government has approved modern meteorological instrumentations at various locations for drought forecasting purposes. This is because the ability to predict the occurrence of natural disasters, particularly drought, is of the utmost importance in lessening the impact of disasters. The project, which is expected to cost about seventy nine million *naira* (equivalent to US $526, 666.67. 00), is being implemented in collaboration with the Nigerian Meteorological Agency (NIMET). The project aims at identifying and developing the social, economic and biological components of early warning systems. A capacity-building programme for drought forecasting is also being developed.

Assessment of the Severity and Extent of Desertification, and Preparation of a Desertification Map for Nigeria.

The Federal Government has approved this project, costing about three hundred and thirty million *naira* (US $2, 200000). A major component of the project is the production of a National Desertification Map using satellite imagery and GIS. Data on the extent, severity and rate of desertification in Nigeria will also be generated by the project.

Nigeria-Niger Transboundary Ecosystem Management Project

The Integrated Ecosystem Management of Transboundary Areas between Nigeria and Niger is a Global Environment Facility (GEF)-funded project. This project is aimed at enabling conditions for sustainable integrated ecosystem management and, hence, at enhancing livelihoods in the areas covered by the Maiduguri Agreement between the two countries. This will be achieved through developing an integrated legal and institutional framework for collaboration; through coordinated financing from the Nigeria – Niger Joint Commission for Cooperation to community-based organizations; through harnessing (and improving upon) research-based and indigenous knowledge, and cultural values, to support natural resource management, conservation and productivity; and developing and implementing sub-regional catchments and community level ecosystem management plans through participatory and inclusive processes. When these plans are executed, they will consolidate regional cooperation, conserve habitats and biodiversity, manage water resources, promote sustainable land use practices, control degradation trends, build institutional capacity, improve equity, and reduce the vulnerability of local communities to environmental change.

IMPLEMENTING ORGANS IN NIGERIA

With respect to desertification and drought management in Nigeria, a number of institutions are responsible for the implantation of projects. These institutions are listed below:

Ministry of Environment

The Federal Ministry of Environment was established as the Federal Protection Agency by Decree number 58 of 1988 in 1988, amended by Decree 59 of 1992 and then by Decree 14 of 1999. The Ministry has the responsibilities of environmental protection, biodiversity and natural resources conservation, including policy matters relating to desertification control, and is in fact the National Focal Point for the Convention to Combat Desertification in Nigeria.

Federal Ministry of Agriculture

Responsibility for forestry issues, including the implementation of afforestation programmes and projects as a means of halting the spread of the desert in Nigeria, lies with the Federal Department of Forestry in the Federal Ministry of Agriculture. Annual Tree Planting Campaigns throughout the country are organised and coordinated by the Ministry. The ministry also implements projects on afforestation, woodlot plantations, plant nursery, etc. so as to check deforestation and desertification. Also, the Agricultural Land Resources department of the same Ministry has responsibility for land conservation measures.

Federal Ministry of Water Resources and Rural Development

The Federal Ministry of Water Resources and Rural Development is, among other things, responsible for the management of water resources generally. Since water is a very crucial issue, with respect to desertification, the Ministry, in collaboration with other relevant Ministries and agencies, is involved in programmes and other projects in order to converge and manage marine, fresh water, and other ground water resources.

Federal Ministry of Education

The Ministry of Education plays a key role in public awareness. By introducing a course on environmental education at all levels of education, it has generated substantial awareness of the serious environmental problems, including drought and desertification, which Nigeria faces. It has also created Conservation Education Clubs and Societies in schools, colleges and universities, across the country.

Other Ministries

The Federal Ministry of Finance potentially plays a key role in releasing funds related to drought and desertification management for the proper and timely funding and implementation of environmental activities. The charge of the Federal Ministry of Information is to disseminate information, especially to rural people. The Federal Ministry of Women Affairs, in relation to drought and desertification, fosters the participation of women, who obviously play a key role in respect of the environment and the household. The Federal Ministry of Power and Steel is charged with stabilising the energy sector; without electricity, rural households would rely on natural resources for their fuel consumption.

The Energy Commission of Nigeria

Linked to the Federal Ministry of Science and Technology, the Energy Commission of Nigeria is in charge of issues related to combating desertification and drought. More so, the ministry has two research centres for conducting research on alternative sources for the country. The main target of the Energy Commission is to provide in short means to reduce and eventually eradicate the use of fuel wood. An aim of the Commission is to enable less pressure on the forestry resources in the Sahel, and the semi-arid zones more generally.

National Poverty Eradication Programme

This programme was initiated with the aim of alleviating poverty, since 70 percent of Nigeria's population is below the poverty line. The poverty level of the northern population is notably high.

Nigerian Meteorological Agency

The major responsibility of this agency is to give up-to-date data on weather forecasts and drought early-warning signals.

Local Government Authorities

The National policy on Environment is the responsibility of all the tiers, including the local government authorities.

CONCLUSION

This chapter has shown that the twin problem of drought and desertification is not a new experience for peasant households in Sahelian societies. These societies have, over the years, adapted their cropping and grazing to their fickle, precarious environment. At the household, village and state levels, they have been engaged in mechanisms to secure and enhance their livelihoods.

In summary, as discussed in this chapter, households in pre-colonial Hausaland formed the first response level to hazards resulting from drought and desertification as the decisions of the head of household is crucial for survival. At the village level, the *masu sarauta*, that is the ruling class, were given a portion of the surplus produced by ordinary people in the form of grains or cash, and these grains were partially redistributed in periods of food shortages. The last level of response to environmental hazards in pre-colonial Sahelian societies was a resort to the state, the Sokoto Caliphate. The state had the power to control and coerce those under its jurisdiction; but it also provided protection for the peasants and travelling merchants and "organised large-scale labour projects and acted as a guarantor in times of needs" (Watts, 1983b: 354). Yet the state was not a perfect social structure as it "possessed its own contradictions, methods of surplus extraction and ideological hegemony" (ibid).

Pre-colonial Sahelian societies also had other means of responding to food shortages. These strategies included closure of the granaries for long-term preservation; migration during the dry season or in between planting and harvesting season; and the reliance on the social network of kinship ties to guarantee a minimum of food supply.

In general, pre-colonial societies understood the functioning of their environment and, consequently, favoured in their productive practices those livelihood activities that were geared towards environmental risk aversion. For example, they favoured growing diverse cereal varieties that were adapted to their environment, and engaged in advantageous land use practices such as diversifying of crops, intercropping and crop rotation. They also farmed drought-resistant crops. Also, they were more concerned with growing consumption crops than with planting cash crops. However, they sometimes traded crops and livestock for cash, mostly in times of family crisis.

This chapter has also discussed the impacts of European colonialism on the peasant subsistence ethic. It notes that by incorporating peasant households into the global capitalist system, the colonialists made households more vulnerable to drought and desertification. They caused this through the introduction of taxation, through monetization and the greatly expanded production of export commodities. Consequently, drought and desertification took on a different dimension. In other words, it increased the peasants' vulnerability to hazards. In the contemporary era, the introduction of the policies of the Structural Adjustment Programme also made peasants more vulnerable.

Finally, this chapter has discussed policies and programmes of the Nigerian government that are related to desertification and drought. It has also shown that the understanding of the nature and causes of desertification, among researchers, has greatly informed the choice of policies adopted in Nigeria in the fight against desertification.

CHAPTER FOUR

HOUSEHOLDS' BIOGRAPHIES, VULNERABILITY, AND DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

This chapter presents some of the key findings of this Research Report, in line with the research question and research design outlined in Chapter 1. This chapter is divided into three sections. Section one presents households' information and the biographies of informants in Gursulu village; section two discusses the households' demographic and the socio-economic characteristics of Gursulu peasants; and section three discusses the vulnerability context of the peasants.

4.1. BACKGROUND: RESPONDENTS' BIOGRAPHIES AND HOUSEHOLDS' INFORMATION

Household information and biographies from the research interviews and discussions with key informants in Gursulu are discussed and presented in this section. All the names used are pseudonyms for the sake of anonymity. The village is composed of compounds which form the basic living structure of people bound together by ties of kinship. In Gursulu village in general, the basic requirement in terms of housing in each compound is a room for each wife, and a sitting room common to all (more of a tent or a temporary shelter roofed with reed, in Hausa the *rumfa*), and granaries. The *rumfa* is the main area of interaction for the wives and for the reception of visitors common to all. Compounds designed in the Hausa style have an entrance which serves as the sitting area, where the *maigida* receives visitors. Most compounds have at least one granary. There is a small village market in the village, and, close to the village market, are some trees where young men sit to play games and recreate.

AL-KANEMI

This interview was conducted in the sitting area at the entrance to the compound of Al-Kanemi. He is a 65-year-old Kanuri man, and the chief of Gursulu. He has a very large household composed of 30 people, 20 of which are his children, and two of which are his relatives: his brother and nephew (his deceased brother's son). Each of Al-Kanemi's two wives owns their farmlands, in which they grow a variety of crops including vegetables. His household members work in the household farmlands from about 7 am to 12.00 noon, and from 3 pm to 6 pm; they return home because of the heat of the midday sun. Sometimes, Al-Kanemi hires outside labour to augment his family labour, but he also uses an animal plough and hires a tractor to work in his lands. Even though Al-Kanemi no longer engages in farming activities because of old age, as the *maigida* of his household, he apportions his

household harvest that to be used for his household consumption, that to be reserved as seeds for the next planting season, and that to be sold for purchasing farm inputs, hiring tractors and taking care of household needs.

Al-Kanemi explains that two types of farming system are available to him and some others households that own *Fadama* farmlands, that is, can crop on the floodplain wetland. In upland farming, Al-Kanemi grows guinea corn (or sorghum), millet, maize and beans; he crops rice, pepper and onion in the *Fadama* lands. Al-Kanemi owns 10 farmlands in total (in Hausa: *gona*), in which he grows different crops. Al-Kanemi's rationale for growing these varieties is evident in his statement: "if I do not farm more, I will not get enough food to feed my family. Also, sometimes if a particular crop fails, I can fall back on the other crops".

Al-Kanemi has lived in Gursulu village all of his life, and he says that sand dunes (which are everywhere in Kanamma and Gursulu village) are brought to the village by wind. But he is more concerned with the problem of rainfall. Al-Kanemi is worried that it is already towards the end of June, and the rains have not yet come. "The problem [we are facing in this community] is lack of rainfall. I cannot plant anything when there is no rain. You too can see for yourself". As a farmer he is aware that lack of rainfall is disastrous for his household's livelihood, as it could affect the livestock and crop production they depend upon.

Being aware of the nature of the environment from which he has to eke out his livelihood, the constant fear of crop failure informs his livelihood choices. Even though Al-Kanemi harvests 100 bags in total of the different crops that he grow annually, his family has grown so large that his farm produce is now insufficient for his large family. "In the past when my family was small, what I produced used to be enough for my household, but now my family is very large and my produce is not enough for my family," he reckons.

Al-Kanemi is involved in more than crop production; he keeps a variety of animals: goats, sheep and cattle. Yet, here too, the problem of rainfall is keenly felt: it affects livestock production since there is insufficient fodder for animals. This, sometimes, results in the death of his livestock. Al-Kanemi explains that he keeps a variety of livestock because of the precarious situation that Gursulu faces, due to the problem of variable and insufficient rainfall. "Everywhere is dry; there are no grasses for the animals, and until the rains come we

cannot farm". Thus, when his family experiences a crisis, Al-Kanemi resorts to selling his livestock to solve his problem.

MUSA

This interview was conducted in the sitting area of Musa's compound, which is comprised of many huts and granaries. Musa is a 60-year-old Hausa man. He has a large household size of 50 members, which includes his 15 children (all from his one wife), and his grandchildren. Musa does not work in the farm on account of his age; but while Musa's wife works in her own farm growing such crops as beans, groundnut and bambara nut and okra, his children's wives do not go to the farm, but remain at home to prepare food for those in the field. He owns about 10 farmlands, including some for *Fadama* farming.

Musa now uses fertilizers to raise the soil fertility of his farmlands, as opposed to the past when he relied on manure. He blames the the reduction of his land quality on the scarcity of rain: "If rainfall is available, grasses will grow very tall, and we can easily get organic manure. But as the situation is now, there is a lack of rainfall and because of this, there is little or no availability of grass. We can only get fertilizer which is a modern innovation, and it is not readily available to us".

Musa's household depends mainly on farming for its livelihood. He grows crop varieties such as millet, rice, maize, guinea corn (sorghum), beans, groundnut, okra, sweet potatoes, tomatoes, cassava, cocoyam, and bambara nut. He mentions that he harvests about 150 to 200 bags of rice every harvest season, and 50 to 60 bags of beans. While Musa grows guinea corn (sorghum), rice and millet mainly for household consumption, he sells the others in case of household emergencies. During the period of rainfall scarcity, Musa harvests about 60 to 70 bags of millet, as opposed to periods of normal rainfall where he harvests over 100 bags of millet. Musa takes care of his family needs from these crops. His household spends about 6 hours daily in the farm, and Musa employs outside labour only when the need arises, because his family is very large. He makes use of traditional farm implements, but also uses an animal plough, and hires tractors, mostly for his rice farm.

Musa also rears livestock such as chickens, ducks, cattle, goats and sheep. To solve his household problems during periods of crisis and challenge, Musa sells some of his birds and ruminants. He explains that he has started rearing small ruminants because these can easily be

sold at good prices to solve his family problems, avoiding the embarrassment of begging other people for assistance. “Sometimes, we sell these animals in situations such as a marriage in the family or when a family member is being charged in court for stealing or fighting”. In years past, there were animals in the wild for game (bush meat), and so Musa did not need to rear hens, duck and sheep. Musa used to rear horses and donkeys but nowadays he has discontinued this, because the cost of rearing them is unaffordable for him: “I do not have enough money to rear [donkeys and horses]. If you do not have enough money, you cannot rear these kinds of animal because they are heavy feeders”.

Another source of livelihoods for Musa’s household is the migrant remittance that Musa receives occasionally from his brother, who lives in Kano. He visits his brother only in times of family hardship for assistance during the rainy season. Musa can afford to travel to Kano during the raining season, because of his large household size and because he no longer works in the farm anymore on account of his age.

Lastly, the different members of Musa’s household are engaged in an assortment of activities such as schooling, fishing, trading and the vending of fish. While some members of Musa’s household mainly cultivate rice, others mainly cultivate guinea corn (sorghum), millet and beans. One of Musa’s sons is studying at the Polytechnic and also works for the local government. Hence, his household also receives remittance from this son.

MOHAMMED

This interview conducted in Mohammed’s sitting area, at the entrance to his compound. No specific data was collected on Mohammed’s age. Although Mohammed says he has lived for more than 40 years in Gursulu, he seems to be in his 50s. He is Hausa. He has 12 children, but two are deceased; he has seven grandchildren. He has two wives. Together there are 21 people living in the household. Most of Mohammed’s surviving 10 children are involved in their own businesses: some are fishermen, others are traders. Mohammed is mainly a fisherman, spending 5 to 6 hours fishing daily, but he also grows crops and rears livestock. Mohammed’s two wives do not go to the farm; they are traders involved in the baking and selling of groundnut cakes, as well as in the purchase and sale of millet, beans and rice.

Mohammed rears a range of animals such as cattle, goats, sheep and chickens. “As a poor man, it is necessary that I keep these different animals because there are domestic problems

like marriage and court cases that household members are involved in occasionally. One day a problem may arise in the family, and I can take these animals to the market to solve my family problem". In time past, Mohammed only reared cattle and goats (he did not rear chickens and sheep). He says he now rears these because of the problem of rainfall scarcity and desertification, and because when his family is beset by problems, he can resort to his animals. He says: "if I do not benefit from the cows, I can easily benefit from the sheep; if I do not benefit from the sheep, I can easily benefit from the hens".

Mohammed owns four farmlands in which he grows guinea corn (sorghum), millet, maize and groundnuts. Mohammed farms these variety of crops because, as he says, "if I depend on one, I may find myself in a state of loss. If I depend on all of them when one of the crops fails, the others may do well". He also laments the poor state of his farmlands. In the past, the fertility of Mohammed's farmlands was better, and organic matter could easily be acquired. Now he has to depend on artificial fertilizer, when he can afford it. He hires outside labour for which he pays 500 *naira* ($3.3 USD), and normally employs 10 people. He also uses an animal plough, and traditional farm implements.

UMAR

This interview was conducted in the village square under a tree shade. By ethnicity, Umar is Kanuri. He is 40 years old. Umar's wife is deceased and he lives with his two children. The youngest of his sons is a student; the oldest is a middleman.

Umar is mainly a farmer. He grows beans, groundnut and millet on his two farmlands; he does not rear livestock. While Umar harvests from his farms about 30 to 40 bags of grain, he sells about 20 bags and reserves the rest for his household consumption, and any other household emergency that may arise. He laments about rainfall scarcity and desertification, with their attendant problem of farmland deterioration.

In the past he used to harvest 50 bags of millet from the piece of land that now does not produce more than 15 to 20 bags of millet. According to Umar, 2 basins of bean seeds used to produce 20 bags of beans on his farmland, but 2 basins now only produce 9 to 10 bags of beans. Umar does not employ outside labour; he and his children work on his two farmlands. Also, Umar does not employ tractors or an animal plough; he only uses traditional farm implements. Umar and his children spend about 5 to 6 hours on their farms daily, except on

Fridays which are set aside as their Muslim holiday. In addition to farming, Umar is also a vulcanizer.

IDRIS

This interview was conducted in the Local Government Secretariat. Idris is 56 years old. He is Fulani, and has a total of five people in his household, which include two sons and a daughter. He does not live with any extended family members, but only with his three children and one wife. He is a security guard, working in the Local Government Secretariat. Idris owns only one farmland, which he uses to grow millet, groundnut and guinea corn (sorghum), with the assistance of all his household labour. Idris does not employ outside labour, and the family uses traditional farm implements, working his farm for 7 to 8 hours daily. However, he engages in labour exchange, and as he says, "Sometimes I work in people's farm so that they could also work in my farm".

Idris produces only 2 to 3 bags of his produce, which he reserves mainly for household consumption. In time past, Idris used to rear more animals than he does today. Because he is facing some challenges, Idris does not have any major source of income. In the past, Idris used to harvest about 3 to 5 bags of the different crops that he grew, but today, he harvests not more than two bags. He blames some of these changes on the problem of rainfall scarcity. In addition to farming, Idris rears goats and sheep which he sells sometimes to solve some domestic problems.

SHEHU

This interview was conducted in Shehu's sitting area in the compound. Shehu is a 50-year-old Kanuri-speaking man. He is married to one woman, and has three children. The total number of people in the household is 30, with his father and two wives included in this number. His household is composed of his two brothers and their two wives and eight children. It is not only Shehu's two brothers that own farmlands; the two wives have their own farmlands, and grow sweet potatoes, groundnuts and vegetables. Farming is not the only source of livelihood for his household; members of the household are also engaged in other livelihood generating activities. The household women sometimes milk and vend milk from camels and cows. In addition to fabricating and selling locally produced farm implements, Shehu's younger brother is a herbalist. His children also sometimes fish during the rainy season.

Shehu spends about 8 hours, working on the farm and employs outside labour (for which he pays 500 Naira ($3.33 USD per day) to complement his household labour. He employs traditional farm implement, animal plough and tractor on his farm. Shehu grows millet, guinea corn (sorghum), beans and ground nuts.

Years ago, Shehu claims that he did not need fertilizers for his eight farmlands: “Even though I use fertilizer in my farm today, you cannot compare what we used to harvest in the past with what we harvest today. Our harvest was much”. He blames this problem on rainfall scarcity and on the sand dunes that are everywhere in the village.

While Shehu is uncertain about the quantity of guinea corn (sorghum) and millet that he harvests from his farmlands, he produces about 25 to 30 bags of groundnut and about 15 bags of beans. He grows millet and guinea corn on the same farmland and says that he does not grow the same crop on the same piece of farmland for two years in a row. “We consume some of the millet and guinea corn (sorghum), and store some as seeds for the next planting season. We sell the beans and groundnuts when we need to; otherwise we store them and sell them when the prizes are high in the rainy season. But we also reserve some for the next planting season. We buy farm implements and farm inputs; we buy provisions for children who go to school. If there is any sickness or problem, we use the money to take care of it”.

Shehu also rears camels, sheep, goats and cattle; he markets his goats or sheep to solve problems that may arise within his household. As compared to the past, Shehu now rears more goats and sheep, and resorts to his goats and sheep often for resources: he sells some of them to solve his problems. Lastly, Shehu’s brother who is employed in the Ministry of Agriculture, Damaturu, sends them some bags of fertilizer.

ADAMU

This interview was conducted with Adamu on the way from the farm. Adamu is an Hausa-speaking 49–year-old man. He is married with two wives and nine children. His household is composed of a total of 17 people. While Adamu’s wives do not work in the farm, they prepare food at home and take it to those working in the farm. Adamu owns 7 farmlands in which he spends 7 to 8 hours daily working. He employs outside labour for weeding and harvesting his rice farm. As a result of an arrangement between his two children and their friends, he now engages in labour exchange and cooperation. Adamu uses traditional farm

implements and a tractor on his farm. Also, some members of his household have their own farmlands.

Farming is not the only source of livelihood for Adamu's household; in fact, he weaves and sells mats and baskets. Adamu used to go to Gashua after harvest periods for work as a migrant labourer. He would use the money for the following purposes: taking care of his family needs; buying seeds and fertilizers; and hiring a tractor to work his farm.

In time past, the land in Gursulu was much more fertile, according to Adam: "Now because of desertification and lack of rainfall, it is difficult to feed my animals because there are no grasses, and also crops do not produce as much as before unless I use fertilizers". Adamu farms guinea corn (sorghum), millet and beans. Normally, he harvests about 85 bags of these different crops in total. He complains that the quantity of his yields is affected by rainfall decline, and that sometimes the rain abruptly stops earlier than normal, thus affecting his crops. In times of normal rainfall, Adamu produces enough crops to last him until the next harvest season, but his produce does not, he claims, usually last until the next harvest season nowadays.

In addition to farming and weaving baskets and mats, Adamu rears livestock such as goats, cattle and sheep (He rears mainly goats and sheep, and but a few cattle). Adamu does not want to rely on his farm alone. When he needs money and does not have crops to sell, Adamu relies on his livestock. His household consumes the milk from his livestock. He says it is a source of pride for him to keep these livestock. However, the number of livestock that Adamu rears has reduced because of the difficulty of getting fodders for these animals.

IBRAHIM

I interviewed Ibrahim, a 60-year-old Kanuri-speaking man, on his farm. He is married to one woman, and has five sons and a total of 10 people in his household. Ibrahim does not rear livestock because he is poor. He owns four farmlands. Ibrahim has a wealth of local knowledge about the different soil types in Gursulu and about the crop type best suited to a soil type: pointing, he says "This area is very hot; beans produces more here than millet. If I grow millet on this farmland, it will not produce well. This is close to the river area. This farmland is for irrigation. If I get money, I will do irrigation farming. On this farm, I can grow maize, beans and yam". Ibrahim harvests 7 to 10 bags of beans from his farmland. He

farms rice on two of the farmlands. Whereas, on the smaller farmland, he harvests about 15 to 16 bags of rice (depending on the land quality), he harvests 30 to 40 bags of rice on the big farmland.

Ibrahim consumes a portion of his produce, sells some to take care of his family needs, and reserves some to sell during the rainy season to take care of family needs arising. In his farms, Ibrahim engages the labour of six members of his household, and only needs to hire two or three people to work in his farms, for which he pays 300 *naira* ($2 USD) per day. He uses simple farm implements and sometimes employs an animal plough and tractor when he gets money. He spends on average 7 hours in the farm daily.

Ibrahim complains that the quality of his farmlands has declined: “in the past if I planted one bag of rice, I harvested at least 40 or 50 bags of rice, but now I harvest only 20 to 22 bags, or less. For millet, before we used to harvest about 30 bags but now we harvest only 10 bags in the same farmland that used to produce 30 bags of millet”. For Ibrahim, the cause of the reduction in land quality is inadequate rainfall and desertification. He says that, “when we farm, the crops sometimes do not get enough water and either die or do not yield a lot”. “If [the government] can help use tackle the problem of desertification and lack of rainfall, it will help. When there is enough rainfall we can farm more than we are farming. Lack of rainfall is a problem; it causes our plants to dry up and leads to low yield. If we get enough rainfall, our farming will yield more. Also if we do not get money, we cannot farm”. He complains that he would like to use fertilizers in his farm but that when they ever get fertilizer, it costs a fortune of 5,000 *naira* ($3.3 USD).

He also argues that the community’s practice of solidarity is fast eroding as people are now more concerned with their own problems. He says, “In this village we have a *sarkin noma*, but we do not receive any assistance; we do not receive any assistance” (the informant strongly emphasized this point. “We have a *sarkin noma*; we do not get any assistance from the local government. We do not receive any help from anyone”. Nevertheless, more wealthy households still assist the poor ones when they can.

AL-HASSAN

This interview, with Al-Hassanm took place outside his house, which was fenced with reeds; he was seated on a log. Al-Hassan belongs to the Hausa ethnic group. He is married to one woman and has seven children. In all, he has nine people in his household.

Al-Hassan is embarrassed that he owns only one farmland. From his speech, it could be deduced that his inability to acquire more farmlands was connected to his poverty. He reveals: "If you have money, you can own more than one or two or three farmlands. But if you do not have money, you can make do with the one that you have". Al-Hassan cultivates millet, cassava and beans on his farmlands, and harvests four bags of millet annually, which he consumes, but he sells the beans that he harvests. He uses traditional farm implements such as hoes, diggers, and cutlasses for his farm work. He refuses to comment whether he uses tractors or an animal plough; instead, he says, "Those who have the means use tractors and those with less means use the cow plough and those without much means use the hoe, cutlasses and diggers".

Al-Hassan does not employ outside labour, but relies on household labour because he does not have the means. He says that four members of his household, who work on his farm, also have their own farmlands. Al-Hassan has noticed the difference in land quality in the past and now, but he uses his livestock to raise the quality of his land.

Farming is the major source of Al-Hassan's livelihood, but he rears livestock like cattle, sheep and goats. He keeps different livestock, especially small ruminants, because it would not make sense for him to sell a cow because of a little problem. So he keeps sheep and goats, so as to sell as family needs arise. However, Al-Hassan does not sell his livestock often, because he also farms. He explains that "If you see any one selling his goats or sheep all the time, it means that person does not have anything to eat".

USMAN

This interview was conducted in the village square, in the shade of a tree. Usman is 54 years old. He is a Kanuri man, who is married to two women and has 18 children and a total of 21 people in his household. Farming is the major source of Usman's livelihood, but he also rears animals. All members of his household that are old enough to farm work on the household farms; his wives sometimes help in the farms. Usman goes to the farm at 6 a.m. and returns

home at 4 or 5 p.m. Usman hires outside labour especially to prepare his fields for planting and during harvest, and sometimes during weeding. Usman does not have money to hire a tractor, so he uses traditional farm implements and an animal plough.

Usman farms maize, millet, guinea corn (sorghum) and rice on his six farmlands. His wives also own farmlands, in which they farm vegetables like tomatoes, okra and pepper. Usman believes that the quality of his lands is not as good as it was in the past. This is because of inadequate rainfall. And: "There is also the problem of sand dunes covering our fields". Because of this, Usman now applies manure on his fields. "After I harvest my fields, I use most of the stalks in preparing organic manure, and some as feed for my livestock. I even sell some of the manure that I prepare to other people who do not have livestock to prepare organic manure for their farms".

Usman has since started the practice of rotational cropping. He says," You know, rotational farming helps the soil to regain some nutrients. Different crops utilize different nutrients, so if I keep farming only a particular crop, in the long run, it will affect my land quality" Usman farms the different crops because first, his family eats from them. Secondly, he farms different crops as an insurance against crop failure, so that when a particular crop fails he can rely on the others. After harvest, Usman divides his harvest according to that to be consumed and that to be sold. Sometimes, the portion Usman reserves for household consumption is finished before the next harvest season. In such times, he sells his livestock in order to get money to buy food.

Usman also rears chickens, and livestock like goats, sheep, donkeys, and cattle. He keeps all these animals because, as he says, "we do not receive enough rainfall here, so our crops do not produce well, so I keep these animals so that I could sell them and solve my family needs. At times we eat the chickens and, on few occasions, we kill a goat for household consumption. I keep goats because goats are not easily attacked by diseases. Chickens may get affected and die. So I also keep goats because goats multiply quickly. I can't kill a cow to eat unless when the situation is very critical; I sell cows to pay for my children's school needs and other family problems, and I milk them sometimes. Cattle are used for festivities and for settling debts. When my brother, who is a trader in Damaturu, was arrested by the police, I had to sell one of my cattle to settle the case. I use my cattle to plough my farm. I also use their dung to prepare manure for my farms".

MUSTAPHA

This interview with Mustapha was conducted outside the living room, and in the hut that serves as a sitting room. Mustapha is Hausa by ethnicity. He is 64 years old, married to two women and has 16 children. The total number of people in his household is 38. This excludes his two sons, who are trading and working in Katsina and Damaturu respectively. Three of his relatives live in his household: one of his brothers, his brother's two children. Mustapha's two wives do not farm because it is against their custom to do so.

Mustapha rears camel, cattle, donkeys, goats, sheep and hen. "We need all these animals. We consume the milk and sometimes sell them. We eat the chickens and, sometimes during festivities, we kill an animal to celebrate. We also sell the animals to solve some family problems. One of my sons is in Damaturu working. When he was in the Polytechnic, when he needed money, I would take some animals and sell when I did not have money to send to him".

Mustapha integrates livestock with crop production. He grows maize, millet, guinea corn (sorghum), rice, beans, onions, vegetables, tomatoes, pepper and groundnuts. He owns 13 farmlands. The soil quality of the farmlands is very poor today, he says: "When I was growing up, our land used to produce very well. It is different now. It does not produce well unless you use organic manure or fertilizer".

Even though Mustapha is the head of the household, as a result of his old age, he is not now in charge of making household decisions. Mustapha also does not farm any longer. Apart from two of his children who possess their own farmlands, the rest of his children work on his farmlands. He also commented on the high temperature in Gursulu: "But because of the heat in the afternoon in Gursulu village, people leave home for their farms very early. Some of them return in the midday when the sun has reduced" its heat. Mustapha does not employ outside labour on account of his large household size; he relies on household labour. But he hires a tractor for his rice farm and uses simple farm implements and an animal plough. Farming is Mustapha's major source of livelihood, but his children are engaged in other activities that help the family as well; some of his children fish and others are traders.

4.2. HOUSEHOLDS' DEMOGRAPHICS AND SOCIO-CULTURAL AND ECONOMIC CHARACTERISTICS.

Informants	No of children	Marital status/ no of wives	No of relatives living in household	Total Number in Households
Al-kanemi	20	2	2	30
Musa	15	1	--	50
Mohammed	12, but 2 dead	2	--	21
Umar	2	-	--	3
Idris	3	1	--	5
Shehu	3	1	Father and two wives	20
Adamu	9	2	--	17
Ibrahim	18	2	--	21
Al-Hassan	7	1	--	9
Usman	18	2	--	21
Mustapha	16	2	-	38--2 sons in Katsina and Damaturu

Table 2: Household composition and marital status of informants

HOUSEHOLD COMPOSITION

The households in Gursulu village are composed of children, grandchildren, parents, and in some instances, other relatives. As was mentioned above, five of the informants are polygamous. Labour for farming and other livelihoods activities is largely supplied by members of the household. 11 heads of household were interviewed in Gursulu village, and two government officials were interviewed in Kanamma. All the informants interviewed were male heads of households. All the informants were married. Five of the informants were polygamous. One informants' wife was deceased.

The household sizes of most of the informants were large: the total number of people with household with the highest member is 50 and the number of people in the household with the smallest member is 3. 3 households have less than 10 household members. As a result of the large population of most of the households, peasants in Gursulu village are mainly dependent upon household labour, although at times augmenting household labour with hired labour for their agricultural activities. Inadequate financial capital is a factor that constrains access to hired labour by some households.

Informants	Age
Al-kanemi	65
Musa	60
Mohammed	50
Umar	40
Idris	56
Shehu	50
Adamu	49
Ibrahim	60
Al-Hassan	--
Usman	54
Mustapha	64

Table 3: Age Distribution of informants

AGE DISTRIBUTION OF INFORMANTS

The age distribution of the informants interviewed is presented in the table above. The informants were between the ages of 40-65. Three informants did not farm because of their age, but the majority of the informants were in their prime age and thus able to farm actively. Since some of the children are in various stages of their education, their labour for agricultural activities would only be available after school hours or during holidays.

SOURCES OF INCOME/LIVELIHOODS

The table below presents the major sources of income and livelihoods for households in Gursulu village. All the households interviewed were engaged in agriculture. Whereas agriculture was the major source of income and livelihoods for 10 of the 11 households interviewed, one informant, Mohammed, named fishing as his major source of income and livelihood. Nearly all the informants, except Umar and Ibrahim, are engaged in livestock production. Of all the households interviewed, Ibrahim alone depended solely on crop production as his source of income. Off-farm income and livelihoods sources in Gursulu include crafts (such as mat and basket weaving), blacksmithing, vulcanizing, fishing, and healing. One of the informants, Idris, is a government-salaried worker, working as a security guard in Yunusari Local Government.

Another source of income for three of the informants was migrant remittances from son(s), relatives or friends. Mustapha's children were involved in different livelihood activities from those of their parents: fishing, farming, and trading. While Mustapha's eldest son is a trader in Katsina and another of his sons is a government worker in Damaturu (migrant remittance) most of the informants in Gursulu village are involved in both rain-fed and *Fadama* farming.

Much of the income of the household is invested in meeting social pressures such as health costs, and the education of the children of the households.

Informants	Sources of Livelihoods and Income for the informants
Al-Kanemi	Major source of livelihood and income: agriculture (crop and animal production); Al-Kanemi is also the chief of Gursulu
Musa	Major source of livelihood and income: agriculture (crop and animal production); but also involves in fishing and trading, and gets remittance from son who is a civil servant; but also involves in fishing and trading, and gets remittance from son who is a civil servant.)
Mohammed	Major source of livelihood and income: fishing; but also involves in agriculture, trading and migrant remittance.
Umar	Major source of livelihood and income: agriculture (crop production); vulcanizes; trading.
Idris	Major source of livelihood and income: agriculture (crop and animal production); but also civil service (government worker as security guard in the local government)
Shehu	Major source of livelihood and income: agriculture (crop and animal production); but also hawking camel and cow milk, blacksmithing, herbalist and fishing
Adamu	Major source of livelihood and income: agriculture (crop and animal production); but also weaves and sells mats and baskets; in the past was engaged in off-farm migrant work
Ibrahim	Major source of livelihood and income: agriculture (crop production)
Al-Hassan	Major source of livelihood and income: agriculture (crop and animal production)
Usman	Major source of livelihood and income: agriculture (crop and animal production); prepares and sells farm manure
Mustapha	Major source of livelihoods and income: agriculture (crop and livestock production); fishing; trading; migrant remittances

Table 4: sources of income of households in Gursulu village

Informants	Activities
Musa	Children: fishing and selling fish, traders; son in the Polytechnic and also works for the local government
Mohammed	Fishing; wives: bake and sell groundnut cake (Kulikuli); buy and sell millet, guinea corn (sorghum) and beans
Umar	Householder: vulcanizer; sons middleman and the other a student
Idris	Householder; security guard
Shehu	Wives: milk and hawk camel and cow milk; brother: blacksmith and herbalist, children fish occasionally.
Adamu	Householder: weaves and sells mats and baskets; used to go to Gashua as migrant labourer
Mustapha	Other members of household: fishermen, traders

Table 5: off-farm activities engaged by members of Gursulu Households

FARMLAND AND GURSULU HOUSEHOLDS

As in many parts of Africa, arable land is a prized commodity. Since households in Gursulu village are dependent on agriculture for their livelihoods and income, land is an important asset and natural resource. The availability of adequate *gona* or farmlands, and access to them for households' agricultural and pastoral purposes, can enable households to secure their livelihoods; the reverse can be the case, when there is non-availability of farmlands. Even though the method of land acquisition in Gursulu village was not investigated, one of the key

informants mentioned that farmland is acquired without pay from the chief of Gursulu village by natives of Gursulu village, but that additional farmlands could be acquired by purchasing them. In the light of the increase in population in Gursulu, as can be seen in the large household membership, there is a high demand for additional farmlands, and this implies paying for them. Farmland can also be inherited from one's father, and this is in line with the Islamic practice.

Data collected in Gursulu reveals that different households have differential access to land capital, as the table below shows. The quantity of farmland owned by the informants is one of the determinants of the economic status of households in Gursulu. This explains why different households have different amounts of cultivable lands. Even though some of the farmers possessed 13 and 10 farmlands (*gona*), they fit within the general characteristics of peasant farmers, and as such are smallholder farmers, of the type predominant in rural northern Nigeria.

In conclusion, land use in Gursulu is intensive among the informants as they attempt to alleviate land constraints. The pressure on land is compounded by the lack of alternative employment opportunities in the non-farm sector.

A number of informants also have access to *Fadama* farmlands, which is used for cropping rice, vegetables and other crops. The advantage of *Fadama* farmland is that it enables households to grow crops that are ordinarily cropped only in the wet season, or in other climatic zones.

Informants	**Number of Farmlands Owned**
Al-Kanemi	10
Musa	10
Mohammed	4
Umar	2
Idris	1
Shehu	8
Adamu	7
Ibrahim	4
Al-Hassan	1
Usman	6
Mustapha	13

Table 6: the number of *gona* owned by informants

HOUSEHOLDS AND LABOUR

Labour is a necessary human resource and, for large households, it is an important asset for livelihood pursuits. As was mentioned in section 4.1, households in Gursulu village are composed of children, grandchildren, parents and, sometimes, relatives. These members of the household supply labour for farming and other livelihood activities.

Land preparation, weeding and harvesting are mostly done manually, using traditional farm implements. All households interviewed made use of traditional farm implements, and these are often labour-intensive. Around half of the households interviewed employed a tractor for their farming activities, because of financial constraints. As the table below shows, while only 6 informants made use of the tractor, while 6 made use of animal plough. 7 of the 11 informants hired outside labour to augment household labour, while 4 informants relied solely on household labour. The large household sizes of most households in Gursulu village could partly be a reason for most informants' dependence on household labour. Most households interviewed work in their farms for not less than 5 hours daily (except on Fridays, a Muslim holiday). In some of the households, women engaged in agricultural activities, owned their own farmlands, and in some instances, assist in the farm work.

Informants	Labour used	Farm implement used
Al-kanemi	Outside labour employed to augment household labour	Manpower: traditional farm implement; animal power and tractor
Musa	Outside labour employed to augment household labour	Manpower: traditional farm implement; animal power and tractor
Mohammed	Outside labour employed to augment household labour	Manpower: traditional farm implement; animal power
Umar	Rely solely on household labour, does not employ outside labour	Manpower: traditional farm implement
Idris	Rely solely on household labour, does not employ outside labour; engages in labour exchange	Manpower: traditional farm implement
Shehu	Outside labour employed to augment household labour	Manpower: traditional farm implement; animal power and tractor
Adamu	Outside labour employed to augment household labour, engages in labour exchange and cooperation	Manpower: traditional farm implement and tractor
Ibrahim	Outside labour employed to augment household labour	Manpower and tractor
Al-Hassan	Rely solely on household labour, does not employ outside labour	Manpower: traditional farm implement
Usman	Outside labour employed to augment household labour	Manpower: traditional farm implement; animal power
Mohammed	Rely solely on household labour, does not employ outside labour	Manpower: traditional farm implement; tractor and animal power

Table 7: type of labour and farm implements employed for farming

WOMEN, RELIGION AND THE HOUSEHOLD

Religion is an important factor that shapes issues such as land ownership, marriage, and the larger social milieu. All informants were Muslims. In five of the 11 households interviewed, women were engaged in agricultural activities but in three households, women were not engaged in farming. Some of the women, though, were traders, and one informant's wife was deceased. Access to women for the study was difficult mainly due to religious or cultural restrictions (*purdah*). In households where women did not participate in agricultural activities, they prepared food for households' members who were working in the fields. For households where women participated in farming, they either owned their own farmlands, or were engaged in farming with the rest of the household members in the family farmlands.

Crops principally grown by women include beans, onions, pepper, bambara nuts, and groundnuts, and these augmented household supplies of food. The relatively low involvement of women in major income-earning activities is related to religious and cultural norms.

Informants	Women participate in farming activities	Women do not participate in farming activities
Al-Kanemi	Yes, own farms	
Musa	Yes, own farms	But children's wives do not work in farms
Mohammed	No, traders	
Umar	Deceased	Deceased
Idris	Wife works in household farm	
Shehu	Wives own farms	
Adamu		Wives do not go to the farm
Ibrahim	Not specified	Not specified
Al-Hassan	Not specified	Not specified
Usman	Wives own farm	
Mustapha		Wives may not farm

Table 8: the activities in which women engaged.

EDUCATIONAL STATUS OF INFORMANTS

The level of literacy among the informants was generally low. Of all the informants interviewed in Gursulu village, none could speak the English language, suggesting that none had any formal education. However, some of the children of the informants were in various stages in primary and secondary schools. One of Musa's children, who is married, is in the Polytechnic and also works for the local government. Formal education is different from Quranic (religious) education, and the researcher is not certain of the level of Quranic education in Gursulu village as this was not investigated.

4.3. VULNERABILITY CONTEXT OF GURSULU VILLAGE

According to Vogel (1997:2), the term "vulnerability or vulnerable groups ... implies some form of external dimension that may increasingly predispose people to risk and hence greater vulnerability but also includes important internal elements ... such as defencelessness and a lack of means to cope with damaging loss". She distinguishes between vulnerability and risk, and says that there is a close relationship between risk and vulnerability. For her, the two are

not the same thing. Vulnerable communities are most likely to be more at risk to shock or disturbance, and not all communities who face the same risk will be equally vulnerable. The Sustainable Livelihoods Approach (SLA) argues that an analysis of the vulnerability context will reveal that they are responsible for many of the sufferings experienced by the poor (DFID, 1999). Watts (1983b: 352) points out that environmental crisis reveals the adaptive capacity, or lack of it, of communities to deal with these hazards. Thus, environmental crisis reflects the capacity of a society to cope with environmental crisis and its effects. In this section, the vulnerability context within which peasant households in Gursulu village have to eke out their livelihoods is presented. The risky context is discussed under the headings: rainfall and desertification, natural resources, in adequate capital and household size.

A. RAINFALL AND DESERTIFICATION

The characteristics of rainfall are a key factor that determines the economic activities in the semi-arid region (Apeldoorn, 1981: 22). The availability of water for dryland cropping, domestic use and livestock, especially for the arid and semi-arid regions, cannot be overemphasized. Since most households are mainly dependent on rain-fed agriculture, the problem of rainfall becomes a grave issue for households.

One of the major constraints to peasant livelihoods in the semi-arid region of northern Nigeria is rainfall–its variability and scarcity. In fact, this finding is contrary to the expectation of the researcher. First, much of the literature on desertification seems to over-emphasize the problem of desertification, as compared to rainfall, and the researcher, having immersed himself in the literature on desertification, expected the informants to mention desertification as the major factor constraining peasant livelihoods; they stressed, however, rain.

Secondly, Gursulu village is located within the semi-arid zone and located in the northernmost part of Yobe State, and as such, one would expect (in accordance with literature on desertification), that desertification would be the major issue; it was not however mentioned much. What little mention there was of desertification was with respect to the movement of sand dunes, which were perceived to be transported by wind to Gursulu village. According to the Principal Agricultural Officer II of the Yunusari Local Government, “desertification occurs when the natural vegetation reduces and exposes the soil to natural elements, thus providing the opportunity for winds to pile dunes from place to place”.

Obviously, then, the sand dunes reflect desertification. Thus, for example, Al-Kanemi, the chief of Gursulu village, has lived in Gursulu village all his life; and for him, the sand dunes were brought to the village by wind. Most informants believed in fact that sand dunes are that the sand dunes in Gursulu village have increased over the years. Yet they were still more concerned about the problem of rainfall.

Fieldwork data from Gursulu village shows that households contend with the twin problems of rainfall problems, and desertification. For households in Gursulu village, of the two, it was rainfall availability and scarcity, rather than desertification, that was perceived by the peasants as constituting a major constraint that impacts on households' livelihoods.

Rainfall in Gursulu village is characterized by uncertainty and this constitutes a problem for crop and livestock production. For example, Al-Kanemi complains about the decline in rainfall: "it is already towards the end of June and we still have not received rainfall. The problem is lack of rainfall. I cannot plant anything when there is no rain. You too can see for yourself". Furthermore, the onset of the rainy season varies, as Musa points out in his interview: "Sometime we get rain in June or July; sometime we get it even by May ending". Of the 11 interviews conducted in Gursulu village, similar responses with respect to rainfall decline, variability and scarcity were recorded for the following informants: Musa, Mohammed, Umar, Idris, Usman and Mustapha. Rainfall scarcity affects the yield of crops and livestock. All the peasants interviewed in Gursulu village listed rainfall decline, variability and scarcity as factors which impacted on their agricultural yields of crops and animals.

All the respondents in Gursulu village also believed that there was a decline in soil fertility and in the yields of their farmlands. This decline also affects the availability of fodder for livestock, resulting in the low productivity of livestock as well, and in some cases, the death of households' livestock. All the households interviewed blamed the changes over time in the livestock reared in Gursulu on the scarcity of rainfall, although a few also blamed desertification. Al-Kanemi says that as a result of lack of rainfall, "there is not enough grass for fodder and animals to survive". Furthermore, Adamu reports that "in the past when we had enough rainfall, my harvest used to be more than today. It used to last me till the next planting season, but sometime today, my produce sometimes does not last till the next harvest season".

All the informants interviewed mentioned the reduction in the crop yield of their farmlands. For example, Ibrahim complains about the reduction in his land quality: "in the past, if I broadcast (plant) one bag of rice, I can harvest at least forty or fifty bags of rice, but now I harvest only 20 to 22 bags or less than that. For millet, before we harvested about 30 bags but now we harvest only 10 bags in the same piece of land that used to produce 30 bags of millet".

B. OTHER NATURAL RESOURCES

One of the effects of rainfall variability and desertification is their effect on natural resources systems: i.e., river flow and wetlands, forests and trees availability and soil and land productivity. In their article on "Rainfall Variability in East Africa: Implications for Natural Resources Management and Livelihoods," Conway, Allison, Felstead and Goulden (2005) write of the implications for natural-resources management and livelihoods in East Africa of hydro-climatic variability. They claim that rainfall variability, extreme weather events, changing temperatures and wind speed affect food production systems by impacting upon the livelihood strategies of producers, especially farmers, fishers and livestock keepers (2005:51).

A first time visitor to Kanamma and Gursulu during the dry season is surprised by the scanty vegetation cover, by the dry grasses, the visible stretches of land, and by sand dunes. The informants were divided on the question of the availability of free plant and grass species for the benefit of the community. Four of the informants claimed that tamarine and guava or, for some, mangoes, are available for their use when in season. For example, according to Musa, "We have tamarine and guava in the field. It is free and available for anyone to make use of". Seven of the informants mentioned however that there are no free plants around the village that residents can freely use. For example, Adamu said that "This place is empty; there are no trees here so I do not think we have any plant like that in this place".

All of the peasants blamed rainfall decline, scarcity and variability, and desertification and land degradation for the declining land / soil bioproductivity. For Musa, "In the past, we did not use fertilizer; we used organic matter. But now I have to use fertilizer to raise the quality of my lands.... It is due to the scarcity of rainfall. If rainfall is available, grasses will grow tall. When they germinate, we can easily get organic matter. But as the situation is now, there is a lack of rainfall and because of this, there is no available grass". Peasants like

Mohammed, with inadequate capital, are in a difficult situation as a result. They have no choice but to rely on organic manure or fertilizer, but they cannot always afford it: "Years ago, we could easily get organic matter. Now we rely on fertilizer if we have money. I buy fertilizer to apply on my farm but when I do not have money, I do without it".

Another natural resource present to Gursulu households for their livelihoods pursuit is the Yobe River, which passes through Gursulu, and empties in Lake Chad. The floodplain of the Yobe River is used for *Fadama* farming. Hence, the river serves households' livelihood pursuits. Unfortunately, the Yobe River is a seasonal river and dries up during the dry season.

C. INADEQUATE CAPITAL

Inadequate financial resource and poverty were identified as factors constraining households' livelihoods. Data collected in Gursulu village show that households do not have equal access to natural capital like land. This is evident from the varying quantity of farmlands possessed by the different informants. The number of farmlands owned by the informants is also dependent on the financial capital available to households and, thus, determines their economic status, as was mentioned before.

The following from households' narratives were used as determinants of inadequate financial capital/ poverty:

(a) Those who say they are poor;

(b) The number of farmland owned by households. In some cases, land alone is not an adequate measure of poverty, as in the case of Mohammed who has four farmlands but is mainly a fisherman;

(c) Number of livestock being reared;

(d) The inability to procure farm inputs such as fertilizers and other modern technology such as tractors. Let us take the case of Al-Hassan. In response to the question to ascertain if he uses animal plough or tractor, he said: "Those who have the means use tractors and those with less means use cow plough and those without much means use hoe, cutlasses and diggers". This suggests that only those who have adequate capital, either monetary or in

assets such as livestock, are able to procure assets and other farm inputs. Hence, Al-Hassan utilizes traditional farm implements (hoe, digger and cutlasses) in his farm;

(e) Inability to access irrigation farming; and

(f) Quantity of yield per year. But this alone is problematic because the household size also determines the quantity of yield. More so, a small harvest, for example, would be sufficient for household with membership sizes, but this may be insufficient for households with a large size.

D. HOUSEHOLD SIZE

The household, in rural Sahelian Hausaland, is the basic unit of the social system. It serves as the basic unit of production and of consumption of food and other crops.

The household sizes of most of the informants are large. These, in most cases, supply the household labour for farming and other livelihood activities. At times, though, household labour is augmented by hired labour. Labour is a necessary human resource, and for households with large composition, it is an important asset for the livelihoods pursuit of peasants' households. This is because diversifying livelihood portfolios, intensifying agriculture and dry season migration for other work, all depend on the availability of labour. Another factor that influences the increase in population is the early marriage prevalent in the village.

As with many contemporary rural Nigerian communities, a "growth in population could only be a blessing, whether at the level of the household, the community or the state. More people [mean] more crop production, more time for tending livestock, and more opportunities for diversifying activities outside primary production" (Mortimore and Adams, 1999: 11).

Yet there is also a downside to population growth. Although more people mean an increase in the population available for labour, it also means a shortage of the available land for farming activities. This is so because land does not increase with population. Also, more household members mean that there are more mouths to feed and more family needs. The point that needs to be emphasized is that a large household is not necessarily a constraint for peasants' households, but at the same time, a large household can also generate severe pressures.

CHAPTER FIVE

LIVELIHOOD STRATEGIES OF GURSULU PEASANTS

This chapter presents evidence of the livelihoods and adaptive strategies of Gursulu households. The findings were derived from interviews conducted in Gursulu village, where as noted, 11 heads of households were interviewed, as well as from interviews with government officials. Government officials were interviewed include the Principal Agricultural Officer II and the Head of Agriculture Department for Yunusari Local Government Area; the Director of Drought and Desertification Control in the State Ministry of Environment; the Director and Deputy Director of Community Development at the Yobe State Ministry of Integrated Rural Development; some officials of the Ministry of Agriculture and Water Resources; and, lastly, some officials of the Drought and Desertification Department of the Federal Ministry of Environment. The data collected were qualitatively analyzed using content analysis.

The livelihoods and adaptive strategies developed by Gursulu peasants are discussed within three sub-headings: diversification, intensification, reliance on migrant remittance and a bias in favour of small ruminants. Livelihoods enabling policies are also discussed under the sub-heading, institution and policy. The chapter discusses reasons for the failure of government policies.

5.1. DIVERSIFICATION

To begin with, crop production is the predominant source of all households in Gursulu. Except for two households, all are also engaged in livestock production. Peasant households do not rely solely on farming for their livelihoods, because farming alone is increasingly becoming incapable of providing adequate livelihoods. As Barrett, Reardon and Webb (2001) rightly remark, "diversification is the norm and that few people collect all their income from just one source or hold all their wealth in the form of any singe asset" (2001: 315).

According to Ellis (1998: 4), diversification refers to "the process by which rural families construct a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their standards of living". This involves engaging in a range of off-farm and non-farm income-earning activities including wage labour, healing, weaving, and blacksmithing. Fieldwork data from Gursulu show that most households diversify their income sources to include more than one income-earning activity in both on-farm and off-farm endeavours.

A. DIVERSITY OF CROPS AND LIVESTOCK PRODUCTION

Diversity in crops grown and livestock reared is the norm for most households in Gursulu, as the table below shows. Whereas households grow a variety of crops such as maize, millet, guinea corn (sorghum), groundnuts, bambara nut and vegetables, they rear a variety of livestock like sheep, goats, cattle and, for a few of the informants interviewed, camel and donkeys. The rationale for keeping different types of livestock is risk aversion, that is, as insurance against crop failures, and as an investment to be drawn upon to purchase farm inputs or solve family problem. Also, while most households combine both small and large ruminants in addition to crop production, others combine both crop production and small ruminants.

In times of family crisis and hardship, households in Gursulu can sell their livestock and, with the income from the sales, solve their problems. For instance, some of these problems are the educational needs of children, and problems from environmental or socio-economic problems. According to Adamu, he rears livestock "so that I do not have to rely on farming alone. When I need money for any problem, I sometimes rely on my animals if I don't have crop to sell. There are many advantages of keeping these animals. I use their milk and I get manure from these animals". Mohammed keeps different livestock for similar reasons: "the reason I keep chickens and sheep today is so that I can easily use one of the types of animals I am keeping. One day if I do not benefit from the cattle, I can easily benefit from sheep; if I do not benefit from sheep, I can easily benefit from chickens".

B. OFF-FARM/NON-FARM LIVELIHOODS ENGAGEMENT

A number of informants in Gursulu, in addition to farming and rearing animals, are involved in off-farm activities such as trading, fishing, the weaving of baskets and mats, blacksmithing and traditional healing. There are several reasons why peasants diversify into non-farm and off-farm livelihoods activities.

Risk reduction from crop failures resulting from rainfall variability and shortage is an important reason for diversifying into non-farm and off-farm activities. Members within an extended household in Gursulu are involved in an assortment of livelihood activities. For example, while some children may be involved in fishing and trading, other household

members may rear livestock, or embark on migrant labour, or on migrant remittance. However, not all informants are involved in off-farm/non-farm livelihoods activities.

5.2. INTENSIFICATION

Much of the agricultural growth in Africa results from the extension of the land area that is under cultivation, and not in fact through "increased productivity of the land already under production" (Dorsey, 1999: 180). However, this is not the case with the semi-arid zone of northern Nigeria, because of the constraints of desertification and of land degradation, and by the problem of population increase with its concomitant impacts on land availability.

In such a scenario, expansion of the land area under cultivation becomes impossible because of non-availability of arable land. In such conditions, intensification and diversification in fact becomes the norm. From Boserup's (1965: 7) *The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure*, it has now been established (against the neo-Malthusian hypothesis) that population increase could, rather than impact negatively on agrarian communities, lead to the practice of intensifying agriculture. Tiffen et al. see intensification as "increased average inputs of labour or capital on a smallholding, either on cultivated land alone, or on cultivated and grazing land, for the purpose of increasing the value of output per hectare" (Adams and Mortimore, 1997: 151). This includes extend additional inputs of labour per hectare; the creation of capital like "water management structures or irrigation systems"; and the alteration of land management systems.

Al-Kanemi, the chief of Gursulu, brings out the implications of high population growth rates for households when he says that "In the past, when my family was small, what I produced used to be enough for my household but now my family is very large and my produce is not enough for my family". According to Adams and Mortimore (1997: 151), with low population densities, the declines in crop yield and soil fertility "may not matter (because extension of the cultivated area is an option), and may not be possible to correct (because there is too little labour to invest in intensive agricultural practices)".

In response to uncertainties and rainfall shortage, Gursulu households have clearly intensified their agricultural practices. They rely upon household labour as a livelihood strategy, and some households also rely on outside labour to augment their labour input per farmland. Some households have intensified their agricultural activities by intercropping millet and

guinea corn (sorghum) because these crops have different nutrient requirements. Intercropping also suggests indigenous knowledge, and is a method of soil management.

Gursulu households also make increasing use of use inorganic fertilizers, as opposed to in the past, when organic manure was mainly used to raise the quality of the land. "In the past, we did not use fertilizer; we used organic matter," says Musa. "But now I have to use fertilizer to raise the quality of my land". Organic manure is becoming increasingly difficult to access because of a shortage of grasses, due to rainfall scarcity. "If rainfall is available, grasses will germinate, and we can easily get organic matter. But as the situation is now, there is lack of rainfall and because of this, grasses are not available. We can only get fertilizer which is a new form of modernisation and is very expensive to procure".

However, Adams and Mortimore (1997:151) have noted that intensification is not always an easy option for peasants experiencing a high population growth rate in marginal environments, because intensification is a risky practice. According to Sutton (1989), attempting a "more elaborate, more 'intensive' and laborious method is always a risk, one sensibly undertaken only if both the needs and the expectation of rewards are overwhelming" (Adams and Mortimore, 1997: 151).

So, while households may seek to intensify agriculture, it is important to stress at the onset that not all communities are able to successfully implement this strategy. This is especially true for those communities with a high population growth rate, and which are already densely populated and are not able to invest in more intensive methods of agriculture.

In Chapter 4 of the Research Report, I demonstrated that Gursulu households have large memberships, and high population growth rates, which impact on land availability and food production. It was also shown that all households in Gursulu experience a decline in crop and livestock yields due to the problem of rainfall decline, scarcity and variability, as well as desertification and land degradation.

Finally, not all households have the resources for intensification – for example, many households lack the finances for inputs like fertiliser, tractors and plough animals. Some determinants of the possibilities of intensification in Gursulu are the amount of time spent in the agriculture or related activities; the quantity and quality of land owned; the number of

household members that work the household land; the amount of labour allocated for the household land; the system of farming practiced by the household and the soil management practice of households.

A. INTEGRATION OF LIVESTOCK AND CROP PRODUCTION

Many households in Gursulu village have resorted to the practice of rearing and growing livestock and crops concurrently. According to Mortimore and Adams (2001: 54), in mostly agricultural communities in the Sahel, "everyone owns, or aspires to own, livestock". As it is the case with Gursulu, livestock serves as an asset, a store in which households can "bank" their wealth, and draw upon in times of household hardship.

The sale of livestock also enables households, to acquire other assets such as farm inputs and technologies (Usman interview). Also, households benefit from integrating livestock and crop production, in that it provides them with the opportunity to recycle both crop residues, and manure. This confirms the point made by Mortimore and Adams (2001:54), livestock-keeping is beneficial for farming households because "livestock could serve as a reserve for contingencies, a self-reproducing asset, a source of current income, and a source of energy for farm....In addition to all these, they support intensification on the farm through the cycling of nutrients through crop residues and manure". Another benefit of integrating livestock and crop production is that it supplements household labour, in the form of animal traction.

Again, it is important to be clear that not all households in Gursulu have the means to rear both crop and livestock production, as the table below shows. There are those who grow crops and keep livestock at the same time. Mohammed is a good example of this privileged group as he integrates crops, livestock and fishing as the sources of his livelihood, as depicted in the table below. However, two of the 11 informants interviewed do not keep livestock but only grow crops, not because they do not aspire to own livestock, but because they are constrained by lack of financial capital.

Informants	Crops farm	Livestock and birds rear
Al-Kanemi	Maize, millet, guinea corn (sorghum), Beans, Rice, pepper and onion	Goats, sheep and cattle
Musa	Beans, millet, bambara nuts, okra, rice, maize, guinea corn sweet potatoes, tomatoes, cassava, cocoyam	Chicken, duck, goats, sheep and cattle
Mohammed	Guinea corn (sorghum), millet, maize and ground nuts.	Mainly a fisherman; but rears cattle, goats, sheep and chickens
Umar	Beans, groundnuts and millet	Does not rear livestock or birds
Idris	Millet, groundnuts and guinea corn (sorghum)	Goats and sheep
Shehu	Sweet potatoes, groundnuts, vegetables, millet, guinea corn (sorghum) and beans	Camel, cattle, sheep and goats
Adamu	Rice, guinea corn, millet and beans	Goats, sheep and cattle
Ibrahim	Beans, rice and millet	Does not rear livestock or birds
Al-Hassan	Millet, beans and cassava	Cattle, goats and sheep
Usman	Maize, millet, guinea corn (sorghum), rice, tomatoes, okra and pepper	Goats, sheep, donkeys and cattle
Mustapha	Maize, millet, guinea corn (sorghum), rice, beans, onion, tomatoes, pepper and ground nuts	Camel, donkeys, goats, sheep and chicken

Table 9: Households integration of crop and livestock production

B. SOIL FERTILITY MANAGEMENT

Soil management is a conservation practice that helps in raising the fertility of soil and therefore an optimal yield from farmland. This is because soil management entails the manipulation and exploitation of nutrient levels and of soil physical conditions to meet the needs of the crops (Philips-Howard 1995:187).The purpose of this practice is to produce as adequate crops for households' consumption and other needs. According to Philips-Howard (1995: 187), the practice of soil management is necessary "for sustained crop production and the improvement of the farmers' livelihoods".

Soil management involves a considerable knowledge not only of local environment but also of crops, fertilizers and soils. Traditional smallholder farmers are able to differentiate among the different soil types, using a simple traditional soil-profiling techniques based upon characteristics such as colour, texture and nutrient value, and "recognize their moisture holding, crop suitability and other properties" (Mortimore and Adams, 1999: 99). This is show, for example, by Mortimore and Adams's case-study involving four north-eastern Nigerian villages (Tumbau: Kano State, Dagaceri: Jigawa State, Futchimiram and Kaska: Yobe State) demonstrates.

Gursulu farmers likewise have a wealth of indigenous knowledge about their local environment and about the soil types suitable for different crops. Such knowledge of soil types, soil fertility, types and prevalence of weeds and importantly of rainfall patterns is essential for peasant agricultural production. Ibrahim expressed this knowledge clearly, with words and gestures, on his farm: “This area is very hot; beans produces more here than millet. If I grow millet on this piece of land, it will not produce well,” he pointed out. Then, “This is close to the river area. This piece of land is for irrigation, if I get money I will do irrigation farming. You see in this piece of land I can grow maize, beans and yam”.

All the informants were concerned about the decline in soil fertility and, hence, crop yields. They attributed these problems to low rainfall, desertification and land degradation. Consequently, the main concern for peasants in Gursulu is how to manage the risks associated with low and often erratic rainfall patterns.

One method through which households improve the quality of their farmland and crop yield is through the use of farm inputs like inorganic fertilizers as well as organic manure, and the practices of crop rotation, intercropping and early planting. Since peasants understand the rainfall patterns, and engage in the practice of early planting in which they cultivate and sow their seeds with the sign of the first rain. These management and conservation practices are generally recognized by Gursulu farmers as improving the fertility of the soil and, thus, crop yield.

The use of organic manure as a means of improving soil fertility is a common practice among the informants. Organic manure is commonly used in Gursulu, but not because farmers generally recognize that it is non-toxic and environmentally more sustainable than inorganic fertilizers. Organic manure is predominantly used, because of its affordability and accessibility compared to chemical fertilizer.

The most common organic manure employed by farmers includes manure prepared from livestock dung, of which cow manure is the most common. Some of the farmers graze some of their livestock like goat, sheep, cattle, camel in their farms and harvest the manure for use

in the farm.[15] Those without livestock or those who do not prepare organic manure sometimes purchase that prepared by others. For example, in Geidam, a suburb of Abuja, organic manure packaged in 50kg bags cost about 40 *naira* apiece. In some instances, some farmers in Gursulu enter into a beneficial relationship with herdsmen, in which the farmers allow the herdsmen to graze their livestock in their farmlands, usually during the dry season. The animal droppings serve as manure and enrich the soil against the next farming season. More so, another kind of organic manure used by Gursulu peasants is the use of plant-based organic manure, for example, compost, which is a rich source of soil nutrient.

In addition to these sources of organic manure, farmers in Gursulu also generally employ the slash-and-burn method to clear grasses and shrubs from the land. The advantage of the ash is that it raises soil pH, improves soil structure, and adds nutrients like potassium to the field. There is research on the economic advantages of the slash-and-burn method of land preparation (see, for example, Simoranggkir's 2007: 154) work on Indonesia).

Low rainfall is a factor that constrains the availability of organic manure because drought impacts on both livestock production and grass and plant growth, and these are used for preparing organic manure. Musa expresses this well: "grasses and plants germinate when there is rainfall, and we use plants and animal dung for preparing organic matter". Usman has also observed that the quality of his lands is not as high as it was in the past. "This is because of inadequate rainfall. There is also the problem of sand dunes covering our fields." Because of this, Usman now applies manure to his fields. "After I harvest my fields, I use most of the stalks in preparing organic manure and some as feed for my livestock. I even sell some of the manure that I prepare to other people who do not have livestock to prepare organic manure for their farms".

There is a general Nigerian government reluctance to encourage the use of organic manure through research and finance. This is because of the general perception by officials that traditional farming should be phased out; there is a general bias towards modern agriculture, which emphasizes more use of external inputs for increased productivity.

[15] Manure is usually mixed with the soil during land preparation just before planting.

Inorganic fertilizer has gained ascendancy over organic manure in the last few years because its effects seem to be more immediate than those of organic manure. As the table below shows, many households in Gursulu today prefer inorganic fertilizer to organic manure, because of the decline in soil fertility and, hence, in crop yields. They tend to perceive inorganic fertilizer as being more potent than organic manure. Moreover, many households consider the use of inorganic fertilizer to be a prerequisite for successful and plentiful harvest and, hence, the best and most expedient way to improve the soil fertility.

Another reason why inorganic fertilizer is increasingly preferred in Gursulu is that the acquisition of organic manure is increasingly becoming difficult as a result of inadequate rainfall which impacts on grass availability for livestock feeds and organic manure. According to Mohammed, one of the *maigida* interviewed, these days "we rely on inorganic fertilizer if we have money. I buy fertilizers to apply on my farm but when I do not have money, I do without it". Musa, also a *maigida*, echoed the motive for his preference for inorganic fertilizer: "in the past, we did not use inorganic fertilizer. We used organic matter. But now I have to use inorganic fertilizer to raise the quality of my farmlands…We can only get fertilizer which is a new form of modernization". However, even though the use of chemical fertilizer is preferred in Gursulu, the quantity applied is usually low because of the high cost of acquiring chemical fertilizer.

Informants	Reason for the adaptive strategy	Use of organic manure	Use of inorganic fertilizer
Musa	Reduction in the quality of land as a result of scarcity of rain. Hence lack of grass for organic manure.	In the past, he relied on organic manure.	The use of inorganic fertilizers is necessitated by the rise in the quality of land now.
Mohammed	Poor state of the land's quality and inaccessibility of inorganic manure today	In the past, organic manure could easily be acquired	Dependence on inorganic fertilizers when financial capital is available; otherwise, he makes do without it
Shehu	Reduction in crop yield caused by scarcity of rainfall and the desertification.		In the past, he did not have access to inorganic fertilizers to boost crop yield; no need for fertilizer in the past (crops yield is incomparable with the past even with the use of inorganic fertilizers).
Adamu	Reduction in the quality of land as a result of desertification and scarcity of rainfall.	Benefits from animals includes organic manure.	Crops yields raised with inorganic fertilizers.
Ibrahim	Reduction in crop yield as a result of low rainfall and desertification.		Would like to use inorganic fertilizer in farms, but his access to fertilizers is constrained by high cost.
Usman	Reduction in the quality of land as a result of desertification and inadequate rainfall.	Prepares organic manure from stalk of farm produce and livestock waste; sells organic manure.	
Mustapha	Decrease in the quality of land; increasing the quality of land requires organic and inorganic fertilizer.		
Head of Agric Depart., Yunusari Local Government	Reduction in crop yield as a result of the decrease in the quality of land.	Gursulu peasants rely on organic manure.	People do not use inorganic fertilizers.

Table 10: Households' motive for use of organic and inorganic fertilizers

5.3. RELIANCE ON MIGRANT REMITTANCES

Migration means that one or more household members move away temporarily or permanently either due to seasonal variations, or for higher income-earning opportunities in urban or rural centres. In fact, there are two basic reasons for migration: voluntary and economic migration and forced migration (Ellis, 2003: 5). An example of forced migration is that which takes place when environmental and climatic hazards such as drought and desertification lead to migration, as was the case during the 1968-1973 droughts in the Sahel which led to the vast migration of people (UN, 1977).

Popular perceptions of migration tend to regard migration solely as an outcome of negative occurrences. According to De Haan (2000:1), migration "is often seen as the *consequence* of ruptures, of environmental disaster, economic exploitation, or political or civil tensions and violence. And it is often perceived to be a cause of problems, like environmental degradation, health problems, 'brain drain', political or social instability, declining law and order, and unravelling social fabric and support systems".

A number of factors determine who migrates and who can benefit from opportunities arising from migration to other locations. These factors, according to De Haan, include the social context, norms and structures; the household composition; gendered ideology; and people's social contacts and networks. Decisions about migration are made by households, and the "head of households decide about the migration of their sons or nephews – and their wives. This is an economic investment" (De Haan, 2000:21). This is because remittances by migrants enable households to enhance their livelihoods by investing in other assets, or resources such as livestock, land and farm inputs and implements, thus improving the livelihoods of rural households.

Not all of the households interviewed in Gursulu receive remittance from relatives or friends who have migrated to the city or other places. As the table below shows, five of the 11 households interviewed receive remittances from household members or friends. Some households have two household members who have migrated to the city. Remittances are received either in the form of cash or farm inputs, as in the case of Shehu who receives bags of fertilizers from his brother who works in Yobe State Ministry of Agriculture. It is important to point out that some households receive remittances from people other than their household members.

Informants	Households receiving Migrant remittances	Location of Migrant (s)	Occupation of Migrant(s)
Al-Kanemi	No	---	---
Musa	Yes from 2 migrants, one of which is his son	Kano; Kanamma	Son is a civil servant, working in Yunisari Local Government; other migrant occupation not specified
Mohammed	Yes	Geidam	Businessman
Umar	No	---	---
Idris	No	---	---
Shehu	Yes from brother	Damaturu	Civil servant, working in State Ministry of Agriculture
Adamu	No, but Adamu used to go to Gashua to work as migrant labour	---	---
Ibrahim	No	---	---
Al-Hassan	No	---	---
Usman	Yes from brother	Damaturu	Trader
Mustapha	Yes from two sons	Katsina and Damaturu	Trader and civil servant, working for the government

Table 11: Households and Migrant remittances

Mohammed and Musa are examples of the Gursulu dwellers who receive migrant remittances. Musa, whose friend is a businessman in Geidam, receives financial assistance when in family difficulty. In the case of Adamu, he would migrate to Gashua during the dry season, hiring himself out as migrant labour. Most households rely on migrant remittances in times of household difficulty, and remittances are also sometimes invested in assets for livelihood activities. According to Ellis (1998), migration is one of the most important methods of diversifying rural livelihoods. Research has shown that migrant remittances relieve rural credit constraints and mitigate risks (Ellis, 1998).

This is not to say that migration does not have its negative impacts. In fact, as mentioned in Chapter 2, migration impacts negatively upon family life. It leads to separation from wives and children, and ultimately to the destruction of family patterns as women, children and the elderly are left with the burden of agricultural activities (NAP, 2000: 19; Oladikpo, 1993). Furthermore, Ellis (1998) has shown that migration can lead to a decline in agricultural output. For example, better income-earning opportunities in distant labour markets divert labour resources away from agriculture and, hence, lead to the depletion of the labour force required to prepare and harvest the land.

5.4. BIAS IN FAVOUR OF SMALL RUMINANTS[16]

In the Sahel of northern Nigeria, rainfall scarcity and desertification impact on the availability of fodder. This can impact upon the livestock production, and can even lead to the death of the animals. Al-Kanemi, the chief of Gursulu, recognizes this fact of Sahelian life: "The greatest problem we are facing is the lack of rainfall, and because of the lack of rainfall there is not enough grass for animal fodder, thus animals cannot survive. Also, lack of rainfall makes the animals not produce well".

As a result of this, in the past few years in Gursulu, there have been changes in the pattern of livestock reared. There is a shift from large ruminants to small ruminants. This is largely because small ruminants have many advantages over large ruminants like cattle, donkeys and camels. First, small ruminants like goats and sheep are not only less costly and more resilient, but are also easier to feed, and they reproduce faster than cattle (Mortimore and Adams, 2001: 54). Moreover, they are less easily affected by diseases than cattle.

Similarly, it is easier to sell small ruminants than cattle in times of family hardship (interview with Usman). Shankarnarayan, Bohra and Ghosh (1985: 1965) confirm this point when they say that small ruminants like goats are preferred in marginal environments because fodder is scarce, and has a low nutrient value in the semi-arid zone. They go on to say: "Smaller animals like the goat with lower maintenance needs can cover large areas to gather sufficient nutrients for survival and for the minimum production of meat and milk". Musa, one of the informants interviewed in Gursulu, is representative of those informants who have adapted to the changing climatic, environmental and social circumstances in Gursulu by changing the patterns of their livestock production.

Musa now rears chickens, ducks and sheep, because there are no animals in the wild for hunting, and because keeping horses and donkeys has become too expensive to rear. He is constrained by a lack of financial capital: "I do not have enough money to rear donkeys and horses. If you do not have enough money, you cannot rear these kinds of animal because they are heavy feeders". Moreover, Musa explains that he now rears small ruminants because he can easily sell them at good prices to solve his family problems, avoiding begging other people for assistance. He notes that "sometimes, we sell these animals in situations such as

[16] While small ruminants include goats and sheep, large ruminants include cattle, Carmel and donkeys.

marriage in the family, or when a family member is being charged to court for stealing or fighting".

Prima facie, it seems that there is a contradiction in the material analysed and presented in this paper: how or why there would be a decline in agricultural output, as reported by informants, when modern agricultural innovations such as tractors, inorganic fertilizers, and extension services are available in Yobe State and in Gursulu in particular?

However, a closer examination of the interplay of realities on the ground provides a basis for understanding the reason for the decline in crop and livestock production, even amidst the availability of modern agricultural innovations. The scrutiny reveals that, although these innovations are available in Yobe State, and indeed in Gursulu village, the peasants who need these most, rarely have actual access to them, because of obstacles like corruption, nepotism and favouritism in government. Akpokodje, Lancon and Erenstein (2001: 41) bring out the problems associated with fertilizer production in Nigeria, which can be applied to the problem of fertility distribution in Gursulu: "Fertilizer production in Nigeria has been constrained by politicking and ethnic rivalry. Moreover, some government officials have been more favourably disposed towards the importation of fertilizer from which large sums of money was swindled. Even importation itself has been fraught with a number of problems".

Furthermore, in cases when the peasants *do* have access to inorganic fertilizers, many do not know how to apply them for optimal yields. However, some of the peasants who do know how to apply the fertilizers effectively are constrained by supply problems, such as not being able to get the fertilizers from the government or the sellers at the right time. It is also important to know that fertilizers are of different types, and different fertilizers produce better when applied to particular soil types. In the case of Gursulu, the fertilizers sent there often do not take into consideration the soil types of the village, and hence, the peasants fail to get the desired outputs whenever they applied them.

In the rare cases where tractors are available, the high cost of hire makes them effectively unavailable to many peasants. There are further problems. For example, in his study of "Increasing Output through Tractor Use in Abambra State, Nigeria," Okereke (1991) examined rice production from traditional farms employing manual labour and from those

farms using tractors. He shows that while the use of tractor can guarantee the timely preparation of land to take advantage of the early rains, "tractors were not readily available, in spite of the existence of private and government tractor hire services. The government tractors were frequently in need of repair" (in Akpokodje, Lancon and Erenstein, 2001: 41)

The point of this research is not that modern innovations cannot yield enormous dividends, even amidst harsh climatic conditions such as drought and desertification. Rather, it makes the case that, if these innovations are not made *accessible* to the peasants, and at the right time and quantity, and that the peasants do not always apply these innovations properly, sufficiently and timely, meaning that the high yields expected may not be achieved.

5.5. INSTITUTIONS AND POLICY

This section considers the institutions and policies that affect peasant livelihoods. It evaluates the impact of government institutions and policies on the peasants of Gursulu village. This is because an understanding of policies and institutions, and of their impact on peasant households, can better enable them to achieve their desired impacts.

A. LIVELIHOODS AND ENABLING POLICY

In section 3.3 of Chapter 3, the Nigerian government's policies on desertification were presented and discussed. According to section 2.2 of Chapter 2 of this Research Report, the Sustainable Livelihoods Approach (SLA) also establishes a relationship between livelihoods and the policies, institutions and processes (PIPs) that determine access to assets. Governments through policies can, for instance, determine access to human capital assets. The SLA approach shows the interrelationships between the events and trends that impact on people's lives, as well as the structures (such as levels of government, the private sector, actors) and practices (such as laws, policies, institutions, etc) all influence people's access to, and their use of, livelihoods assets. Other factors also determine whether development interventions achieve their desired impacts, including the quality of the technical solution, the appropriateness of the intervention and the creation of an enabling environment for implementation (Sandford and Ashley, 2008: 2).

This section draws on interviews with the following government officials: the officials of the Yunusari Local Government Area, the Yobe State Ministry of Environment and the Ministry

of Integrated Rural Development, the Federal Ministry of Agriculture and Water Resources and the Ministry of Environment.

Data collected from these officials shows that, through policies and actions, the government of Yobe State renders assistance to peasant households in the State (and in Gursulu) by creating enabling environments for them to secure their livelihoods. Analysis of policy documents in section 3.3 of this Research Report also supports the claims of government officials interviewed that the State government and other actors, through their laws, policies and institutions, influence peasants' access and use of livelihoods assets.

According to the Principal Agricultural Officer II (hereafter referred to as PAO II) of Yunusari Local Government Area, the government assists the peasants of Gursulu village through project interventions as they enhance agricultural systems because of the problem of desertification and rainfall scarcity. The Yobe State Agricultural Development Programme (ADP), which is under the Yobe State Ministry of Agriculture, is responsible for a number of government interventions that are related to agriculture, desertification and livelihoods.

MITIGATING LAW AND ACTIONS AGAINST DESERTIFICATION

There was a consensus among government officials that there are laws for desertification management. All of these government officials recognize desertification as a serious threat affecting northern Nigeria. The following are in place to mitigate the effects of desertification.

STATE LAWS AGAINST DEFORESTATION AND BUSH BURNING.

According to Medugu, Majid and Choji (2008: 698), the National Forestry Policy and Action Plan of 1987-1998 was formulated to serve as a framework for arresting deforestation, and its destructive impacts. The objectives of the policy are the protection of forest resources, achieving 25 percent forest coverage in Nigeria, and the sustainable use of forest products. There are Federal and State laws against deforestation and bush burning. The law is implemented with the help of forest guards and the traditional rulers present in all the Local Governments Areas in Yobe State.

The duty of the forest guard is to advise rural households against mass tree felling, and to encourage them to plant new trees (PAO II interview, June 2009). However, in Yobe State

and Gursulu village in particular, all the government officials interviewed are in agreement that the existing laws promulgated to deal with desertification are outdated. For example, the Director of Drought and Desertification section, the Yobe State Ministry of Environment (DDDME) says, "There are state laws against trees felling and bush burning but these laws are quite old now [outdated]. There are no new changes in the laws yet. We are trying to review the old laws and formulate new ones to meet the current situation" (DDDME interview, June 2009). Furthermore, the DDDME official states that there are no changes in the regulations to reflect the recent findings in desertification studies.

THE PROVISION OF FARM INPUTS AND IMPLEMENTS

Government officials from the Local Government Area, State Government and Federal Government agree that government needs to provide peasant households with farm implements and inputs. This would enable them to realize their livelihoods. In fact, the Head of the Agriculture Department of the Yunusari Local Government area (hereafter referred to as HODAY), the PAO II, the Director and Deputy Director of Community Development of Ministry of Integrated Rural Development (hereafter referred to as DCDMIRD) and the Director of Drought and Desertification Control of the Ministry of Environment (hereafter referred to as DDDCME) are in agreement that government renders assistance to households in Yunusari and Yobe State by providing them with farm inputs such as tractors, fertilizers, and animal traction.

For example, the PAO II says, the government also provides households in Gursulu village "with packages of animal tractions, agrochemicals, pesticides, and fertilizers to enhance their farming system" as well as "assisting rural communities with new breeds, and improved crop varieties," and "providing them with improved breeds of animals to enhance their farming systems". According to the HODAY, the State and Local Governments assist peasant households in their farming practices by providing them with tractors at subsidized rates:

> About two weeks ago, Yobe State Government supplied us with 10 new tractors. Apart from those supplied by the State Government, the local government area has got at least 3 tractors which is managed by the department of agriculture. Out of these 3, only one is in good condition. So in all we have about 11 good tractors. The present local government area administration has not yet released these tractors. Very soon they will be released. Many local governments have already done this, and have already given every ward a tractor each for use by their farmers.... At least with this

> development, the farmer will not go elsewhere to look for tractors because they know the tractor has come to their village. They can use these tractors after paying a token (interview, June 2009).

Furthermore, other farm inputs like seedlings of economic food trees are also provided by the government. Relief materials are also provided to rural households in the event of drought. The DDDCME says that "seedlings of economic food trees are distributed to rural farmers. When there is drought, government provides relief materials" to peasants (interview, June 2009). In connection with the above, the government also provides health care services to peasants' livestock, according to PAO II. These are some of the government efforts geared towards securing and ameliorating the livelihoods of rural households since the return to democracy in Nigeria in 1999.

LINKING RURAL COMMUNITIES WITH FINANCIAL SERVICE PROVIDERS AND OTHER SERVICE PROVIDERS

According to government officials, the local and state governments link peasant farmers with financial service providers, and with other service providers, to enable peasant households to access loans and farm machinery like tractors that are beneficial for rural livelihoods. As the POA II notes, the "There is a community which once benefited from tractors, and there is another community which benefited from loan packages from agricultural and cooperative banks".

YOUTH EMPLOYMENT

The Yobe State Government also provides assistance to rural communities in the form of employment for rural youths. This project serves the youth in 17 Local Governments of Yobe State, according to the PAO II, through a project called Youth in Farming. The project is empowering unemployed and vulnerable youths by employing them, and ot also helps to increase farm productivity.

Local communities and households in need of enabling assistance are identified through various organizations. The government identifies a target village, which is then sensitized by facilitators or technicians. Assistance is provided through the associations that farmers belong to; farmers' needs and requests are channelled through the facilitators of these groups to the higher state channels such as the *Fadama* Farmers and the Onion Farmers Association. It is through these groups that the packages reach farmers.

OTHER ACTIONS AGAINST DESERTIFICATION

Other actions by government against desertification include encouraging and mobilizing small communities to plant trees, establishing sand dunes fixation projects, the creation of shelterbelts and the creation of Green belt in Gashua (PAO II interview). In an interview with the DDDME, he says:

> The Federal government is also assisting the State. In fact, in 1998, we sent a situation report to the Federal government and requested for their assistance. The Federal government is trying to fix sand dunes, creating shelterbelts and range lands. In the state, we are encouraging farmers to plants shrubs and plants around their farms to prevent the dunes from encroaching further.

There is, however, a notable disconnection between the views expressed by the peasants, and those of government officials with respect to the actual impacts of government policies and institutions on Gursulu.

Whereas government officials greatly praised the enabling environment that government created to assists peasant secure their livelihoods, many of the peasants interviewed insisted they were left unsupported in the face of the problem of desertification and other livelihood problems. It is possible that the Gursulu peasants' assertion that they do not benefit in any direct way from the state is shaped by their interest in lessening tax claims, and in increasing state assistance. Certainly, the evidence provided by government officials and documentation shows that there is substantial state expenditure on the peasantry.

It also seems that the peasants of Gursulu are largely unaware of the government laws and actions related to desertification management. Of all the participants interviewed, four are aware that there is a law on desertification management, while the remaining 7 have not heard of any such law. For example, Usman says he is not aware of any law on desertification management. Al-Kanemi by contrast states "There is a law. There is a forest guard who is in charge of the forest. He arrests, fines or charges people in court" for felling trees. While offenders against this law are prosecuted, it seems somewhat ineffective. According to Adamu, "the law is not effective because peasants do not have alternative sources of fuel and have to rely on firewood for their cooking".

B. LACK OF ACCESS/ INADEQUATE ACCESS TO FINANCIAL ASSISTANCE, FERTILIZERS, AND OTHER FARM INPUTS, EXPERTISE AND IRRIGATION SERVICE

In general, farmers expect assistance and advice from not only the community, but also and more especially from the government. The basic assistance peasants expect includes financial assistance, fertilizers and other farm inputs, advice from extension workers, the control of desertification and provision of boreholes.

However, almost all the Gursulu peasants interviewed (there was one exception) complained of inadequate financial assistance, farm inputs and services, and, in general, peasants in Gursulu are dissatisfied with the lack of assistance from the government. Many of the households insisted that they did not receive the assistance that officials claimed had been given to them. At least according to their testimonies (see table below), all peasant households in Gursulu village (bar one), received neither assistance nor advice from the government.

The general view was that government does not assist household livelihoods. As Usman puts it, "I have not received any assistance from the government. Even the fertilizer they sell to us is very expensive". Another informant, Al-Kanemi, stated: "Sometimes, we ask for financial assistance, tractors and other chemicals from the local government but we do not get help". Only Shehu says that he receives assistance from the government: "sometimes they bring us fertilizers and chemical in order to protect some plants" (probably meaning pesticides). He claimed these were provided for free.

Perhaps the contradictory claims of government officials and peasants on the existence of state support reflect their different views on what the state *should* provide. Fertilizers and other agrochemicals are provided, but they are subsidized, rather than distributed for free. According to HODAY, "the local government does not supply seeds to farmers; farmers acquire their own seeds. Some farmers go to the offices of Agricultural Development Programme in Damaturu (which is the State Capital) to buy some improved seed variety. If farmers are not willing to buy these, they have to use their own local seeds". Evidently, fertilizers and other agrochemicals are not supplied for free, as Shehu implied. This suggests that what the peasants are complaining about is the lack of direct grants and free services and supplies – a consequence of the reforms of the Structural Adjustment Programme,

Informants	Expectations from Government and others	Assistance received from Government
Shehu	Financial assistance, fertilizers (other farm inputs), tractors, advice from extension workers, government to control desertification, provision of more boreholes, prayers	Receives assistance in the form of fertilizers and agrochemicals from the government for without pay
Idris	Same as above	Claims no assistance from the government
Umar	Same as above	Claims no assistance from government
Mohammed	Same as above	Claims government does not assist
Musa	Same as above	Claims no assistance received from government
Al-Kanemi	Same as above	Claims no assistance received from government
Adamu	Same as above	Claims he does not receive assistance from the government
Ibrahim	Same as above	Claims no assistance from government
Al-Hassan	Same as above	No comment
Usman	Same as above	Claims does not receive assistance from government
Mustapha	Same as above	Claims does not receive assistance from the government

Table 12: Households expectations of, and reports on, assistance received from Government and others

C. LOCAL PERCEPTION OF ACTIONS TO MITIGATE THE EFFECTS OF DESERTIFICATION

Peasants are aware of the factors impacting on their livelihoods, and they are aware of the solutions to these problems. In Gursulu village, almost all the peasants were in unison that the plantation of shelter belt and trees would generally help in halting the advancement of the desert. For example, Musa says:

> What can be done to prevent desertification is the plantation of trees. The Ministry of Agriculture can come and plant some certain trees. They should hire labour to maintain and prevent people from destroying these trees as they grow. When these trees grow up, they can reduce the rate of desertification. They can also serve as wind breakers and erosion control.

And Al-Kanemi states that "tree plantations can help to halt the spread of desertification. For example, the plantation of acacia gum trees can halt the spread of the desert". Others are of the opinion that the provision of more boreholes by the government can help mitigate the effect of desertification and rainfall scarcity.

CHAPTER SIX

CONCLUSION

This Research Report set out to investigate the way in which the villagers of Gursulu village in the northernmost part of Yobe State develop livelihood strategies in the face of what is generally called "desertification". In this concluding chapter, the principal findings of the report are laid out.

The first, and possibly most important, finding of the research is that (in contrast to the literature which tends to overemphasize the issue of desertification), Gursulu peasants are primarily concerned about the problem of rainfall shortage and scarcity. Rather than desertification itself, they see rainfall shortage/scarcity as the most severe problem facing northern Nigeria.

This Research Report also set out to investigate how peasant households dependent upon rain-fed agriculture coped with desertification. It stresses that the Sahelian peasants of Gursulu are not passive victims of an environmental crisis. They are aware of the functioning of their environment, and their farming techniques are arguably well-suited to their environment. They have, for example, a wealth of knowledge of soil management skills and of their local environment, its soil types, and of the different crops that they grow. More so, they have some knowledge about weed management, and about rainfall patterns. This position challenges the view in some of the literature that drought and desertification are merely the product peasants' ignorance and refusal to use more modern agricultural practices.

Given the problem of rainfall shortage, desertification, land degradation and inadequate capital, Sahelian peasants of northern Nigeria have devised adaptive responses to environmental change, as Chapter 5 of this Research Report shows. The findings of the research have shown that peasant households in northern Nigeria do not only diversify their livelihoods and intensify their land use; they also rely on migrant remittances and favour rearing small ruminants because of the advantages of small ruminants over large ruminants. These strategies enable them eke out livelihoods. Thus, on the basis of the findings, understanding the livelihood strategies of rural households in the face of constraints will enable government initiate policies that are geared towards removing these constraint and expanding the opportunities of the rural poor (Ellis, 1998).

Thirdly, the Research Report gives evidence that, while there are a number of State and National Government policies and interventions on livelihoods such as the provision of farm

inputs and implements, linking rural communities with financial service providers and other services is still a problem that deserves urgent attention. The researcher witnessed a number of new tractors parked outside the Yobe State Ministry of Agriculture that are meant for local communities. Easier access to these tractors ought to be given to the rural farmers in order to trigger a meaningful rise in crop productivity

Also, the Research Report indicates that the government provides employment for jobless youths through the Youth in Farming programme, and provides agricultural extension services for peasants. According to key informants amongst government officials, through policies and actions, the government of Yobe State renders assistance to peasant households in the state and in Gursulu by creating an enabling environment for them to secure their livelihoods.

Despite these efforts and intervention programmes by the government, many peasants of Gursulu village reported that they did not benefit in any direct way from some of these government interventions. Many of these peasants spoke of a lack of access (or inadequate access) to financial assistance, fertilizers and other farm inputs, expertise and irrigation services. It is possible that Gursulu peasants' assertion that they do not benefit in any direct way from the state may be because of their self-serving interests intended to lessen tax claims by the state and/or increase the state's assistance to them. Also, there may be some disagreement on what sort of assistance should be provided: the state prefers for example to provide subsidised inputs, while the peasants may favour free inputs.

There is, in any case, a definite need for timely and adequate finance for development intervention projects; consistent monitoring and evaluation of livelihoods enabling projects; for adequate consultation with the beneficiaries of policies, projects and intervention actions; for more consideration of indigenous knowledge in environmental knowledge; and for the creation of productive synergy amongst stakeholders, policies and interventions.

Fourth, evidence from the historical analysis of peasants' livelihoods and development strategies in Chapter 3 and from the fieldwork data shows, that desertification and drought reveal the strengths and weaknesses of socio-political and economic systems to cope with environmental crises. Pre-capitalist Sahelian societies, it was shown, devised strategies at the

household, village and the larger state level to respond to the incessant environmental perturbations they encountered.

By integrating Sahelian peasant societies into the capitalist economy through measures such as cash-cropping, European colonialism weakened their adaptive flexibility, that is, their capacity to cope with the unstable environment of the semi-arid region. The neo-liberal policies of the Structural Adjustment Programme further impacted, negatively, on the livelihoods of the peasants. In the contemporary scenario, the prices of farm inputs and implements have sky-rocketed because of trade liberalization and the reduction and even elimination of subsidies. As a result, many peasants can no longer compete with imported agricultural products.

Another negative impact on peasant adaptive and livelihoods strategies of the colonial policies, and later of the neo-liberal policies of the Structural Adjustment Programme, was a weakening of the community practices of social solidarity and associated support networks. State aid has not filled the gap thus created. As Ibrahim, one of the informants, pointed out, "in this village we have a *sarkin noma*, but we do not receive any assistance. We have a *sarkin noma*; we do not get any assistance from the local government. We do not receive any help from anyone".

The Research Report, despite noting these challenges, gives evidence to the fact that peasants continue to adapt and develop effective livelihood strategies, based on traditions, innovations and associations. Thus, environmental conservation strategies and livelihoods enabling programmes and interventions in Nigeria should employ a bottom-up approach. All stakeholders should be consulted in all the processes of policy design, formulation, implementation and evaluation. In this way, the interventions will not be at variance with the needs of the people. Desertification and livelihoods policies and projects should start with popular participatory methods in articulating the priorities and needs of the poor, so as to provide access to the right kind of interventions, and real peasant participation should continue in all subsequent stages of policy.

In connection with this, local or indigenous knowledge should be taken seriously. A lesson from previous efforts to tackle the problem of desertification and its impacts is that a failure to incorporate indigenous knowledge creates serious problem in the adaptation of

recommended measures by the peasants. As the discussion from the Research Report shows, Sahelian peasants have a great knowledge of their precarious environment and have adapted their livelihoods to this environment; they have evolved traditional mechanisms to cope with their precarious environment. Hence, government should place emphasis on building on *existing* knowledge and skills.

Lastly, the funds currently allocated for the implementation of policies and programmes are grossly inadequate. Hence, they have been unable to yield significant results in the struggle against desertification and its associated impacts. Thus, adequate finance is needed to tackle this environmental hazard, which has grave implications for the livelihoods of rural households and the country at large.

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Nigerian National Drought and Desertification Policy, 2007

Nigerian National Drought Preparedness Plan, 2007

Nigerian National Policy on Environment, 1999

Nigerian National Energy Policy, 2003

APPENDIX 1: Interview Schedule

Adamu, 16 June 2009, on the Way from his Farm, Gursulu Village, Yunusari Local Government Area, Yobe State.

Al-Hassan, 16 June 2009, Outside his Compound, Gursulu Village, Yunusari Local Government Area, Yobe State.

Al-kanemi, 13 June 2009, Entrance to his Compound, Gursulu Village, Yunusari Local Government Area, Yobe State, Nigeria

Ibrahim, 16 June 2009, In his Farmland, Gursulu Village, Yunusari Local Government Area, Yobe State.

Idris, 15 June 2009, Local Government Secretariat, Kanamma,Yunusari Local Government Area, Yobe State.

Director and Deputy Director of Community Development, 1 July 2009, Yobe State Ministry of Integrated Rural Development Abuja, Nigeria.

Director of Drought and Desertification Control[17], 3 July 2009, Yobe State Ministry of Environment, Abuja.

Federal Ministry of Agriculture and Water Resources, 7 July 2009, FCDA[18] Secretariat, Abuja, Nigeria.

Head of Agriculture Department, 17 June 2009, Local Government Staff Quarters, Kanamma, Yunusari Local Government Area, Yobe State.

Mohammed, 13 June 2009, Sitting Area Located at the Entrance to his Compound, Gursulu Village, Yunusari Local Government Area, Yobe State.

Musa, 13, June 2009, Sitting Area in Compound, Gursulu Village, Yunusari Local Government Area, Yobe State.

Mustapha, 17 June 2009, in his Sitting Room, Gursulu Village, Yunusari Local Government Area, Yobe State.

Principal Agricultural Officer 2, 16 June 2009, Yunusari Local Government Area Secretariat, Yobe State.

Shehu, 16 June 2009, Sitting Area in the Compound, Gursulu Village, Yunusari Local Government Area, Yobe State.

Umar, 15 June, 2009, Under a Tree Shade at the Village Square, Gursulu Village, Yunusari Local Government Area, Yobe State.

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[17] The name of the Director of Drought and Desertification Control interviewed is Alhaji Mahammedu Mamudo
[18] FCDA stands for Federal Capital Development Authority

Usman, 17 June 2009, Under a Tree Shade at the Village Square, Gursulu Village, Yunusari Local Government Area, Yobe State.

APPENDIX 2: Interview Guide

DESERTIFICATION AND RURAL LIVELIHOODS
THE CASE OF GURSULU VILLAGE, YOBE STATE, NIGERIA

Research question

How do households in Gursulu village, Yobe State, Nigeria, cope with desertification and land degradation?

Subsidiary questions:

What is the nature of desertification in northern Nigeria?

What are State and National Government policies in Nigeria on desertification?

What is desertification and what are its causes?

What are coping patterns of rural villages in northern Nigeria since democracy in Nigeria in 1999?

No.	Questions	Probes	Aspect being investigated

Section A: Assets, Entitlements, opportunities/ Livelihoods Strategies

1	What livestock do you keep?	Can you explain why you keep these	Diversification
2	What are the different crops that you grow?	Can you give some examples	intensification
3	How many bags do you consume and sell?		diversification
4	Could you describe for me any changes in livestock and crops grown over time?	please elaborate	adaptation
5	How many pieces of land do you have? Can you compare land quality in the past and now? How Many of your household members work on your land? And what tasks do they do?	please elaborate	Natural resource endowment/asset

	Do you employ anyone from outside the household to work on your land? How often do they work?		
6	What type of free plant and grass species is of value to the community? Has their availability change over time?	Could you give some give examples	Natural resources endowment/asset/ diversification
7	What equipment do you use for your agricultural activities?	Could you say more on this?	Technical resources endowment/ indigenous knowledge
8	Do you have access to other forms of technology, for example, farm inputs, expertise and irrigation?		Indigenous knowledge/enabling government institutions/ NGOs
9	Have you received any assistance from the government because of desertification?	Please give examples	Favourable policy on desertification
10	Are you aware of any law on desertification management?	Elaborate	Favourable policy on desertification
11	What measures should be taken to reduce the damages caused by desertification?	Could you explain what you mean?	Indigenous Knowledge
12	How can you describe the community's norms on social solidarity and support network to households hit by desertification?	Could you elaborate on that?	Social resources endowment/ asset
13	Have any of your dependents migrated to the city?	Can you tell me how often they come back?	Household composition/migration
14	Is farming your only source of income? If no, kindly explain how you meet these needs?	explain Elaborate	 Other sources income/ diversification/livelihood options

15	How many hours on average do you spend on the farm every week?		Livelihoods strategy: intensification
16	Do you engage in labour exchange/cooperation?	Could you explain?	Social resources endowment/ coping strategy

Section B: Biographical Data & General Demography

	Age		
	Gender		
	Position in the family		
	Marital Status		
	Number of children		Household composition
	Total number of people currently living in your household		Household composition

APPENDIX 3: Wits Ethics Approval Letter

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (NON MEDICAL)
R14/49 Gbahabo

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER H0 90601**
PROJECT	Desertification and sustainable rural livelihood The case of rural households in Kartako, Yobe State Nigeria
INVESTIGATORS	Mr PT Gbahabo
DEPARTMENT	Sociology
DATE CONSIDERED	12.06.2009
DECISION OF THE COMMITTEE*	Approved Unconditionally
NOTE:	

Unless otherwise specified this ethical clearance is valid for 2 years and may be renewed upon application

DATE 14.09.2009

CHAIRPERSON .....
(Professor R Thornton)

cc: Supervisor : Mr P Germond

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10005, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

.....
Signature

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX 4: Recording Consent Form in Hausa Language as Recommended by the Ethics Committee

Department of Sociology, School of Social Sciences
The University of Witwatersrand,
Johannesburg, South Africa

Ina so in gode maka domin zarafin da ka bani in hadu da kai yau. Suna na Percy Terfa Gbahabo. Ni dan makaranta ne, daga baban makarantan Witwatersrand a garin Johannesburg.

Idan ka yarda, kuma ya game ka, zan yi amfani da na'uran daukan murya a lokacin tattaunawan mu. Dalilin amfani da wanna na'ura shine ina son in tuna da dukan abubuwan da za mu yi magana akai. Duk abubuwan da muka yi magana akai zai zama a asirci. A kowa ne lokaci, idan akwai wani abun da ba ka so in dauka a na'uro, ka yi hanzari ka gaya mi ni.

In ka yarda da wannan, zan bukace ka ka sa hanu. Kuma, za ka iya cin gaba da wannan zarafi ko ka ki ka sa hanu. Izinin yadda zamu yi wanna zango na hanun ka.

_____ _____
Mai amsa Kwanan wata

_____ _____
Mai tambaya Kwanan wata

APPENDIX 5: Subject Information and Consent Form in Hausa Language as Recommended by the Ethics Committee

Department of Sociology, School of Social Sciences
The University of Witwatersrand,
Johannesburg, South Africa

Ina so in gode muku da zarafin da kuka bani don in sadu da ku. Suna na Percy Terfa Gbahabo. Ni dan makaranta ne daga Witwatersrand, Johannesburg.

1. **Abin da na ke bincikawa**: Ina so in fahimce yadda iyalen ku a na kauyen Katarko ke rawuya da kuma yadda ku ke magance matsalin ko damuwan hamada. Ku fahimtar da ni a hanyoyi rawukar ku a hamada da kuma yadda kuke samun abinci, ababun rayuwa da saurun su. Haka kuma, yaya kuke samun abin hanu da abin rayuwa ganin yadda hamada na dame ku. A matsayin ka na kan gida, ka iya taimako na da amsoci da na ke bida?

2. **Azancin wannan bincika ?** Wanna tataunawa ba zai wuce awa daya ba. Idan ka na da tamboyoyi ko wani abun da ka ke so ka fada, sai ka yi hanzari ka tsayar da ni a ko yaushe. Kuma, zan yi amfani da na'ura radiyo domin in dauke muryan ka. Wannan zai tamake ni tunashe dukan abubuwan da muka tattauna. A karshi, kai ne za ka zabi lokaci da kuma wurin da za mu hadu.

3. **Asiri wannan bincika**? Dukan amsocin ka da abun da muka tattauna a wanan zarafi zai zama tsakanin mu. Ba zan yi amfani da sunan ka ba, kuma ba zan fada ma kowa abun da ka gaya mi ni ba sai sugaba na a makaranta, Paul Germond. Amma shi ma ba zai san sunan ka ba. Za a ajiye littafin dan zan rubata a makarantan mu a Wits. Zan nema izinin ka duk inda na ambaci sunanka.

4. **Izinin ka?** A kowane lokaci, ka na da izini ka amsa or ka ki amsa tambayoyi na. Sa'an nan, ka na da izini ka dakatar da wannan gamuwa dun lokacin da ka ke so.

5. **Idan ka na da tambaya fa?** A duk wani lokaci idan ka na da wani tambaya ka yi hanzari ka tambaye ni. Zan yi iya kokari ni in baka amsa. Idan kuma ba na nan kusa, za iya samu na a waya 08075008314 ko kuma gpterfa@yahoo.com

6. **Matsayinka a wannan bincika?** In ka yarda ka taimaka min da amsocin da na ke nema a wanan aikin makaranta, za ka sa hanu a nan don a tabbata ce wa lallai ka bada izinin ka.