University of Khartoum

Faculty of Economic and Social Studies

Department Of Sociology and Social Anthropology

Title of the Thesis:

RESPONSES TO DROUGHT AND COPING STRATEGIES IN SEMIARID AREAS: THE CASE OF NORTH DARFUR RURAL POPULATION IN WESTERN SUDAN.

A ThesisSubmitted to U. of K. in fulfillment for the Requirement for Ph.D. In Sociology and Social Anthropology.

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Feb. 2006
Dedication

To the soul of my father,
ACKNOWLEDGMENT

The preparation of this thesis would not have been possible without help from numerous individuals and institutions. I wish to thank all of them for the invaluable support and assistance.

First I wish to thank my supervisor Dr. Fahima Zahir for her guidance valuable advices, encouragement, and follow-up and close supervision during the planning of the study up to the preparation of the final manuscript.

I wish to express my grateful thank to Dr. Mustafa Zakaria , the previous director of the DSRC, for his generous financial support to cover partially field work expenses. Unfortunately, he passed away quietly smoothly before seeing the final result of the work. Mercy upon his soul and memory.

I am very grateful to my colleague Dr. Shaza S. Ayoub for help on the section on study area physical set-up. Chapter two, part one.

Fieldwork would not have been possible without the help from considerable body of people and institutions. In particular, I wish to thank my colleague Ibrahim Suliman ex minister of ministry of finance- North Darfur state for providing full board accommodation and other facilities during the field work, special thank to Mr. Abdalla Elzaber general director of Ministry of Agriculture for help in collection the necessary information for sites selection. I am also thankful to many others in
Elfasher, the state secretary general, Department of Planning, Department of Veterinary, Rural Water Corporation, general director of Sag Elneam scheme and the staff of Elfasher guesthouse for the help and generosity they have offered which facilitated the fieldwork.

Despite the considerable thank offered to the mentioned above, perhaps the greatest and most important assistance and co-operation came from the interviewed people themselves.

I would like to thank Ustaza Mahad Abdue. Department of linguistic U. of K. and Ustaza Hala Mohmoud for language revision, thank to Ust. Mohamed Khair “Director of IT Dept. - U of K” for his tips in formatting the text, thank also extend to Miss. Amina and Miss Namia Omer for typing the thesis.
This study examines how people in the semi-arid land respond to prolonged drought impacts. Mainly their ability to cope with resources shortage and food insecurity over time. It draws from the experience of North Darfur rural population, living in semi-arid zone of the Sahel, an area with a long history of frequent food shortage and three decades ago of persistent short rainfall. The study specifically examines the potential capacity for the Sahel semi-arid zone resources to sustain livelihood under conditions of frequent and persistent traditional resources diminishes. The study looks at the historical and ecological perspective of the problem in order to explore the factors influencing the socio-economic structure and food production in the area. It specifically investigates the capacities and abilities of different production systems in the varied ecological zone to cope with the slow resources depletion. The study also investigates the role of cultural social set-up and indigenous knowledge as a factor for adapting to resources diminishes by exploiting local diversity or conflicting over the meager resources.

A detailed assessment is made of the coping strategies among the main three communities in the area. The people in this varied ecological zone differ in how they deal with the situation of short rainfall and mobilization of the local resources in various seasons. Household’s peasant’s cultivators in south part of the area have great ability in
mobilizing local resources. Mainly introduction of new methods and techniques of production as well as accumulating and managing resources in away to maintain sustainable food security. The semi pastoralist households in the north part of the area are flexible in utilizing their own labour by migration and performing various farm and non-farm activities. The Arab pastoralist of the far north adapted by strengthening their competitive power over the meager resources regardless of the customary laws which govern and regulate land use in the area. It is clear from the study that the different communities of the semi arid zone differ in their ability to develop the traditional coping strategies into more sustainable live hood strategies or develop new ones.

The study concluded by assessing the potential of the prominent land resources utilization strategies in term of economic social, and environmental and political as well.
لا يمكنني قراءة النص بشكل طبيعي. يرجى تقديم النص بشكل يمكنني قراءته بشكل طبيعي.
لدى المواسم المتغيرة، تكون البيئة المختلفة، حيث نجد مع التفاعل الكيفية، البيئة المختلفة المواسم والتحرك الأمطار ينقص ظروف الأسر. 

إذاً، تتغير الأمطار بشكل ضخم، وفقًا لستطيع الأمطار، في منطقة جنوبية في الزراعة، وتقنية ووسائل الإنتاج، بالоборот من الأمانة وتوريد الأمطار، وتداولة تراكب وسائل الغذاء، وتطور الأمنية تضمن القدرة. 

الأعمال القوية، استغلال في البالمرنة، وامتزاج، دراسة منطقية شماليًا في الزراعية، فإلى الإنتاج، وتماطغ وعملية، وعلاقة، معينة، من حيث القدرة، القتالية، التي تكون المحلية والموازنة، مع العوارض، وراءها، وعلاقتها، بقليل من الموارد حول المنطقة في الأرض، والتع течение، أو الآشري، أو، تطوير الآشري، أو، تطور الآشري، أو، تطور الآشري.
Limitation of the Fieldwork:

The main problem facing the researcher was meeting personal finance, fieldwork in remote and wide scattered sites is organization of trips, cost and requirement such as transport and accommodation, further more that road were often unsecured and there were no public transports. The inability to visit some sites due to security problem required visiting weekly central markets in which farmers of such sites gather to sale their products. Following up as of such central market constituted pressures on the fieldwork time and limited resources. However, if the situation had secured we would have made deeper investigation of the social and organizational change at household, extended family and community level.

Other practical problems of the field include the delay and problems of security measures made by official and security members.
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1.1: Introduction:

During the late 1970s, most of the Sub-Sahara and Sahel countries have faced successive drought hits that impaired the productive capacity of majority of those countries, and hence resulted in profound economic and social problems, which are intensified by the effects of the international economic crisis and pressures of the IMF and World Bank on the economies of LDCs. For Sudan, environmental disasters and afflictions such as short rainfall, locust and agricultural pests...etc., which have been held responsible from its current traditional economy collapse were normal features of rural life, and until recent time people were managed to cope and recover without acute suffering. It is up to the 1977 and according to the World Bank report (WB, 1981); the Sudan economy was growing steadily and better than many other third world countries. The implementation of the so called the IMF conditionality (i.e. devaluation, reduction of government expenditure, removal of subsidization) and deterioration of term of trade against primary products have intensified the effect of harvest failure particularly at the local level. The accumulation of these factors has weakened the traditional resilience system and capacity of the people to cope with and recover from the effect of harvest failure. The situation culminated in the 1985 famine and
the successive food shortage periods over many parts of the country during the last two decades.

Like the other rural traditional parts of the Sudan, Darfur region has been subject to profound economic and social problems and crises due to drought and local resources decline. Moreover, the adverse effect of the economic liberalization policies has resulted in sharp decline in the standard of living of the people. The people reacted to these crises by introducing new coping strategies. Most of these survival strategies are already known in traditional areas, and usually resort to or being adopted during the frequent short-rainfall and food deficit periods. As successive short-rainfall periods continued and intensified by increased cost of living and inability to compensate for resources and livestock assets losses, the traditional resilience system has failed to maintain the traditional economy. This has shaken-up the traditional socio-economic structure and paved the way for new socio-economic changes and transformation. The new changes included, among others, new cultivation patterns and cropping, and changes in animal keeping pattern, changes in the direction and pattern of migration, changes in land tenure, flourishing influence of the market in economic and social activities and changes in consumption pattern and social institutions and behavior.
1.2: Research Focus:

The short rainfall and drought have led the rural population to adopt traditional coping strategies to mitigate the impact of drought. The potential capacity of resources in North Darfur (i.e. Wadis and water sources) has given such coping strategies wider dimension.

In addition to the traditional coping strategies, people have developed new structural adjustment strategies. The resort to and expansion in the Wadi and clay plain cultivation has implied fundamental changes in the traditional economy in the sense that such a change is labour intensive and cash crop cultivation necessity. Unlike communal or group work mode of production, this new type of cultivation is organized partly on individual bases (that of the household members only) and partly on hired labour. The introduction of new water harvesting methods and traditional and mechanized well-irrigation systems have enabled some farmers to maintain cultivation round the year and consequently subsistence farming in many areas gave way to market production and new crops other than the traditional ones. Cash crops have gained significant importance i.e. tobacco “Tombak” and vegetables. The expansion in farming and crops has also activated the agricultural labour market and commercialization of land tenure and use and changed the traditional pattern and trekking of pastoralists.
The research attempts to investigate and evaluate the responses of the people of North Darfur to the short rainfall and drought impacts and its effect in people style of life.

As the study, is concerned, with the investigation of the socio-economic transformation. Its main aims and objectives is to investigate and explore the new changes and the structural adjustment in the traditional structure including changes in the consumption, production, labour force and wages, crops market and economic activities and land tenure as well as to assess the prospects of these changes. For this purpose the main issues, among others, to be discussed are:-

1. To obtain detailed description of economic activities and social institutions and the rural traditional resilience system prior to advent of drought.

2. To examine the inhabitant’s response to successive drought hits and increased cost of living as well as the economic and social dimension of the survival strategies and buffering mechanism, which were adopted during the last two decades?

3. To discover the mobility pattern of population under the condition of decomposition of the rural traditional structure and introduction of the new market pattern. This is through studying the nature of the new institutional and the structural change in rural traditional production system. For this purpose, special attention is given to the new cultivation and animal keeping pattern in the area.
4. To discuss the impact of production commercialization on land, and the impact on intensification of conflict and competition over resources within the communities and between the different ethnic groups in the region.

5. The repercussions of market economy expansion on the traditional modes of production, and commercial activities and animal trading.

6. The conflict intensification between the nomadic pastoralist and settled farmers due to the increased competition over resources.

1.3: Hypothesis:

The hypotheses dealt with the impact of drought and increased cost of living on rural traditional structure and production in the area, and the effects these may have had on people style of life and introduction of new environmental adaptation and production system.

Although the drought presumably have resulted in series of socio-economic crises in the area in the short-run, the people have developed imperative structural adjustment strategies in the long-run, which haven’t yet received enough investigation.

The collapse of traditional cultivation and animal keeping pattern have developed the utilization of resources potential capacity and evolved new economic activities, which resulted in new socio-economic changes drive towards expanding the local market. These changes could have positive impacts on the transformation and commercialization of local
economy if they found external intervention to develop the deep-water utilization and water gathering technique and harvesting methods systems and facilitating access to tools and inputs.

The comparative advantage of clay-plain and tobacco and other crops supply response to prices rise would activate the labour market and expand cash crops production further at the expense of subsistence crops. This would accelerate the processes of articulating the local economy with the local market, given that the potential capacity and comparative advantage of clay-plain remain unchanged.

The first hypothesis to be tested is based on the assumption that the sedentary cultivators have more potential capacity to cope with drought through shifting cultivation and using new agricultural techniques and methods, while the intrusion of pastoralist into rich lands of the sedentary will possibly influence the present ethnic conflict between the two groups. Thus it is expected that there are significant differences between the sedentary cultivators and pastoralist development on one hand and within different agricultural locations on the other hand, so the hypothesis put forward are:-

1- The present ethnic conflict in the state is a manifestation of the intensification of competition over resources rather than the root cause of the war between the two sedentary and pastoralists' ethnic groups. That is the intensification of the competition over resources between the settled non Arab
The study is based on Participatory Rural Appraisal Approach (PRAA) and adopted exploratory and explanatory approaches. The data is acquired at different social, regional, provincial and villages level through informal interview. The study has used multi-stage sample. Several sites around North Darfur have been selected according to specific criteria including allocation of clay-plain and Goz land, level of involvement in the market economy, cultivation, animal keeping pattern
and level of income. The fieldwork at the sites has covered the following themes:-

i. Agriculture

ii. Animal keeping systems

iii. Migration and labour market

iv. Consumption and production pattern

v. Markets

vi. Social institutions

vii. Population and conflicts

1.5: The Thesis Organization:

The thesis consists of six chapters. Chapter one is an introductory chapter layout the introduction, research focus, hypothesis, methodology and organization of the thesis. Moreover, it gives theoretical framework, which discusses the main theoretical doctrine, which is usually used to explain the problems of underdevelopment.

Chapter two highlights the study area with some discussion on population and socio-economic structures.

Chapter three is devoted to discussion of the origin of Sudan economy and social formation. For this purpose it discussed the development of Sudan economy, the Sudanese social formation and the unequal regional development.

Chapter four reviews the main theories which explain the climatic changes in the Sahel. This in addition to discussion of the impact of the
drought on the conflict between pastoralist and sedentary cultivation in the Sahel. Moreover, it investigates the impact of competition over resources between pastoralist and sedentary cultivation on the ongoing war in Darfur.

Chapter five is the central chapter of the thesis. It investigates and discusses the main responses and coping strategies adopted among the cultivators of the area understudy. It pointed out that the shift to Wadi cultivation has constituted structural adjustment in the traditional modes of production, which influenced economic and social aspects of life in the area understudy. The chapter also demonstrated the nature of this influence and how the new pattern looks like.

Chapter six summarizes the findings and gives some concluding remarks and policy implications.
1.2.1 Introduction:

In the last century, economists and social analysts have provided a multitude of theories and ideas regarding economic development. The attempts to understand the features of underdevelopment and to explain why economies grow at different rates and how to stimulate development in LDCs is effectively influenced by the cold war between the two antagonistic blocks during the first mid half of the 19 century. However, among the different theoretical and ideological doctrine, which are concerned with promoting economic development in the LDCs, there are two main antagonistic theories, which are usually used to explain economic development and changes in LDCs. The first theory is the modernization theory; it takes the general features of a developed western industrial economy as a typical model and contrasts it with feature of a poor economy. It views development as transformation of one type into the other. Consequently, the west is seen as diffusing knowledge, skills organization, technology, capital and values to the poor nations. The second main theory, which explains development and underdevelopment problems is the dependency theory, which started by attacking the shortcoming and limitation of the modernization theory. Its main criticism center round the question of relevance of the standard models of
theoretical analysis concerned with the problem of advanced countries to
the problem of promoting economic development in the underdeveloped
countries, which have a different concerns. However, up to the present
time there is no alternative theory, which is free from the shortcoming of
these two main ideological doctrines. Therefore, most of the
development policies and projects during the colonial era and post
independence were based on either of the two theories according to the
dominant political ideology in the country concerned.

Despite the absence of alternative satisfactory development theory,
it is now realized that some communities have promoted and developed
their socio-economic situation in their own. This particularly for the case
of the structural adjustment among the Goz cultivators of North Darfur
where the drought and food shortage have succeeded to mobilized the
local resources potential capacity as will be seen in chapter (5).

The aim is not to attempt a review of the theories of economic
development, but to outline the main underlying ideological doctrine,
which is usually used to explain the problem of development in the LDC.

1.2.2. Modernization Theory:

Modernization theory assumes that development is successive
stages of evolution through which the present developed countries have
already passed while the now underdeveloped countries are still in the
early stages of the development path which they are supposed to go
through. Modernization as an idea and concept is the work of western intellectuals. Their chief concern was to explain the wide gap between the newly independent states and the western countries, with the attempt of transformation of these societies into the type of technology and associated social organizations that characterize the modern advanced and politically stable nations of the Western Europe Mose, (1963).

The idea of modernization as process of socio-economic transformation is rooted in the history of the west. With the breakdown of western feudalism and rise of capitalism and drawing on what is happening in the newly independent states, the world is divided into traditional and advanced or modern.

The use of modernization concept in the contemporary social science literature denotes at least three senses. The first is that modernization is conceived of as an attribute of history a development or evolutionary change. Second modernization is defined historically as the process of change from western feudalism to western capitalism society. Thirdly modernization is seen as a program or policy orientation of elite in a new nation. Often this meaning are blurred in actual attempts to explain what is happening in Africa and some parts of Latin America Nash (1977). In his attempts to free the meaning of modernization from the shackles and misconception of the neo-evolutionists functionalism school Nash has divided the human knowledge into three important historical events. The first stage is the pre-history and development of
culture and tools using, which extends over hundred or thousands of millennia and has spread out into different traditions in different parts of the world and became the common possession of all human groups. The second event is the invention of steal, source of food supply and the domestication of animals and plants. It provided the basis for settled village life. The tempo of this Neolithic revolution was more restricted and many groups of human being never received or accept such way of life (farming, herding and agriculture). The third revolution is the industrial revolution which led to development of energy and machines and characterized by ceaseless search for innovation and development. In this stage the tempo of social changes was increased, but again the spread of diffusion of the basic innovations was more restricted than in the preceding revolution. Nash has emphasized that participation in this stream of culture history is the case of modern economic development. Thus the concern of the scientists is to discover the condition under which different societies and cultures enter this stream i.e. social and economic aspect as well as the technological aspects. This view stresses the historical social transformation and underlines that modernization is in large part a human choice structured by the culture in which they live and the consequences of these choices will further restructure these cultures.


The historical social transformation analytical framework examines modernization mainly from view point of contemporary traditional or
transitional to the transformation of such societies into their modern type in a linear process, (Herbert Spencer, August Comte, Ferdinand Toennies, W.W. Rastow and Wilbert Emere). Of the various attempts to formulate an analytical framework for the study of modernization, Neil J.Smelser theoretical scheme is perhaps the most elegant. Drowse on the differentiation mode of Parsons he analyses the process by which the major social functions gain structural independence. With modernization special autonomous social units evolve with more specialized autonomous functions. Such changes occur in several different affairs. Smelleser was interesting in analyzing the relationship between economic growth and the social structure. He defined economic development as the growth of output per head of population. The economic development is frequently accompanied by several interrelated technical, economic and ecological processes:-

- The change from simple and traditional technique towards the application of scientific knowledge. Evolution from subsistence farming towards commercial production, crops specialization and wage labour.
- Transition from the use of human and animal power towards machine.
- Movement from a farm and village towards urban center.

These processes sometimes occur simultaneously and sometimes at different rates, but all tend to affect the social structure in similar way and
give rise to the following ideal type structural change, which ramifies throughout society.

The uneven march of differentiation and integration may be accompanied by some social disturbance such as mass hysteria outbursts of violence etc.

The implication of the technological advance and organization differs from society to society and so do the resulting structural changes (realignment). The processes of differentiation cover several different social realms including economic activities, family activities, value systems and systems of stratification.

The ideal-typical features and processes of social development model is not confined to Smellser, Hoseltz, (1960) argues that developed countries are characterized by universalism, achievement, orientation and functional specificity, on the other hand underdeveloped countries are by ascription and functional diffuseness.

Like Smellser, Hoseltz conceptualized development as the elimination of the traditional pattern and shift from functionally diffused economic roles to functionally specific roles that operate irrespective of social relations with whom they are interact. This modification or transformation of the traditional institutions is conceived by Parsons and Hoseltz as occurring by means of the differentiation process described by Smellser the presence or absence of these structural elements determine the level of nation development.
Later theorist notably Esenstade has refined this approach by adding to the concept of differentiation and integration a third term, adaptation. Esenstade states that the process of modernization may take off from different societal types and with different degrees and types of pre-urbanization societies. These different groups or societies may vary greatly in the resources and ability for modernization. The initial impetus to modernization can vary enormously. In some cases it has been provided by internal factors like the protestant of Western Europe Weber, (1904) or the Meiji Oligarchs of Japan Bellahi, (1957). But in the developing countries it has been more usually the result of external factors such as colonial intervention and spread of technical innovation and acculturation of the societies. While acknowledging that the core characteristics are more or less as described by Smelser and Hoslitze he argues that modernization can only be sustained if the society develops certain degree of flexibility and become capable of dealing with new changing problems and social groups.

Limitation and shortcoming:

The empirical problem and theoretical and methodological limitation of the theory has led to dissatisfaction and failure to understand and tackle the problems of the developing countries. This has raised some questions center round the relevancy and adoptability of the theory in the developing countries. The ethnocentrism and the preoccupation of the theory with western culture and experience have led some economists and
social analysts to look for an alternative theory of development notably Frank, (1974) Szentes, (1971) Bernstein, (1971) Amin, (1974). This main problem is that the theory gives standard model of theoretical analysis, which is meant for the advanced industrial European countries rather than the structurally different economic and institutional setting of the developing countries. This would generate application difficulties, which in turn would lead to the question of relevancy and concern of the new-classical economics theoretical framework to the underdeveloping countries (which have different problems and concern) i.e. Latin America. In addition, the problem of preconception and biases of the orthodox economic theory as it is bound with the socio-economic and political constructions in the western countries.

Other writers, from different disciplines, Connel (1971) Gilbert, (1971) Brookfield, (1973) also argues that we can not transplant this model in the developing countries as it has been developed and experienced in an entirely different socio-economic structure and setting, which is not prevailing at any extend or level in the underdeveloped countries.

It remains that modernization theorists often construct their models on western experience and ideologies in the economic and social trends of success, which was historically prevailing in the west rather than the average experience of the western nation states. Therefore, they equate modernization with the western systems and values. Such models are
unlikely fitting in the developing countries whose social and economic and historical conditions and formation are various and different from the west. Therefore, such models are ethnocentric in the sense that it calls for restructuring the developing nations in western style through diffusion of the Western Europe values and systems with the aim of acculturating them.

1.2.3: Structural Dependency Theory:

The dependency theorists started with the study and analysis of underdeveloped countries problems on the basis of their historical, socio-economic and political formation. They argued that we could not understand the processes and problems of underdevelopment unless we treated this within the wider socio-historical context of colonialism and expansion of western mercantile and industrial capitalism. This expansion has linked the developing nations by dependency relations to the western capitalist and industrial countries. Such relations have structured them in a way to serve investment of the central industrial capitalist in Europe. Based on the comparative advantage system, the developing countries have been specialized in primary products production, for industrial centers in Europe for further processing and manufacturing to be distributed again in the developing countries. This dependency system has put the colonies in the orbit of the metropolitans centers and been served as their satellites. Hence and since then the developing countries have been dominated economically and politically
by the world centers of power in Europe and North America. Within the
underdeveloped countries the same periphery – metropolitan feature has
been established and been generating domination and inequality between
the economic sectors. Hence, the developing societies have been
restructured into minorities who monopolize the power and economic
resources and majority who are principally rural peasants. Therefore the
present underdeveloped countries are a product of historical forces,“Europe did not discover the underdeveloped countries on the contrary,
she created them Criffin, (1968).

There are two main analytical approaches to the problem of
underdevelopment in the underdeveloped countries. The first concern the
analysis of internal colonialism and formation of the satellite states. The
second analysis the articulated mode of production and perpetuation of
the underdeveloped structure. The work of certain neo-Marxist is very
influential in this theoretical development, most notably Paul Baran, Paul
Sweezy Ander, G. Frank and Samir Amin.

For Baran and Sweezy, H. modern advanced capitalism is defined
as monopoly capital which made of giant corporations Baran and Sweezy,
(1970) In his work, the political economy of growth Baran has explained
the differences between monopoly and competitive capital. He explained
that a critical feature of monopoly capital is the abuse of price and market
control. He argued that the advanced industrial western capital is
fundamentally opposed to the industrialization of the underdeveloped
countries, which constitute the main source of raw materials and investment outlet for the western capitalist metropolitan. Hence Baran attributed the backwardness of the developing countries to their status in the international market system, which controlled by metropolitan-satellites relationships. Frank set out from Baran to explore the implication of this at the local and national level. He started from the view that underdevelopment is caused by capitalism expansion, but he rejected the dualistic interpretation and poor integration concept. Frank maintained that the metropolitan-satellites relation articulate even the far remote areas of the country. He visualizes it as a whole of metropolitan’s centers down to the national metropolitan center down to the rural merchants up to the peasants even in the far remote corners of the country.

Thus, the internal mechanism of this relation involves chain of metropolitan-satellite relation at different levels bound with close economic, political, social cultural ties. Every internal metropolitan center expropriates the economic surplus of their own satellites for their own satellites with tendency of concentration in metropolitan’s centers, which usually consist of small urban elite class. Unlike the international market metropolitan-satellites relations, internal metropolis-satellite relations cannot achieve a pattern of self sustained and autonomous development. Frank maintain that, the connection between the bourgeois of both satellites and metropolises develop mutual interest in maintaining
the system. Thus, the pattern of rural economic exploitation is associated with class differentiated class structure. The dominant class of a colony is well integrated in the national elites and participated actively in various institutions, while the rest of the population is discriminated against and limited in their access to the economic, political, cultural and external institutions. They are also subject to the control of the dominant class.

According to Frank eventually this polarization sharpens political tension, and the radical change and development will only come once the national and regional bourgeoisie is overthrown.
CHAPTER TWO

PART (1)

STUDY AREA

2.1. PHYSICAL SET-UP:

2.1.1. Location:

Greater Darfur is the most western region of the Sudan, extending between latitude 10°N - 20°N and from longitude 22°E - 27° 30E. GFE/GTZ (1988). It has an area of 138,150 square miles or nearly one fifth of the total area of Sudan and an estimated population of about 3,094,000 that according to the 1983 census constitutes approximately 15% of the Sudan total population and has an annual growth rate of 3.2% R.T Paterson, (1990). It is bounded north by the Libyan Desert, west by Chad, Southwest by Central African Republic and north east and South by Northern region, Kordofan Bahr El Ghazal respectively.

The region is remote and isolated from the rest of the country and from the only seaport, Port Sudan.

Historically the region has been the cross road for movement between west and North Africa. Thus, traders and pilgrims used the region since early times and much of Darb-Elarbaien trade rout to Egypt originated from goods passed through Darfur from West Africa.
2.1.2: Physiography:

The greater part of the region is a plateau from 2000 – 3000 feet above the sea level. A range of mountains of volcanic, Jabel Marra, runs north and South along the line of 24°E and forms the water shed between the basin of the Nile and the Lake Chad. About 70 miles and 30 miles wide. Its highest point is nearly 10,000 ft. (R.T. Paterson, 1958). East wards the mountains fall gradually into sandy bush covered step. Northeast of Jabel Marra lies Jabel Meidob (highest point perhaps 5,000 ft) a mountain range much distorted by volcanic action, and Malha, an extinct volcano with a crater 300 ft. deep and 1 mile in diameter. South of Jabel Marra is broken tree, covered plains. Southwest is a plateau, which reaches a height of between 3,000 and 4,000 ft. above the sea. The mountains are scored by numerous khors, whose lower courses across the table – land represent the beds former rivers and dry except when scored by torrents in the rainy season. C.R.W Spedding and L.J. Peel, (1991). These numerous seasonal khors and Wadis drain ultimately into four major drainage lines, which are Wadi Azum, Wadi Elku, Wadi Howar and Bahr Alarab. Elsamma, (1985). In the west and South, part of the state water can be obtained in the dry season by digging 5-6 ft. below the surface of the khors R.T. Paterson, (1958).
2.1.3: Soils:
According to the different surveys, which are carried out during the period of 1948 – 1978, Darfur soils can be grouped into six major classes Elsammani, (1985) Table No. (2.1.1) which are:

2.1.3.1: Desert Soils:
These are found in the desert and semi-desert parts of the state where rainfall is between 0.0 – 200 mm per year C.R.W.S Pedding and L.J. Peel (1991). These soils have originated under the harsh desert conditions, where wind erosion is the dominant physical factor in the process of soil formation.

2.1.3.2: Stabilized Dune Sand:
This type is wide spread in the central part of the state where relatively high dunes are formed during the quaternary era and lately stabilized by the binding action of the vegetation when moisture conditions returned.

This type of soil is characterized by high percentage of coarse line and sand in its mechanical composition, low mineral and organic matter content (its pH varies between 5 - 9).

In the South western parts of the state, where the rainfall varies between 600-700 mm per year, another types of sand dunes occur which have better agricultural potential than those located in the semi desert parts e.g. Goz Dango C.R.W. Spedding and L.J. Peel, (1991).
2.1.3.3: Cracking Clay:

This type of soil occurs roughly in the southern half of the Greater Darfur state. It is considered as outliners of the cracking clay plain of the Sudan that extends from the Butana, Blue Nile Gezira and the White Nile up to Rank, Malakal and Bor.

2.1.3.4: Reverie Soils:

It originated from the layer of soft volcanic dust produced during the period of activity of Jabel Marra, and then it redeposited to form the most fertile soil of Zalengi, Suni and Shingel Tubai.

In huge Wadis, such as Wadi Azum and Wadi Elku, the reverie soil form an excellent edaphic condition for agricultural purposes, in spite of the fact that the moisture regime is not always favourable El Sammani, (1985).

2.1.3.5: Alternating Non-Cracking Clay and Sand Dune Soil:

These are often called Baggar Catena and it consists of flats of non-cracking clay “Nagaa” alternating raised spots of stabilized sand dune “Atmmure”. In some recent ecological classification, the Catena soil is known as alluvium system referring to its origin.

The land scope of this soil is informed by collection of “Nagaa” soil in shallow “Rahad” as a result of the surface run-off C.R.W. Spedding and L.J. Peel, (1991).
2.1.3.6: Alternating Non-Cracking and Cracking Clay Soils:

It is also known as “Ragaba” catena and composed of three alternating types of clay, which are:

1. Qardud: Which is similar to the non-cracking clay flats of the “Naggaa”
2. Talha: It is dark cracking clay.
3. Fau: It is also dark cracking clay subjected to flooding and run in water from Qardud for a considerable period of time.

Therefore and due to the alluvial actions the characteristics of these three types of soils vary, and thus support different herbaceous arboreous vegetation.

According to this brief account on soil types in Darfur, one can conclude that, the state’s soil vary from pure sand which occurs in the desert and semi desert zones in the northern half to clay and volcanic deposits in the South and west. Although sandy soils are characterized by low fertility, it represents the backbone for cultivation in the state where Goz soil is traditionally utilized for the production of millet as staple food and groundnut as a cash crop. The large plains of alluvial clay occur in the South up to Bahr El Arab River, but due to the presence of the march, their cultivation is very difficult. Along khors and Wadis, silts are found and it represents the most fertile soil in the state – vegetable, tobacco, fruits and cereals are grown successfully along famous Wadis e.g. Wadi Azum on silty soil deposited by them. Adequate agricultural production is
associated with volcanic deposits which are found in mountainous areas particularly Jabel Marra.

Table No. 2.1.1
Rough distribution of soil types by area council

<table>
<thead>
<tr>
<th>Locality</th>
<th>Main Soil Type</th>
<th>Minor Soil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kutum area council</td>
<td>Sandy</td>
<td>Clay and Pediplain</td>
</tr>
<tr>
<td>Mellit area council</td>
<td>“</td>
<td>Clay</td>
</tr>
<tr>
<td>Umm Kedda area council</td>
<td>“</td>
<td>“</td>
</tr>
<tr>
<td>El Fashir area council</td>
<td>“</td>
<td>“</td>
</tr>
<tr>
<td>Kebkabia area council</td>
<td>Pediplain</td>
<td>Clay and sandy clay</td>
</tr>
</tbody>
</table>

Source: El Sammani (1985)

2.1.4. Geology and Hydrology:

2.1.4.1. Geology:

The Sudan Geomorphologic map (1=4000,000), reveals that the western Sudan is dominated by three rocks formation, namely the Archean and Precambrian complex, the Nubian series and the Umm Ruwaba series El Sammani, (1987) Fig. No. 2.1.1.

Nubian sand stone formation: Are the largest geological formation and the main source of ground water in the area and Sudan. This formation spreads over most of the northern half of the area and forms a rich ground water aquifer known as Umm Kaddada Basin El Sammani, (1987) which occupies almost all of Umm Keddada Rural council.
Fig No. (2.1.1)

Geology of the study area

Source: Elsammani, 1985
Umm Ruwaba formation is also an important source of ground water. It is found in the southern part of the state. Sometimes it overlies the Nubian sand stone and other formation El Sammani, (1987).

2.1.4.2. Hydrology:

Ground water mostly occurs in the Nubian aquifers. Drilling showed that reliable water supplies extended to depths of 700-800 ft. Power is needed to pump water from such depth. Generally, places on basement complex are void of ground water except in local pockets in the weathered zones and along joins and fractures. Deep boreholes and hand-dug wells are the main water supply in the dry period. There are a few natural pools Rahad in clay hollows that provide water during the rainy period and early dry season.

Obtaining water is a problem during the dry period because of the high demand, low rate of discharge and inadequate fuel supply for pumping. Most of the study area being in the rain shadow of the central Darfur highlands, receive very little rainfall compared to its latitudinal position. This is strengthened by the fact that surface run off is almost absent in part of the state because of the vast sand sheets. The depth of sand is enormous and thus all precipitation is immediately absorbed by the highly porous sand. Water is a critical factor found in very restricted locations.

The early sixties witnessed the tapping of the huge underground water basin in the state. Tapping continued up to early seventies, then
tapped for a while and resumed again in the mid-seventies. Water amount was reported to be slightly fluctuating throughout the different seasons El Mangouri, (1985). Summer was reported to be the most critical season with regard to water obtained from shallow hand dug wells.

2.1.5. Climate:

2.1.5.1. Type of Climate:

The climate of Darfur state is continental which is characterized by mild dry and windy winters and hot rainy summers. There is adequate sunshine, wide range between day and night temperatures, short rainy season and low relative humidity in most parts of the year. In this climate regime, rains occur when the wet southerlies meets with the hot dry northerlies. As a consequence most of the rain is convectional and has a marked diurnal maximum in the afternoon.

Orographic effect in Darfur state on climate components particularly rainfall is evident and effective only in Jabel Marra area due to elevation (3,000 meter above the sea level), while the entire part is characterized by smooth gradient in rainfall that increases from north to south.

2.1.5.2. Temperature:

Being mostly arid and semi-arid climate, there is a great variation between day and night temperatures. The highest mean maximum usually precedes the rains and the months of occurrence are generally
April and May, while the lowest mean minimum occurs in winter (December, January and February).

2.1.5.3. Rainfall:

Literature on studies carried out by many scientists and writers on the Sahel belt reveals that rainfall is generally low, unevenly distributed and highly variable. Ibrahim, (1984) Mohamed, Abdul Galil, (1992). In the last two decades, conditions have changed abruptly. Human activities have led to progressive reduction in biological diversity and productivity. Ecological balance exposed to recent droughts has resulted in severe social and environmental catastrophes in African Sahel zone. Abdel Galil, (1992)

Generally, rainfall in Darfur region increases gradually from North to South. It varies roughly between 0.0 mm in the desert to 800 mm in the high rainfall woodland savannah in the South. Fig No. (2.1.2).

Different systems of climate classification designate North Darfur area as arid, applying Thronthwaite (1948) approach.

Awadalla (1981) designated the area as part of the arid zone. Maximum rain ever received in one day at Elfasher in the standard period (1951-1980) was 88.5 mm on the first of August 1974. July and August are the cloudiest month, during which the cloud coverage is about ¾ of the sky while relative humidity is well over 60%.

Effective rainfall is confined to the period between May to October and the peak is reached in July and August. A prolong summer drought
of up to seven months between two rainy seasons is a normal feature of the rain regime in the region.

From the standpoint of rainfall, Jabel Marra area constitutes a conspicuous ecological identity as compared to the rest of the region. The aerographic effect on the rainfall is highly significant and there is a clear deformation in the mean annual isohyets produced by Jabel Marra elevation as shown in Table No. (2.1.2).
Fig No. (2.1.2)

Rain Isohyets

Source: Sudan Metrological Department
Table No. (2.1.2):

Mean annual rainfall amount received in 1984 and 1985 by area council

<table>
<thead>
<tr>
<th>Area</th>
<th>Mean (mm)</th>
<th>1984 (mm)</th>
<th>Deficit %</th>
<th>1985 (mm)</th>
<th>Deficit %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kutum area council</td>
<td>300</td>
<td>11</td>
<td>96%</td>
<td>123</td>
<td>59%</td>
</tr>
<tr>
<td>Mellit area council</td>
<td>250</td>
<td>-</td>
<td>-</td>
<td>300</td>
<td>20%</td>
</tr>
<tr>
<td>Umm Kaddada area council</td>
<td>420</td>
<td>-</td>
<td>-</td>
<td>376</td>
<td>11%</td>
</tr>
<tr>
<td>Elfasher area council</td>
<td>250</td>
<td>107</td>
<td>57%</td>
<td>185</td>
<td>26%</td>
</tr>
<tr>
<td>Kebhabiya area council</td>
<td>380</td>
<td>-</td>
<td>-</td>
<td>347</td>
<td>9%</td>
</tr>
</tbody>
</table>

Source: compiled from Sudan meteorological reports.

2.1.6. Annual Rainfall Variability and Reliability:

Three different types of rainfall variability have to be distinguished, which are:

1- Spatial variability:

Two features influenced the spatial variability of the rainfall in the area: the decrease of precipitation towards the South and the variation of the isohyets positions from year to year.

1- Inter-annual variability: between years.

2- Intra-annual variability: within a year i.e. the distribution of rainfall during the rainy season

Rainfall is not evenly distributed within the months of the rainy season, it rather tends to be concentrated in August (44%) and July
Moreover, all of the annual rain usually falls in a limited number of heavy down pours, a characteristic which increases the maldistribution of the rainfall. The state’s rain is also characterized by high fluctuation or variability both spatially and temporarily.

Average of 456mm and 473mm, has been revealed by records of the region for the period 1946-1979 Fig No. (2.1.3) in two successive years of 1950-1951, annual values were 456-137 mm showing a drop of 70%. For the period 1951-1979 the standard deviation (SD) is 33%, this means that in each year to come in the near future the amount of rainfall is expected to deviate about 33% of the average at Elfasher and this because of the fact that during the last 50 years the isohyets for Darfur region moved about 200 km along a NE–SW axis and thus the average amount of annual rainfall becomes considerable less. Various forms of agriculture become marginal, according to their rainfall requirements. The variation of rainfall within localities is due to isolated storms of showers as well as local topography. The average annual rainfall figures for 1987 and 1988 were more or less the same 1987: 240 mm, 1988: 243 Mm), but the different rainfall distribution caused a failure of the Millet crop in 1987 and a very good harvest in 1988 GFE/GTZ, (1988).
Fig No. (2.1.3)

Total amount of rain fall for Umm Keddada for the period (1945 - 1985) in mm

Source: Sudan Meteorological Department
2.1.6.1: Seasonal Rainfall Amount and Distribution:

Rain variation across the study area is of three patterns. First rainfall decreases from South to north. Second, the exact position of isohyets changes from year to another. Third rain shower or storms usually do not cover wide extensive areas; they tend to cover only limited and highly located area El Tom, (1975).

2.1.6.2. Temporal Variability:

Rain pattern in the area is characterized by two levels of time variation, year to year (between years) and within years.

Rainfall patterns show high degree of variation above or below the mean from one year to another. Statistical analysis of precipitation records in the region shows long time averages (40 years) from 1946-1985 for Umm Kaddada station as 232.8 mm with standard deviations of 41.4% year to year variation above or below the mean.

Detailed analysis of the rainfall records from 1946 is shown by comparing short-term average (10 years); using this measure it is clear that recent years receive lower rainfall averages. Such comparison in Umm Keddada gives results which are shown in Table No.(2.1.3).
Table No. (2.1.3):

Short-term rainfall averages (10 years) 1946-1985

<table>
<thead>
<tr>
<th>Period</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1946-1955</td>
<td>281.1 mm</td>
</tr>
<tr>
<td>1956-1965</td>
<td>259.0 mm</td>
</tr>
<tr>
<td>1966-1975</td>
<td>215.0 mm</td>
</tr>
<tr>
<td>1976-1985</td>
<td>175.0 mm</td>
</tr>
<tr>
<td>1986-1995</td>
<td>198.0 mm</td>
</tr>
</tbody>
</table>

Source: Sudan Metrological Department 1995

2.1.6.3: Recent Rainfall Change in the Sudan:

Recent decline in the annual rainfall in the Sahel zone of Africa including the semi-arid parts of the Sudan has continued since 1970’s and intensified in the 1980’s Bryson, (1973) Nicholson, (1979, 1983 and 1985). In all three annual rainfall series, three rainfall epochs can be discerned, a rather dry epoch during the first two decades of this century, a wet period from around 1920’s and 1930’s, and a very dry epoch from 1965 up-to-date. The magnitude and temporal consistency of the recent decline in rainfall are striking. At Elfasher, the 1965 – 1984 mean rainfall is (202 mm) is 38% below the long-term 1921 – 1980 average. The decline is general throughout semi-arid Sudan. A comparison of annual rainfall maps for the wet 1920 – 1939 epoch and the very dry period of 1965 – 1984 confirm this Fig No. (2.1.4), the 200 mm annual rainfall isohyets, for example, has retreated some 120 km southwards.
Fig No. (2.1.4):

vegetation cover in Northern Darfur

Zone 1: semi-desert thorn shrub
Zone 2: low rainfall woodland & acacia Senegal savanna
Zone 3: low rainfall woodland

Source: Ibrahim, 1984
The years 1983 and 1984 were particularly dry, with 1984 the driest year at almost all the stations in semi-arid Sudan (Darfur Regional Government Food Security Plan 1989).

There is some evidence to suggest that, within the context of the climate of the Sahel since 4000 BB, it is believed not to be a dry epoch, but the mid-twentieth century is believed to be a wet period, which is an anomalous. The early part of the last century was also rather dry. Nicholson and Flohn (1980) have argued that historical accounts point to a series of dry periods of approximately equal severity to the current one in the 1680’s, 1740 – 1760, 1820 – 1840 and 1895 – 1920 and a long and severe dry period from around 1150 – 1500 AB.

2.1.7: Vegetation:

Vegetation type is closely associated with rainfall. As the amount of rainfall increases, so do the height and density of vegetation Table No. (2.1.4) Ibrahim (1984) using Jackson and Harrison’s Zonation of Sudan vegetation classified into semi-arid and low rainfall woodland Savannah vegetation Fig No. (2.1.4). According to Awadalla, (1990) the area can be divided by a line running from east to west passing through Ummhosh and Tulu. The two zones roughly coincide with Ibrahim’s (1984) classification, the northern being the semi-desert, which is characterized by sparse and patchily vegetation cover, mainly formed of thorn scrub trees. The dominant species are *Acacia mellifera* (Kiter), *Comphoria Africana* (Gafal), *Bosica sengalensis* (Mukhait). *Acacia radiana* (Sayal),

*Acacia raddiana* (Sayal),
Maerua crassofp; oa (Sereh), Laptadena pyrotechnica (Marekh) and Indigofolia (Saat). With annual grass, cover mainly Cenchrus biflorus (Haskanit), Aristida funiculate (Gow), and Eragrostis tremula (Banu), with some Aristida pupposa (Beyad).

The northern and central parts of the area dominated by Acacia sengal (Elsarh). The northern most limits, where rainfall hardly exceeds 300 mm is dominated by seasonal grasses (mainly Aristida types) with scattered small trees (mainly Balanites aegyptiaca (Hijleaj) and Acacia radiana (Sayal). These plant species form the basis for the camel nomadic tribes e.g. Zeiyadiya and Meidob who presently move southwards in response to environmental changes. The natural vegetation cover is excessively removed as a result of over stocking, over cultivation and climatic fluctuations, thus depending upon the utilitarian value and subsequently the degree of use of some species can be considered as decreases while others are increases (Table No. 2.1.5). The southern part of the Darfur is dominated by the Savanna tree of the Goz
Table No. (2.1.4)

Ecological zones and the major representative plant species.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Zone and Sub-zone</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kutum</td>
<td>Semi-desert + thorns land + grassland on sand</td>
<td>Leptadenia pyrotechnica</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acacia raddiana</td>
</tr>
<tr>
<td>Mellit</td>
<td>Semi-desert + <em>Acacia mellifera</em> Commiphora</td>
<td><em>Acacia mellifera</em></td>
</tr>
<tr>
<td></td>
<td>Africana</td>
<td>Commiphora Africana</td>
</tr>
<tr>
<td>Umm Kaddada</td>
<td>Low rainfall Savannah on Sand Acacia sengal</td>
<td><em>Acacia sengal</em></td>
</tr>
<tr>
<td></td>
<td>Savannah</td>
<td><em>Guiera sengalensis</em></td>
</tr>
<tr>
<td>Elfasher</td>
<td>Low rainfall savannah on sand + <em>Acacia sengal</em> Savannah</td>
<td><em>Acacia sengal</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Boscia sp</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Acacia mellifera</em></td>
</tr>
<tr>
<td>Kebkabiya</td>
<td>Low rainfall savannah + <em>Acacia mellifera</em> thorns land</td>
<td><em>Acacia mellifera</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Acacia albida</em></td>
</tr>
</tbody>
</table>

Table No. (2.1.5): Increases and Decreases Plant Species in Various Ecological Zones and Sub-Zones in Darfur Region

<table>
<thead>
<tr>
<th>Ecological Zone</th>
<th>Ecological Sub-Zone</th>
<th>Decreases</th>
<th>Increases</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-desert</td>
<td>Thorn land and grass land on sand</td>
<td>Acacia radiana</td>
<td>Leptadenia</td>
<td>(I) Decreased under overgrazing and over cutting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pyrotechnica</td>
<td>(ii) Increased under increased aridity conditions, the species also shifted southward</td>
</tr>
<tr>
<td></td>
<td>Semi-desert</td>
<td>Acacia mellifera</td>
<td></td>
<td>(I) Decreased under heavy browsing and use as fuel wood</td>
</tr>
<tr>
<td></td>
<td>Acacia mellifera</td>
<td></td>
<td></td>
<td>(ii) Decreased under increased aridity and disruption of its natural habitat</td>
</tr>
<tr>
<td></td>
<td>Commiphora Africana</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low rainfall</td>
<td>Acacia sengal Savannah sand</td>
<td></td>
<td>Guiera Sengalensis</td>
<td>(I) Decreased under drought, aridity and use.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I) Acacia sengal</td>
<td></td>
<td>(ii) Increased northward due to increased aridity and light use.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acacia mellifera</td>
<td>(iii) Decreased under over-cutting and increased aridity conditions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acacia alhida</td>
<td></td>
</tr>
</tbody>
</table>

Compiled by the researcher
Soils of eastern Darfur *Combretum cordofanum, Dalbergia albizia, Serocicephola* wood land Savannah. According to Harrison and Jackson (1958) and Lebon (1965) two principal ecological zones are described in the area, which are correlated with climatic sequences from north to south: the semi-desert and the low rainfall wood land savannah sand. Some differences occur in the composition of the vegetation within each zone. These are largely due to changes in rainfall and soils. The character of each zone together with its divisions is summarized as follows:

i) The semi-desert (rainfall 75-300). This zone occupies the extreme northern part of the study area. In general the vegetation is a varying mixture of grasses and herbs either without woody vegetation or more usually, with variable scatter shrubs interspersed with bare areas. The semi-desert has been further subdivided into the following:

Semi-desert grassland on sand: This division is either without trees, shrubs or contains only limited scattered individuals of *Acacia rodianna* (Seyal), *Acacia melifera* (Kiter) and *Commiphora africana* (Gafal), the first mostly occurs near hills and drainage courses. The other two are in hollows.

ii) Low rainfall woodland savannah sand: This belt comprises two divisions, though the line of demarcation between these two is not sharply defined, as there is considerable variation due to the position
on the slope of the dunes and past land-use practices, within each
division are Acacia sengal and *Combretum cordofanum Dalbergia albizia*
Savannah woodland. As regards the best grazing plants of the semi-
desert zone Lebon, (1965) emphasized the usefulness of *Aristida* (Gow),
*Belipharis* (Bogeil), and *Monssnia spp.* (Gurn).

2.1.8: Field Observation:

The above-mentioned vegetation associations, however, appear in
their pure potential forms only in a few remote or relatively untouched
areas. In general, a more or less modified degradation form of these
associations can be observed in the investigation areas. The degree of
modification is related to the intensity of land use of the ecosystem.

The part of Goz within the study area is almost completely covered
by traditional rain fed agriculture, millet being by far the most important
crop. The tree vegetation of the former *Acacia sengal* Savannah is almost
completely depleted.

On the alluvials in the basement, the vegetation consists of some
trees and shrubs, but depending on the intensity of land use and clay soil
cultivation expansion.

On the alluvials in the Goz, the trees and shrubs associations
remain only along the drainage line (Khor) and around the wet
depressions. In some areas, most of the original tree and shrub vegetation
has been replaced by agroforest crops. Due to the high grazing intensity
in areas that have not yet been cultivated the vegetation has been reduced considerably.

2.1.9: Water Resources and Drainages Systems:

2.1.9.1: Background:

Water is considered the most important natural resources upon which the activities of all living things depend. In general and man in particular, in addition to man’s daily domestic needs, these activities involve agriculture and animal razing.

The future development of the economy of the study area depends to a great extend upon the promotion and balanced development of its renewable resources. In this context, the provision of water is the corner stone for the promotion or development of clay soil cultivation.

Ground water in Sudan is found in three geological formations, which are:

1- Nubian sand stone formation.

2- Umm Ruwaba series.

3- Alluvial deposits.

2.1.9.2. Water Resource in Darfur:

The greater part of Northern Darfur state belongs to the desert and semi-desert with 10-12 arid months, the rest of the region include high lands of Jabel Marra, are less dry (8-9 arid months). The prevailing aridity in Northern Darfur constitutes the most important precondition for the process of desertification. (Ibrahim, 1984).
In Darfur as elsewhere in Sudan, there are three water sources: surface water, rainwater and ground water.

Rainfall varies from traces in the North to 900 mm in the south. The rainfall isohyets parallel with the latitudes Fig No. (2.1.5). A Jabel Marra highland forms a belt from northeast to southwest characterized by its higher amount of rainfall reaching 1000 mm annually at the summit. Rainfall variability extends between 25% in the southern areas to 200% in the northern areas. Darfur area suffers from great deficit in its water balance between 200 mm in the South to 1200 mm in northeast part. The surplus water in the wet months are gathered as run-off on the surface or percolate as a recharge to the ground water Iskander, (1992) surface water in Darfur is estimated at 5 milliard m$^3$ per year, although the amount calculated is 1.25m$^3$. The flow of Wadis west to Chad is estimated at 850m$^3$ a year, for Wadi Ibra, 200 million cubic meters for Wadi Nyala, 100m$^3$ for Wadi El Ku and 50m$^3$ for Mareega, Oshra and Beeda. The Wadis which run north to the Nile like Wadi Hawar and Margroor continued to about 3500 year. What runs now occurs only during the high rainfall years.

In eastern Darfur which is extensively covered by Goz sands there is no surface run-off and no ground water recharge under present climatic conditions Ibrahim, (1993). The system is recharged only by water from the Wadis of the surrounding mountains. The sand stone, which in places is over 1000 meter thick, lies in large almost enclosed basins, of which
The most important are the Alauna Shagera and Umm Keddada Basins. The quality of ground water is generally good with E.C values below 2500 Micromohs / cm over most of the area. Local pockets of high salinity occur, notably at Jabel Hilla and Ummshanga. Nitrate concentrations are above permissible limits in many analysis of water from weathered basement Mac Donald, (1970). Geographical traverses across the basins, pumping tests and leveling of the water table gradient enable estimates of ground water flow to be made. This method indicated a total inflow of 21 million cubic meter per year to Umm Keddada, Alauna and Shagera sand stone basins, South of the major Kutum-Meidob ground water divide and an out flow through the sand stone of 4-3 million cubic meter per year Mac Donald, (1970). Abstraction has increased rapidly since 1965 and during the (1969-70) season was estimated at 1.4 million cubic meters throughout the previous basins. 1.18 million Cubic meter being from the alluvial and sand stones in the Umm Keddada Alauna and Shagera basins. During this period the executed number of wells drilled in this basin was 3334 by the Geotechnical Group. The main ground water basin in the area of the study is Umm Keddada located South of Kutum – Meidob ridges. The basin is bounded to the northwest by the Tagaboridge, to the west by the Nigea and Urgud hills, to the South by quartzites running northeast from Karkur to Jurgul and to the east by basement complex at Qala Gozein, Umm Batatikh and Kaja serug. There is some evidence that the basin
comprises of a series of sub-basins. The major basins are separated by basement ridges, which act as ground water divides and barriers. The basins are Umm Keddada basin, Tima basin and Southern Darfur basin, which are connected to Umm Keddada basin by the Umm Gafalah gap. Fig No. (2.1.6). Shown the main ground water basin in Sudan.

The major control on the depth to ground water is the effect of the topography super imposed on the regional ground water table. A section drawn along ground water flow line from Malha to Umm Gafalah gap shows an initial increase in depth from 80 meter at Wadi Usher. The depth then shows a gradual decrease at an overall rate of 0.3 meter per kilometer to 60 meter in the vicinity of Jabel Hilla. The depth increases after this point as ground water flows into the very large southern Darfur basin. Superimposed upon the above, pattern are normalize caused by local topography such as depth of 151 meter at Safaha in the sand stone hills and 25 meter at Burush in a topographic low. The local increase at Wadi Ushar can be traced from northeast of the Meidob hills along a line 40-50 kms from the western edge of Umm Keddada hills. It coincides with a rapid change of groundwater gradient as the influence of the basement aquiclude decreases eastwards as the water table flattens out Mac Donald, (1968). Generally, over Umm Keddada basin, the depth to ground water varies between 25-150 meters, the most common depth in the areas of low relief being in the range of 50-90 m. The southerly flow is concentrated in Umm Keddada basin to escape through the Umm
Gafalah gap and probably through joints and foliation in the Karkur-Kurgul quartzites. Within the basins, the subsurface topography of the basement complex tends to complicate the flow patterns. Mac Donald (1970).

The ground water contours indicated that the major source of ground water recharge to the Umm Keddada basin is in the east of Mallit to the Heitan plateau. Recharge is presumed to take place following Wadi floods. This would occur via the Wadi hill deposits, or along the Meidob and Tagabo hills directly into the Nubian sand stone, which underlies the alluvial deposits in the area. In the Nubian sandstone, seasonal fluctuations of the order of 0.1-0.3 m have been measured at Umm Keddada, Ummelhusein and Shagera. Amount in storage in the Umm Keddada basin is about 300 x 10^9 m^3. During 1970’s, the producing
Fig No. (2.1.5) Annual Rainfall in Sudan

Source: UNESCO, 1988
boreholes in Umm Keddada basin were 86 and abstraction in m³ per year was 835,000 m³ (Mac Donald, 1970).

Umm Keddada basin underlines an area of 80,000 km³ and subdivided into Umbayada, Brush, Jabel Hilla, Sagelniam and Shagera sub basins. The productivity of wells vary widely from 5 – 100 m/h with the exception of Jabel Hilla where water is saline, the ground water of other basin is fresh and suitable for domestic and irrigation purposes. The annual safe yield of the basin is about 100 x 10⁶ m³, while the present withdraw of water hardly exceed 10 x 10⁶ of water every year.

Water availability is the top priority for life to human and animals in the study area, which is poorly endowed with surface or shallow ground water resources. On the other hand, the area is rich in huge underground – water aquifers, especially in the Nubian sand stone formation. The water supply in the area is rather complicated. In locations where the supply is adequate over stocking and farming of large field of millet is continuing, thus accelerating land degradation. In other locations, unavailability or inadequacy of water is the main constrain to better life of the populace. Although there is a common view from most of the people, that water shortage is acute, it is argued that the reason is uneven distribution of water points due to the geological variation.

2.1.10: Types of Water Sources in North Darfur State:

In the study area, there are two types of water sources, surface and ground water. Due to the relief of the area and sandy soils, there are only
limited points where surface run-off can be collected to be available for
human and animal use. These points are reflected as perennial or
seasonal Wadis, Rahad (Natural ponds) and Hafir (artificially excavated
reservoirs). In the area, there are many natural bonds, which are of
limited capacity and keep water during the rainy season for a month or
two after the rains. There are some Hafir excavated by the Rural Water
Corporation, others are excavated by the inhabitants and rehabilitated by
the areas development scheme and some NGOs e.g. Umm Keddada.
Though they are of small capacity, they can provide water up to

December.

The largest Wadi in the area is Wadi Kutum, which has an active
catchments area extending over large area. Soils cultivated by vegetables
and fruits using the Wadi water for irrigation supplemented by the water
tapped from the aquifer.

Ground water is considered the most important source of water in
the areas, tapped from the Nubian sand stone basin whose storage
capacity is estimated at 21x10^6 m^3 the present abstraction from the basin is
estimated at 19x10^6 m^3. According to these estimates, the basin is found
to receive an annual addition of 2x10^6 m^3 of water El Sammani, (1987).

Ground water is usually tapped either by hand-dug wells or deep
boreholes. Hand-dug wells are found in villages. In some of these
villages, they are the only source of water, while in others they form an
alternative source to be used during the break down of boreholes. Hand-
dug wells vary in depth and water quality. Some are shallow (86 meter deep) and very rich in water as in Sag Elniam where there is a regular recharge from the Wadi. The deepest well is at Abu Humeira (80 m deep); other wells vary in depth between 60-80 meters.

Drilling boreholes in Northern Darfur started early 1950’s, but large numbers of boreholes were drilled in 1960’s Ibrahim, (1985). During the 1970’s and as part of the Anti-thirst campaign numbers of boreholes were drilled. During 1988-89 a large drilling and rehabilitation programmed was launched aimed at rehabilitating all the existing boreholes and twinning of the single bore stations.

The main source of water prior to 1960’s came from hand-dug wells. These wells were 10-15 feet deep with varying amounts of water. Some of these wells dried up before the end of the dry season that is why some towns of Northern Darfur state became famous for drinking water melon juice during the critical dry period e.g. Umm Keddada town. The majority of the boreholes were constructed in the 1980’s as well as 1960’s. This large amount of boreholes had been established within the anti-thirst campaign.

Water available for human and animal use is scarce in the state and the most accessible is provided through deep boreholes. This lead to heavy concentration of settlement around boreholes thus; creating maldistribution of settlements with high densities in the Nubian sand stone areas. Hafirs are extremely important in dry season. In wet season
most of the villages rely on natural ponds for water supplies but non-in the dry season.

In general, villagers depend on boreholes, permanent well and Rahads in the wet season leaving Hafirs to be filled during rain. As the dry season advances, recharge of wells becomes low and water supplies from Rahads decline. Hence, Hafirs and boreholes become the main sources of water supplies.

The distribution of the water points in the state follows the geological structure. Where the basement complex rocks dominate, people depend mainly on Hafirs and other types of surface water. To fetch such water, they need to travel up to 10 hours to the nearest water point. During the wet season most of the rural people depend on Rahads either because the ground water is saline or because of the short distance to the Rahad. In the eastern part of the state, some of the rural people still use Tebeldi trees for storing water for the dry period. Others make what is known as Gilat, a hole made in the areas of basement complex and filled by water during the wet season.
Ground Water Basins in Sudan

Source: UNESCO, 1988
2.2. Population:

2.2.1. The Ethnic and Tribal Composition:

General speaking the people of Darfur is composed of numerous ethnic groups. Those groups are classified into Arabs, non-Arabs in addition to the Arabs and Non-Arabs immigrants from West Africa.

Historical sources (Al-Tunis, 1885) indicates that the Arab had penetrated Darfur firstly as traders and refugees, and secondly as waves of nomadic groups who pushed western-ward after the destruction of the Christian Kingdom of Dongola in the 14th century. The later waves were the most influential in the socio-economic structure of Darfur as a whole. Other migrants mainly came from North Africa composed of camel owning and cattle owning elements.

2.2.1.1: Arab tribes:

The present tribes of early Arab immigrants could be divided into three groups, according to the mode of living or economic activities pursued:

1- **The Baggara nomads**: composed of Rizeigat, Habbania, Taaisha, Beni Helba and Beni Khuzum.
2. Camel owing Arabs: include Zeyiadia, Mohamid, Mahria, Nawaiba, Ereigat and Beni Hussen.

3. Sedentary or semi-nomadic tribes: mainly Beni Fadel, Mohasra, Messeriya, Ma’alia and other various small tribes.

2.2.1.2: Non-Arab tribes:

The Non-Arab tribes represent the original groups of Darfur, with exception of some nomadic and semi-nomadic elements all the original inhabitants are sedentary cultivators with keeping home-based livestock. The main sedentary groups are Fur, Gimir, Birgid, Dague, Tunjur, Bartie and Masalit. The nomadic and semi-nomadic, non-Arab elements are represented by Zaghawa, Bedy’yat, Firti and Meidob.

2.2.1.3: Immigrants from West Africa:

There are some tribes that have migrated from West Africa and Chad and settled in Darfur for a very long time, those include among others – Fellata (Fulani), Tukarir, Borgo and Mima.

The ethnical and tribal distinction in Darfur implies socio-cultural and occupational boundaries within contexts of compliment and competitive economic structures and activities. Therefore, tribal affiliation and structures in many cases are very significant elements in politics and political participation at the regional and national levels.

2.2.2. The North Darfur tribal structure and distribution:

Generally speaking each tribe in Darfur occupies a certain space of land represent as its own designated homeland known as "Dar".
In South Darfur, the Rizeigat represent the biggest of the Baggara tribes in Darfur. Its "Dar" covers the southern-eastern corner of Greater Darfur, to the west of them is inhabited Habbania tribe, their "Dar" extend to Buram and Radom areas. The Ta’aisha Beni Helba homeland occupies areas round Reheid el Birdi, Idd el Ghanam.

Fur’s "Dar" cover the whole area around Jebel Marra, and spread almost all over the region. There are other small sedentary and semi-nomad tribes which are found in both North and South Darfur, and in many cases are mixed or embraced with other sedentary tribes or Dars, with the exception of Ma’alia who has their own Dar within Dar Rezeigat.

Masalet’s homeland is the main Dar in the west of Darfur. Both Fur and Masalet are mainly sedentary cultivators, but some of them were keeping some herds and have contact with nomadic tribes who cross their land during the wet and dry seasons. Some of them, particularly among Fur had changed their mode of living and transformed into Baggara. No such attitude is observed after the break down of violence in the area.

Dague and the Tunjur, which were the early ruling houses of Darfur, at present they are mainly found in East Nyala after they had been driven out west ward by the Fur.

Fellata, Takarir and Borgo are migrants from West Africa and have settled in towns and rural council mainly in Tollus’ rural council. The Housa and Fullani are refered to as Fellata are mainly sedentary with
Fullani nomadic fraction. The Takarir and Bargo are scattered all over
the Greater Darfur.

The people of North Darfur are very mixed. Historically the
related tribes occupy together similar habitat with similar modes of life
and culture. The main inhabitants of North Darfur are the domain of
Zaghawa with their related sub-division groups such as Bedayat, Firti and
Kubfa, who are semi-nomadic with the camel as the main livestock.
They cover most of the rural council of Kutum, Umm Bargo and Korno. Nowadays the Zaghawa are found all over Greater Darfur. The second
main domain in North Darfur is the domain of the Meidob who claim that
they are originally Nubian (Mahas). Their main center is the rural council
of Malha and Wadi Marega. The Meidob area is centered by the famous
hill in North Darfur which known as Jabel Meidob. Most of the area to
the North of this hill is uninhabited, but the area of Jabel Tiger to the west
of Jabel Meidob characterized by huge sources of water. The area to the
South of the Meidob area is inhabited by the Zaghawa and Berti with
whom the Meidob have good relation.

In the present time, there is a severe conflict between Meidob and
Berti whom they had established good marriage relation for many
decades. Despite of the regional authority official and local intervention,
the dispute is still unsettled. Such disputes have been common among
different and related communities who occupy the same natural habitat
and environmental resources. Berti have originally occupied northeastern
Darfur, which is referred to as "Dar" Berti, their main towns include Umm Keddada, Mellit, Towisha and Elaiet. They are considered as one of the main cultivator tribe in North Darfur, who are living in harmony with the nomads who cross their land during the rainy season.

North Darfur constitutes the most suitable habitat for camel keeping, therefore, camel owning tribes are mainly found in North Darfur. The main tribes include Mohamid, Nawiba Mahria who represent the Northern Rizeigat camel owning division. This in addition to Zeyiadiya and Ereigat, who belongs to the Fazara group. The main "Dars" of these tribes include Mellit, Kuma, Kutum and areas around Kebkabiya. They browse all over the region up to the Northern Desert including the "Jizzue" land and to the South up to the Baggara areas of southern Darfur El Sammani, (1985).

2.2.3. Population Distribution:

During the last century, Sudan had carried out three censuses: in 1955, 1956 and 1993. Darfur region has attained the following population census Table No. (2.2.1).

<table>
<thead>
<tr>
<th>State</th>
<th>1955-56</th>
<th>%</th>
<th>1983</th>
<th>%</th>
<th>1993</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Darfur</td>
<td>728000</td>
<td>55</td>
<td>1328000</td>
<td>43</td>
<td>1580000</td>
<td>36</td>
</tr>
<tr>
<td>South Darfur</td>
<td>601000</td>
<td>44</td>
<td>1786000</td>
<td>57</td>
<td>2960000</td>
<td>64</td>
</tr>
</tbody>
</table>

Source: Compiled by the researcher from pop. Census
According to the last population report of Northern Darfur which is based on the fourth tabulations of the population census carried out on 1993 (Statistics Department) table No. (2.2.2). The population of the recently reconstituted North Darfur had grown from 803,249 in 1983 to 1,155,872 in 1993, which constituted 3.58 rate of growth. The average size of household members works out to 5-5 person per household with sex ratio of 93 males per 100 females. The age distribution and population follows the normal pattern, with slightly higher percentage of children, which could be attributed to higher fertility rate in rural areas. Children under 14 years of age constitute 48.9% of the total population, while the working age (15-59) amounted to 44.9 of total population. The report shows higher literacy rate in urban area 66.7% compared to 40.9% for both sexes in rural areas. This could be attributed to the easier accessibility to traditional education among rural communities i.e. Khalwa, Faki. The state has an active population of 448.081 out of 702.384 in the age group 10 and over, that is 63.8% of the population is economically active.
Table No. (2.2.2) Number of Households by their Type and their Population by Sex According to State, Mohafaza and Type of Residence

<table>
<thead>
<tr>
<th>STATE MOHAFAZA</th>
<th>TOTAL</th>
<th>SEDENTARY</th>
<th>NOMADIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>RURAL COUNCIL</td>
<td>Households Both Sexes</td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>NORTHERN-DARFUR STATE</td>
<td>211,684</td>
<td>1,155,872</td>
<td>557,093</td>
</tr>
<tr>
<td>Total</td>
<td>203,574</td>
<td>1,094,721</td>
<td>520,541</td>
</tr>
<tr>
<td>Private</td>
<td>822</td>
<td>4,535</td>
<td>2,493</td>
</tr>
<tr>
<td>Displaced</td>
<td>24</td>
<td>136</td>
<td>61</td>
</tr>
<tr>
<td>Refugee</td>
<td>35</td>
<td>193</td>
<td>99</td>
</tr>
<tr>
<td>Homeless</td>
<td>447</td>
<td>12,041</td>
<td>9,116</td>
</tr>
<tr>
<td>Institute. Non-Inst.</td>
<td>237</td>
<td>3,316</td>
<td>3,095</td>
</tr>
<tr>
<td>Collective</td>
<td>6,545</td>
<td>40,930</td>
<td>21,688</td>
</tr>
<tr>
<td>KUTUM STATE</td>
<td>80,107</td>
<td>445,420</td>
<td>215,107</td>
</tr>
<tr>
<td>Total</td>
<td>73,940</td>
<td>402,979</td>
<td>191,420</td>
</tr>
<tr>
<td>Private</td>
<td>95</td>
<td>592</td>
<td>282</td>
</tr>
<tr>
<td>Displaced</td>
<td>5</td>
<td>32</td>
<td>13</td>
</tr>
<tr>
<td>Refugee</td>
<td>6</td>
<td>38</td>
<td>22</td>
</tr>
<tr>
<td>Homeless</td>
<td>124</td>
<td>4,174</td>
<td>3,211</td>
</tr>
<tr>
<td>Institute. Non-Inst.</td>
<td>29</td>
<td>591</td>
<td>550</td>
</tr>
<tr>
<td>Collective</td>
<td>5,908</td>
<td>37,014</td>
<td>19,609</td>
</tr>
<tr>
<td>AL-FASHIR MOHAFAZA</td>
<td>101,440</td>
<td>592,450</td>
<td>261,383</td>
</tr>
<tr>
<td>Total</td>
<td>99,624</td>
<td>525,859</td>
<td>249,632</td>
</tr>
<tr>
<td>Private</td>
<td>676</td>
<td>3,683</td>
<td>2,099</td>
</tr>
<tr>
<td>Displaced</td>
<td>19</td>
<td>104</td>
<td>48</td>
</tr>
<tr>
<td>Refugee</td>
<td>24</td>
<td>113</td>
<td>58</td>
</tr>
<tr>
<td>Homeless</td>
<td>295</td>
<td>6,468</td>
<td>5,260</td>
</tr>
<tr>
<td>Institute. Non-Inst.</td>
<td>192</td>
<td>2,462</td>
<td>2,301</td>
</tr>
<tr>
<td>Collective</td>
<td>610</td>
<td>3,761</td>
<td>1,985</td>
</tr>
<tr>
<td>UM-KADADA MOHAFAZA</td>
<td>30,137</td>
<td>168,002</td>
<td>80,603</td>
</tr>
<tr>
<td>Total</td>
<td>30,010</td>
<td>165,883</td>
<td>79,489</td>
</tr>
<tr>
<td>Private</td>
<td>51</td>
<td>260</td>
<td>112</td>
</tr>
<tr>
<td>Displaced</td>
<td>5</td>
<td>42</td>
<td>19</td>
</tr>
<tr>
<td>Refugee</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Homeless</td>
<td>28</td>
<td>1,399</td>
<td>645</td>
</tr>
<tr>
<td>Institute. Non-Inst.</td>
<td>16</td>
<td>26</td>
<td>244</td>
</tr>
<tr>
<td>Collective Nomadic</td>
<td>27</td>
<td>155</td>
<td>94</td>
</tr>
</tbody>
</table>

## Table No. (2.2.3): Number of Population by Rural sedentary and Nomadic.

<table>
<thead>
<tr>
<th>STATE MOHAFAZA RURAL COUNCIL</th>
<th>TOTAL</th>
<th>SEDENTARY</th>
<th>NOMADIC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Households</td>
<td>Both Sexes</td>
<td>Males</td>
</tr>
<tr>
<td>NORTHERN-DARFUR STATE</td>
<td>178,305</td>
<td>964,605</td>
<td>460,493</td>
</tr>
<tr>
<td>KUTUM MOHAFAZA</td>
<td>79,010</td>
<td>438,712</td>
<td>211,736</td>
</tr>
<tr>
<td>Al Sayiah</td>
<td>5,373</td>
<td>46,628</td>
<td>25,201</td>
</tr>
<tr>
<td>Karmowy</td>
<td>8,022</td>
<td>52,590</td>
<td>26,878</td>
</tr>
<tr>
<td>Fata Barno</td>
<td>10,223</td>
<td>47,121</td>
<td>21,049</td>
</tr>
<tr>
<td>Kutum</td>
<td>11,150</td>
<td>56,091</td>
<td>25,773</td>
</tr>
<tr>
<td>Kabkabyah</td>
<td>20,792</td>
<td>95,567</td>
<td>42,810</td>
</tr>
<tr>
<td>Al Siraif Sirif</td>
<td>4,997</td>
<td>27,000</td>
<td>12,561</td>
</tr>
<tr>
<td>Al Ombaro</td>
<td>11,929</td>
<td>73,293</td>
<td>36,254</td>
</tr>
<tr>
<td>Ruhal</td>
<td>6,524</td>
<td>40,422</td>
<td>21,210</td>
</tr>
<tr>
<td>Al FASHER MOHAFAZA</td>
<td>70,502</td>
<td>365,503</td>
<td>171,687</td>
</tr>
<tr>
<td>Al Malha</td>
<td>5,839</td>
<td>42,132</td>
<td>21,732</td>
</tr>
<tr>
<td>Mileet</td>
<td>3,779</td>
<td>17,711</td>
<td>8,533</td>
</tr>
<tr>
<td>Al Sayiah</td>
<td>4,315</td>
<td>23,683</td>
<td>11,473</td>
</tr>
<tr>
<td>Al Koama</td>
<td>2,285</td>
<td>12,399</td>
<td>5,920</td>
</tr>
<tr>
<td>Koarma</td>
<td>8,598</td>
<td>42,548</td>
<td>19,607</td>
</tr>
<tr>
<td>Al Fasher</td>
<td>14,835</td>
<td>72,883</td>
<td>33,294</td>
</tr>
<tr>
<td>Taweelah</td>
<td>13,098</td>
<td>64,508</td>
<td>30,336</td>
</tr>
<tr>
<td>Dar Al Salam</td>
<td>17,753</td>
<td>89,639</td>
<td>40,792</td>
</tr>
<tr>
<td>KADADA MOHAFAZA</td>
<td>28,793</td>
<td>160,390</td>
<td>77,070</td>
</tr>
<tr>
<td>Um-Mutla</td>
<td>10,429</td>
<td>53,396</td>
<td>24,791</td>
</tr>
<tr>
<td>Kadada</td>
<td>9,781</td>
<td>58,547</td>
<td>29,328</td>
</tr>
<tr>
<td>Al Laayt</td>
<td>8,583</td>
<td>48,347</td>
<td>22,951</td>
</tr>
</tbody>
</table>

The Activity rate for male is 68.7, while the percent of active female constituted the higher percentage among the other state, which amounted to 59.7 of the female in the state. The activity gap between rural and urban women is even deeper that is only 19.8% of urban women are active while 67.8% in rural areas.

The rural urban population distribution reveals high variation. The previous table No. (2.2.2) reflects the population distribution by their type of sex and residence.

The urban population of the state constitutes only 16.5% of the total population. The population distribution reflects the resources endowment and economic activities, which concentrated in the rural areas. The distribution of the population at the rural level reveals an uneven distribution, Table No. (2.2.3) below shows the number of rural population by sedentary and nomadic at different rural levels. When considering the population distribution at council level, the census data reveals the consistency of resources and population distribution and the on going processes and trends of the structural adjustment which is mentioned in the study. Unlike the census of 1983, the 1993 census data shows different trends of population density or concentration. The same table depicts that Kekkabia Rural Council constituted the most highly populated rural council in the state compared with the 1983 census where the same council was on the least list of the state councils in term of population distribution. Table No. (2.2.3).
It was observed that the rural councils of the clay soil and Wadis are the most dense populated areas. This is particularly for the council to the South of Elfasher. Table No. (2.2.3). Also it is worth to mention that the rural councils of North Darfur have been populated by sedentary cultivator with only a few number of nomadic, tribes which can be calculated from the tables as 4% of the total rural population. This is very consistent with the fieldwork during which we have seen only a view nomads. Most of the nomads are to be found in the far north. This is in fact partially due to the last decade phenomena of livestock robbery particularly for camels which have been very interesting and targeted by livestock armed robbers, with the break down of violence all over Darfur, news and evidence reveals different situation.

During the second end of the last century, Darfur states had witnessed different population movements in the region. The major movement was in 1983/84 when the drought had caused severe human and environmental damage in North Darfur. The official and relief organizations which was working in the area at that time had estimated that about 50% or 500,000 persons from rural areas had moved outside the region in search of alternative sources of living either south-ward or into the nearby and far urban centers. These events had accelerated the rate of town’s growth at an alarming rate El Sammani, (1985). Thus, the number of urban dwellers had increased from 9.6% in 1974 to 13.9% and 16.5% in 1983 and 1995 to 32% 2005 respectively. However, drought
and desertification had resulted in large-scale population movement and
distribution as well as changes in the socio-economic structure of the
population and their lifestyle.

2.2.4. Administrative Structure:

The 1991 presidential decree, which has established the Federal
Government in Sudan, has divided Darfur region into three states, North
Darfur state, South Darfur state and West Darfur state. Every state is sub-
divided into different provinces, which in turn consist of several urban
and rural councils.

The North Darfur state with its capital Elfasher consists of four
provinces. Each province in turn is subdivided into local council according to the following divisions:

1- Elfasher province:

The capital city is Elfasher. It consists of ten local councils include:

1- North Elfasher. 2- Elfasher South. 3- Rural Elfasher.
4- Dar El Salam. 5- Malleit. 6- Tawela.
7- Korma. 8- Elmalha. 9- El Kawa.
10- Elsseyah.

2- Umm Keddada province:

The province capital is Umm Keddada city. It includes three
towns:

1- Umm Keddada. 2- El Leit. 3- Tewash.
3- Kebkabia province:

The capital is Kebkabia city, it includes four local councils:

1- Kebkabia
2- El Siraf
3- Saraf Omra
4- Jabel See

4- Kutum province:

The main capital is Kutum town and it includes seven councils:

1- Kutum
2- Rural
3- Fitta Barno
4- Ambro
5- Kornay
6- Eltina
7- Elrohal (The nomads)

2.2.5. The Economy of Darfur:

The region of Darfur includes both North and South states derive all or part of their livelihood from agriculture and pastoral production. Historically there are two main economic sectors in rural sector, which comprise over 80% of total population. The first main economic sector is traditional rain fed crop production and the second is the livestock sector. The productivity and cropping in the region vary according to the rainfall level and soil type. Rainfall amount is not always the main cause of harvest failure; it is rather the frequent precipitation and poor distribution rainfall that generate economic crisis in the region. This could be seen in the fair harvest in 1985/86 and very poor harvest of 1987 where rainfall received was 172.1 mm. and 241.5 mm. respectively. El Sammani, (1985).
The dominant subsistence cultivation of rural population embraces both food and cash crops. The second important economic sector in the region is livestock production. As cultivation in the region varies according to the soil type and rainfall, animal keeping also varies according to the type of ecological zone and rangelands. The extension of range lands in the region cover desert, semi-desert zones up to the flood with marshy and muddy conditions in the far South of the region. It was observed that the inhabitants of the desert and semi-desert zone depend mainly upon rangelands rather than crops. In an interview with the director of regional Ministry of Agriculture, explained that the main reason for the collapse of the Meidoub agricultural scheme in Jabel Meidoub area is the lack of cultivation knowledge and techniques among the nomadic Meidoub in the area. This is very similar to Kordofan state where there is close correlation between ecological and range conditions and dependence upon livestock as main source of income. The range classes conditions can be inferred from the previous discussion in part I, which identified the different ecological zone in Darfur.

The variation and ranking of ecology of the region has produced different production systems usually consistent and rank with the ecological conditions. These different production systems are characterized by different features, production problems, resources endowment and diversification, cropping and risks of productions.
Drawing on the previous literature about the Darfur economy and fieldwork observation, three main production systems in North Darfur can be distinguished which are:

2.2.5.1. Goz Cultivation:

Millet is the main staple food of North Darfur. It is grown in large areas throughout Goz soils in the region. There are two main local varieties of millet; Dembi, which suit North Darfur and Kordofan climate that characterized by fast-maturity and adaptable to short-rainfall period, while low maturity variety which require long rainfall duration as high as 400 mm are found in South Darfur. None of the interviewed households in North Darfur registered sewing seeds of South Darfur. Nearly all households in North Darfur have expanded their plots cultivated under millet. According to the fieldwork data, the household plot has expanded from 3-5 Mukhamass prior to the drought of 1983 to 7-15 nowadays. Other supplementary cash crops also have been expanding either to supplement household subsistence or generate cash for the ever-increasing need for cash. These crops include groundnut, sesame, watermelon and Hibiscus (Karkady).

2.2.5.2. Clay soil and Wadi Cultivation:

Clay soil and Wadi cultivation is well known tradition in South Darfur, while in North Darfur such cultivation was very limited and almost confined to tobacco cultivation in certain areas e.g. Wadi Jurra and Shangili Tobi areas.
The main crop cultivated in the clay soil is the sorghum, which constitute the second main stable food, particularly in South Darfur where soil and reliable rainfall favour its production. Prior to the advent of drought and short rainfall, sorghum consumption was not common in North Darfur. It was mainly confined to local beer brewing and animal consumption rather than food consumption.

With the increased decline of millet production and food shortage in the area, sorghum consumption has been dominant all over the state together with millet; the master of foods in the region.

For North Darfur the new expansion into clay soils and Wadi land has generated two types of agricultural activities, the first is the expansion of sorghum cultivation in clay soil land including the rural council of Elfasher where I have seen large scale sorghum production schemes owned by some traders, big farmers and even high civil servants and professionals. Also sorghum plots are wide spread in Wadis and Khor cultivation. Beside that, millet is planted in some areas of alluvial soils in North Darfur. The other type of agricultural activity in the clay soil is a horticultural crop. This horticulture activity has already existed in South Darfur, particularly in Jabel Marra. The people of Jabel practice mixed farming system long ago. Millet and sorghum are cultivated in the lower altitude of the Jabel while vegetables and fruits are grown throughout the mountainous area altitudes.
For North Darfur the horticultural activities has only developed recently. The development of water harvesting and irrigation systems, which utilizing surface and ground water has resulted in introduction and expansion of horticultural products all over the clay and Wadi soils together beside tobacco. Some local council of North Darfur such as Kebkabia and Kutum has a surplus of both vegetables and fruits. It is not uncommon to observe considerable number of Lorries loaded with both products in daily move towards the urban centers and market whether inside or outside the state.

However, this system of production of horticulture has not yet received full observation or recognition; it is still in its initial processes of expansion. Its capacity and development depends on the Wadi land, clay soils, water resources, and irrigation development. Both Wadi land and clay soil are covering considerable distances of the state as it has seen in part I of this chapter.

Likewise, water resources in the state are available from different sources El Sammani (1985), GTZ report, (1988). Water utilization can be maximized and spread by construction of dams and introduction of new modern irrigation systems suitable for utilizing the state water sources. Thus, this new system could constitute substantial source of food for the region and support large sector of population income.
2.2.5.3. Livestock:

The third system of production in the state is animal keeping. Livestock production is the second main economic activity in the western states as part of the arid and semi-arid and Savannah of Africa. People who lay in the same belt usually follow similar environmental adaptations where farming and animal keeping constitute the core of people activities, interests and lifestyle all over the Sahel belt.

In Darfur region, there are various types of livestock within the different ecological zones in the region. The existence, concentration and disappear once of livestock depend on seasonable availability of water and suitable free range.

According to the climatic conditions and traditional environmental adaptations of regional pastoralists and agro-pastoralists, we can identify two main livestock production systems with different modes of production:

1- The first system of production comprises two modes. The first mode is nomadic which is basically found in the Sahara of northern North Darfur. The nomads of the area are almost entirely dependent on their livestock. They practice transhumant movement in search of range and water sources in a wide dispersed area. Although Meidoub and Zaghawa are used to practice limited millet cultivation for their own consumption, the Goz farming deterioration has even limited such activities. Some individuals
who are originally Goz farmers become livestock producers due to drought, and because of improvement of livestock production and prices at local and national level. Some of the interviewed Meidoub in the North reported that many Berti people turn to be camelers and join them in their pastoralism, also it was observed that, some individuals of Tunjor and other tribes turn to be camelers pastoralists. However traditionally camelers pastoralist are almost subsistent and practice no activities other than raising camels, sheep’s and goats consequently their subsistence, shelter, live style and survival depend on their animals.

The second mode is the agro-pastoralist. This system is similar to the nomadic one in the North. The agro-pastoralist Baggara in South Darfur are mainly cattle producers in addition to some sheep and goats. In spite of the fact that, they have been classified as nomads or cattle herders, they maintained settled villages where they practice food crops cultivation for their own subsistence. The Baggara pastoralist follow regular seasonal pattern in search of range and avoidance of insects. Throughout their movement sometimes come into conflict with the sedentary cultivators as some of their animals usually break away from the herd and damage some fields. Prior to the advent of short rainfall and drought, there was harmony and mutual exchanges and benefit between both nomads and sedentary cultivators and there was a
mechanism for resolving such frequent events and skirmishes. With the coming of drought and increased resources strain, the competition over resources and conflict between the sedentary cultivators and nomads have escalated and turned to be tribal and ethnic conflict between the sedentary non-Arab and pastoralist Arabs.

2- The second system of livestock production is home-based animal rearing which is prevailing all over western Sudan. Traditionally all the rural Darfur inhabitants raise goat, sheep and some cattle for the provision of dairy products and household needs for frequent resources deficit or ceremonial feasts and celebrations.

During the last decades and due to increases of the animal price (devaluation, liberalization policies), production of sheep has been very remunerative production for export sector. As sheep are highly demanded at national and export levels, sheep production at household and small scale trading level has expanded and turned to be significant source of income for some household and new income generating activity for others. During the fieldwork, it was observed that, many flocks of sheep belonging to some traders and farmers are kept for trading purpose. Some of the flock’s owners reported that, the revenue from rearing sheep is good and fast revolving, that sheep and goats are characterized by high prolificacy and reproductive rates. Such type of animal production
usually evolve movement further south Elfasher for 2-3 month during the dry season.

The second type of this mode of production system is the expansion of home-based sheep and goats rearing, not only to meet the frequent household income deficit, but as main supplement of household income.

While the flocks rearing system usually confined to sheep, which kept out skirt of the village with limited movement in the dry season, the home-based commercial rearing usually, combine both goats and sheep with very limited movement in search for better grass.

2.2.6. Land Tenure and Use System:

Land tenure implies the conditions on which land is held and used.

Usually land use practice, is held under certain conditions and subject to regulatory mechanism whether traditional or contractual. It is embodied contractual and legal arrangement as Dorner defined it. He explained that access to productive opportunity on land right, constitute rules and procedures govern the right and duties of individual and groups in the use and control over land and water. (Dorner, 1972).

The land tenure regulatory implies broader concept than land ownership and use, as it concerned with right on land and regulation of access, use, control and distribution among individuals and groups. This could be exemplified by land tenure system in traditional sector of Sudan,
which is based on traditional practices rather than the enacted land law in the country.

Land tenure in Africa is generally vested in the community, and access to land is based upon membership in a community, which could be a tribe, lineage group or clan. Usually every individual or individual household of the community has access to land with usufruct right as far as he continues to put the land under cultivation. Thus, land ownership or retention, of usufruct rights depends on the effective use of the land by the individual or household. The customs, regulations and arrangements governing the control of land use, allocation and reallocation are almost very similar among the traditional African communities. Individuals can have the right of land use only when allocated to them by the chief or the head of the community, and usually the individuals maintain paying small part of their products to the allocate who himself may distribute part of it to his family and/or needed people in the village, El Amin Khalid, (1999) and fieldwork observation. Unlike land tenure in some others countries i.e. Latin America, S. Rodolo, (1970). Land tenure in Africa involves communal control over land use and transfer. The societal control over land corresponds to the nature and modes of production of Africa subsistence systems, where land is abundant.

Despite of the customary rules and regulation governing the wandering of the pastoralists and mobility within certain areas, usually such regulation and right of use are either vague with no individual right
of use to a definite piece of land El Amin Khalid, (1999) or the mobility mechanism and/or the need of expansion is limited and constraint by the others sedentarists need of expanding. That is why the main source of conflict over land use in traditional African community is the pastoralists (as it has seen during the Fieldwork).

2.2.3.1. Historical background of land tenure in Darfur:

The present land tenure system in Darfur refers back to Fur Sultanate. Yet prior to that period there is no specifically land system discovered. Sultan Musa, the second historical sultan of Fur in the end of the 17th century, was the first Fur ruler, who regulates land ownership and land use. He considered all land belong to the sultanate and introduced the system of “Hakura” where land is granted to ruling family members and high ranking officials, who allocates small plots to individual or individual household, who gives them part of their produce. The “Hakura” system was well established throughout the Fur Sultanate era. Abu Salim, (1973) and O’Fahey, (1977). Despite of the development of other forms of land ownership Abu Salim, (1973) the “Hakura” system remains the main significant land tenure system in Darfur traditional sector. It involves interrelated economic societal, political and administrative aspects, which still have bearing on the present prevailing traditions of land system in Darfur. As all land in the Sultanate was belonging to the Sultan, he has the right to allocate it to individuals or groups to support the system and organizes fines and taxes
As there is no money or other forms of rewards to the military, political and administrative leaders, “Hakura” grants had been the main form of payment and economic and social classification in the sultanate O’Fahey, (1977). This form of grant has developed into a complex hierarchical system of land use and administration. The notable men who granted “Hakura” land by the sultanate were considered the soil master, “Sid – al Hakura” or Sid al Arid” with absolute right over it. They administer their lands through the local chief “Sheikh” who were held as “Sheikh al-Rijal”, when he is sponsored by “Sid al-Arid”.

In spite of the fact that “Hakura” is usually inherited, it is regularly changed hands according to the political conditions and consideration. Thus, the “Hakura” allocation and transfer was closely associated with the political status and allies. However, changes in “Hakura” holders or transfer of “Hakura” to other local leader would usually not imply changes of “Sheikh al-Rijal” who usually is appointed to administer land and collect the taxes on behalf of the “Hakura” owner. During the colonial era, the British have maintained the same land system with administrative division based on the tribal distribution without major change. However, the British native administration has maintained the close association between land ownership and use, which evolved during the Fur Sultanate. The system inherited from the colonial rule continued up to the 1970, when Nimeri regime issued the unregistered land act, which states that “All lands of any kind which are unregistered before the
CHAPTER THREE

THE ORIGIN OF SUDAN ECONOMY AND
SOCIAL FORMATION

3.1. Introduction:

While in Europe, the transition to the present industrial capitalism was a result of the internal dynamic of the previous historical formations, in Sudan the present economic structure was mainly initiated and developed by the British colonialism.

Some have described this economic change as a necessary step towards transition to market economy and hence capitalist mode of production and development (modernization school). Others have argued that it is colonialism, which linked the country with the international market in unequal terms of exchange (Dependency theory). To understand the situations of underdevelopment in different parts of Sudan Darfur is no exception, we have to investigate the historical factors, which gave rise to the present underdeveloped socio-economic structures.

However several centuries before colonialism market economy was already developed in some parts of Sudan, while the subsistence economy is still prevailing in many parts of the country. Prior to the advent of colonialism, there were two major kingdoms in Sudan, Sennar and Darfur. Both had trading network, which linked them with the outside world. The trade under both sultanates was organized and controlled by the aristocracy ruling class with the objective of obtaining new
commodities and exotic articles from abroad. Hence Sudan was neither isolated from outside contacts nor lack development stimulus.

The Funj Sultanate in the 19th and 17th centuries had organized caravan to import and export commodities and exotic articles and luxury items from abroad. Such trade was mainly controlled and managed by the Sultans for their own consumption and desires of acquiring new articles from abroad. The influence of the sultanate in the international trade under the Funj rule was reflected in the nature of the goods exported. The most predominant trade items were gold and slaves which Sultan control much of the supply source within the Sultanate, other commodities include gum Arabic, ivory, rhinoceros horn, livet, ostrich feathers and perfumes. The trade with the international market was mainly to Arabian Peninsula, India and the Indies was carried on through the Red Sea and Port of Suakin, while the trade with Egypt was through the desert routes.

Beside the royal international trade, the Sultanate also witnessed free trade in some subsistence commodities i.e. sorghum, millet, cotton and dates. This in addition to development of some commodities production such as leather making and the weaving of cotton cloth known as “Dammur”. Such products had expanded the domestic market and enabled the domestic merchants to pave the way for new commercial system based on petty commodity production. According to Spaulding, it
was the emergence of this merchant class, which contributed significantly to the weakening of the Sennar Sultanate J.L. Spaulding, (1971).

Like the Sennar Sultanate, the Fur Sultanate was linked with outside world through international trade caravans, monopolized by the Sultans. Commodities in the local market were mainly agricultural products such as onion, vegetables, fruits coarse cotton textile, agricultural tools, crude metal and ornaments that were all made locally. They had no local official currency, but they used some commodities as means of exchange i.e. cotton textile, slaves and some copper rings called the “Hashya” Fadel, Hassan, (1977).

Similar to the international trade of Funj most exports of Darfur Sultanate brought from outside the Fur Sultanate, mainly slaves from the southward through organized raids known as the “Salatiya”. Other exports involved ivory, ostrich feathers, rhinoceros horn and tamarind “Arideap”. Imports included luxury items complementing each other. The Sultans needed such interdependent items to maintain their prestiges and to reward their military and political leaders. It seems that these forms of trade had politico-economic orientation. The lucrative profit from such trade empowered the Sultans status and provided a means for distinguishing class. The long distance trade with the outside had affected the Sultanate greatly. It introduced new life style and culture. Some writers argued that the rise of Fur Sultanate like other Islamic king
domes in west Africa refers to long distance trade. O’Fahey attributed the establishment of the Fur Sultanate to the expansion of “Fourteen Days Road” trade route R.S. O’Fahy (1974).

There were three major routes that connected the Sultanate with the outside world trade. The first one connected the Sultanate with the commercial centers between the Nile and the Niger. It went through Bornu, Waday, Darfur, and Kordofan: Sennar Shendi to Sawakin and across the Red Sea to the Hijaz. The second route was the Fourteen Days Road, which is still in use, mainly for camel’s exports to Egypt and also used by some Sudanese smugglers. Some historical evidence has shown that this road goes back to 1698, but its modern development conceded with the expansion and consolidation of the Fur Sultanate. The third road was the North African Route. It connected the Sultanate with Tripoli and Tunis.

The impact of long distance trade on Darfur was very effective and profound. Despite the monopolistic nature of the Sultan and his agents, private merchants played considerable role in trade. The “Jallaba” had their own chief, a title holder, “Malik” “El Jallaba”, he was administratively responsible for immigrant “Jallaba” who came from “Dungula”, the “Mahus” Sennar, Kordofan and also from Egypt, Tunis and Tripoli Fadel, Hassan, (1977).

Despite the fact that the long-distance trade had little direct effect on population live style, the religious and cultural consequences had
effective influence in the tribal character and state institutions of the Fur people.

3.2. The Development of Sudan Economy:

3.2.1. The Gezira Scheme:

As with other countries under colonial rule, Sudan economy was structured in a way to serve the raw materials needs of the colonial power. The comparative advantage of agricultural resources in Sudan had been the most suitable source of cotton to ensure permanent supply for British textile industry, which was facing problem of reliable source of cotton.

By the end of the nineteenth century, British textile industry had faced fierce competition from United States, Germany and even China. With lack of secured and permanent source of cotton, Lancashire cotton industry turned to concentrate on fine products. Such type of product required long staple cotton variety, which was restricted at that time and was limited to Egypt, United States and Peru. For Egypt, the heavy taxation of Egyptian “Fellahin” influenced cotton production negatively and hence reduced British supply and increased the price of row cotton. At the same time, the development of textile industry in United States had made the row cotton highly expensive in the world and less available for Lancashire industry. Given such conditions, it became essential for Lancashire cotton industry to find a reliable source of long stable cotton source to ensure sustainable supply of raw material. In 1902, a British
cotton growing association was formed with the aim of securing an increased supply of cotton within the British colonies. In 1913, the association suggested through parliament that a safe and dependable source of large staple cotton supply should be created in some suitable part of the empire. The comparative advantage of agricultural endowment in Sudan was the most reliable source of cotton supply.

At the same time, the condominium rule administration was expected to raise local income source to finance the colony administration. This was constrained by the subsistence nature of the existing economy and limited opportunities for raising fund through taxation, as the condominium administration was aware of the negative impact of imposition of heavy taxation. Therefore, the concept of establishing large scheme for cotton production in Sudan was very consistent & convenient with the Sudan officials thinking to create an economic base from which they can generate revenues. Such investment would not cost the condominium administration any significant cost as the project was backed by British government loans with powerful support in Britain. While the colonial back loan could provide the necessary infrastructure, including building the dam and irrigation system, the investors themselves would provide the necessary skilled personnel and bear the financial initiation risk. Moreover the increasing demand for cotton and guaranteed market support in Britain had
enhanced the development of cotton production, which became the main economic feature under condominium rule Niblock, Tom, (1985).

The organization under which cotton production in Sudan developed and expanded was influenced by the colonial objectives rather than the indigenous population development. The scheme had met the Lancashire requirement, and the condominium rule had developed self-supporting tax base to maintain the cost of administration.

For the inhabitants they had been displaced from their land by reducing them to tenants being obliged to operate in small and limited holding under conditions and control of an alien administration. M.M. Yassin and H. Abdel Galil, (1973).

The scheme was established and inaugurated in 1921 on an area of 100,000 fedan; it was expanded to almost one million fedan in 1956.

Cotton expansion and development in Sudan was not confined to Gezira area, while the working was proceeding in the Gezira Scheme the condominium administration was at the same time being expanding and developing cotton growing in eastern Sudan. The main development of growing cotton in the east was in the deltas of the seasonal rivers in Gash and Barakat through construction of small dams and digging of some canals to channel the seasonal floodwater for expanding the areas under cultivation. In the west the administration has encouraged growing of short and medium staple cotton in the rain lands in the Nuba mountain area. With exception of these, there was no particular encouragement
given to peasant small holders in the rain fed land or on the banks of the rivers Niblock, Tom (1985).

The revenue generated from Gezira Scheme had enabled the condominium rule to expand and secure its administrative spending including the cost of the establishment and development of Sudan Defense Force. The cost of administration was inevitably expensive. In 1938 the cost of pension and Defense Force amounted to 15.8 percent of the total expenditure compared to 9 percent for social services, health and educational programs during the same period. In 1955/56, expenditure in such field came to 25 percent of total expenditure Niblock, Tom, (1985).

The pattern of government spending has shown even steady rise after independence, but with emphasis in non-social spending. Table 3.2.1 shows that expenditure on defense and non-essential administrative expenditure constituted a high percentage of the total during the period 1965-1973.

**Table No. 3.2.1**

<table>
<thead>
<tr>
<th>Year</th>
<th>Defense and non-essential administration expenditure as a % of GDP</th>
<th>Investment expenditure as % of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>9.1</td>
<td>11.6</td>
</tr>
<tr>
<td>1966</td>
<td>9.3</td>
<td>9.2</td>
</tr>
<tr>
<td>1967</td>
<td>9.7</td>
<td>9.2</td>
</tr>
<tr>
<td>1968</td>
<td>11.4</td>
<td>9.1</td>
</tr>
<tr>
<td>1969</td>
<td>16.7</td>
<td>8.8</td>
</tr>
<tr>
<td>1970</td>
<td>16.9</td>
<td>8.6</td>
</tr>
<tr>
<td>1971</td>
<td>13.4</td>
<td>8.9</td>
</tr>
<tr>
<td>1972</td>
<td>13.6</td>
<td>8.7</td>
</tr>
<tr>
<td>1873</td>
<td>17.1</td>
<td>6.6</td>
</tr>
</tbody>
</table>

As can be inferred from the table above expenditure on defense and administration has registered steady rise during the period 1965-1973 compared to expenditure on investment. It reflects the pattern of modest capital formation and non-essential spending by the postcolonial governments. Similarly economic, social and development services were even more modest compared to defense and security as shown in the following table (3.2.2).
Table No. 3.2.2:

Functional classification of government Current expenditure Ls (Million) (percentage)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Defense and security</td>
<td>25.7</td>
<td>31.1</td>
<td>30.5</td>
<td>29.2</td>
<td>27.8</td>
</tr>
<tr>
<td>Social services</td>
<td>15.7</td>
<td>19.0</td>
<td>16.5</td>
<td>17.4</td>
<td>18.5</td>
</tr>
<tr>
<td>Economic services</td>
<td>17.9</td>
<td>15.4</td>
<td>12.9</td>
<td>12.9</td>
<td>14.7</td>
</tr>
<tr>
<td>Development services</td>
<td>3.0</td>
<td>3.2</td>
<td>3.8</td>
<td>3.4</td>
<td>3.4</td>
</tr>
<tr>
<td>Local Government</td>
<td>14.6</td>
<td>15.4</td>
<td>11.4</td>
<td>17.0</td>
<td>13.8</td>
</tr>
<tr>
<td>Others</td>
<td>23.1</td>
<td>11.4</td>
<td>24.8</td>
<td>19.8</td>
<td>21.6</td>
</tr>
</tbody>
</table>


Examing of government expenditure behaviour post independence both current and development shows overall increase in government expenditure. But, it was the current expenditure which showed dramatic increase as shown in table (3.2.3) below:

Table No. 3.2.3:

Government Expenditure in Money and Real Term 1955/56 –57-58

<table>
<thead>
<tr>
<th>Year</th>
<th>Govt. current exp. in current price</th>
<th>Govt. develops. exp. in current price</th>
<th>Govt. current expenditure in constant price</th>
<th>Govt. expends. in constant prices</th>
<th>Total Govt. exp. in money term</th>
<th>Total Govt. exp. in constant prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1955-56</td>
<td>30.9</td>
<td>11.4</td>
<td>39.0</td>
<td>13.4</td>
<td>42.2</td>
<td>52.0</td>
</tr>
<tr>
<td>1956-57</td>
<td>29.1</td>
<td>12.6</td>
<td>38.8</td>
<td>11.6</td>
<td>41.7</td>
<td>50.4</td>
</tr>
<tr>
<td>1957-58</td>
<td>37.7</td>
<td>21.3</td>
<td>43.3</td>
<td>22.2</td>
<td>59.0</td>
<td>65.5</td>
</tr>
<tr>
<td>1958-59</td>
<td>41.4</td>
<td>22.9</td>
<td>48.2</td>
<td>25.7</td>
<td>63.3</td>
<td>73.8</td>
</tr>
<tr>
<td>1959-60</td>
<td>45.0</td>
<td>22.9</td>
<td>52.3</td>
<td>22.0</td>
<td>67.9</td>
<td>74.3</td>
</tr>
<tr>
<td>1960-61</td>
<td>48.2</td>
<td>26.0</td>
<td>51.3</td>
<td>28.3</td>
<td>74.0</td>
<td>79.6</td>
</tr>
<tr>
<td>1961-62</td>
<td>60.5</td>
<td>45.1</td>
<td>63.0</td>
<td>48.5</td>
<td>105.7</td>
<td>111.5</td>
</tr>
<tr>
<td>1962-63</td>
<td>59.4</td>
<td>51.1</td>
<td>59.4</td>
<td>51.1</td>
<td>110.5</td>
<td>110.5</td>
</tr>
<tr>
<td>1963-64</td>
<td>64.5</td>
<td>58.9</td>
<td>62.0</td>
<td>65.4</td>
<td>123.4</td>
<td>127.4</td>
</tr>
<tr>
<td>1964-65</td>
<td>73.9</td>
<td>41.3</td>
<td>73.2</td>
<td>51.0</td>
<td>115.2</td>
<td>124.0</td>
</tr>
<tr>
<td>1965-66</td>
<td>75.4</td>
<td>42.3</td>
<td>73.5</td>
<td>48.1</td>
<td>118.1</td>
<td>121.6</td>
</tr>
<tr>
<td>1966-67</td>
<td>85.4</td>
<td>33.7</td>
<td>74.9</td>
<td>36.6</td>
<td>119.1</td>
<td>111.5</td>
</tr>
<tr>
<td>1967-68</td>
<td>86.9</td>
<td>38.0</td>
<td>84.3</td>
<td>40.4</td>
<td>124.6</td>
<td>124.7</td>
</tr>
</tbody>
</table>

Only small part of government revenue was spent on productive sectors. Such spending included expenditure on agriculture and animal resources, communication and transport, power, industry and commerce. The percentage of spending on such undertaking, which could be expected to be productive, made-up no more than 20 percent of total government expenditure during the colonial period (1930-1950s) and early years of independence (1930-1950) Niblock, Tom, (1985).

The main public spending in economic development throughout the economic history of development in Sudan was focused on agricultural schemes.

3.2.2. Private Investment:

Although the colonial policies concerning Sudanese agriculture were basically externally motivated, some attention was given to private sector inspired by domestic consideration during the colonial era with the aim of creating an economic base for colonial supporters. The main private agricultural investment was based on granting license for private pump irrigated schemes to encourage cotton production on private bases along the Nile. The immediate significant of these schemes as stated by Taissir, M.

“In reality.... Private pump schemes were used as Prizes to win the support of native administration and religious shepherds to reward them and strengthen Then their commanding position”. (Taissir, M. 1989).
Being the largest private investment, pump scheme remained at center of national and political activities up to the early days of independence. Mohamed, Taissier, (1984).

The second step towards private agricultural development and expansion was introduction of mechanized farming in the rain fed land. This development triggered by condominium government need to meet grain deficit and supply need of the allied forces in Africa during the Second World War.

The development of mechanized farming first began in the public sector, when some unemployed from Omdurman and Khartoum sent to Gedaref area for durra cultivation in public schemes. Following that experience, the condominium government turned to mechanized means for durra cultivation in the area. In 1904, the scheme handled the private sector into plots of around 1000 fedan each, and the role of government was limited to providing advices. From then on, the mechanized rain fed spread and expanded into other suitable areas. Mainly southern part of Sudan, Nuba Mountain Kassala, South Darfur and Blue Nile.

Most of the schemes were allotted to individuals in addition to some companies and partnership. Although the Mechanized Farming Corporation Act (1968) has given preference and special considerations to the local population in allotment of farms, the status of indigenous inhabitants has reduced them from communal landowners to agricultural workers.
In fact, the preference and priority, which were given to the indigenous population was not practical. The entitlement-required sum of capital and other investment beyond the resources of the indigenous people, whose prime source of subsistence the land itself. Unless such capital was available, the allotment board would not consider any other factors (Niblock, Tim, 1985). Corruption and political influence was also influenced the process of distribution.

During the work of the researcher in South Kordofan as administrative officer (1987-1995), he observed that mechanized schemes have limited the expansion of traditional farming and nomad’s movement. This in turn has resulted in frequent conflicts among the two groups who are well known with good history of socio-economic integration. Consequently, the good process of ethnic integration and social formation has negatively been affected and some military groups have developed among both the Nuba and Arab.

Unlike the traditional rain fed farming, the majority of mechanized farming operators were basically urban agro-business who came from outside of the rain fed areas including the region and central Sudan. Abdalla, M. El Hassan, (1988). Thus, the profit was always siphoned outside the mechanized schemes areas.

Most of the land allotted to the capitalist had previously been the main source of seasonal pasture of nomadic herders or traditional cultivators. The cut and clear of hundreds of thousands of fedans, have
negatively affected the environment through reducing humidity, rainfall and soil depletion. At the same time, the encroachment on traditional cultivators and pastoralist lands had pushed them to move into already owned land or in use by other communities. Thus in most cases the result was bloody conflict or crows in marginal land as O’Brien has argued:

These changes have been creating condition in Sudan, which leaves its rural population especially in the northern savanna zone, increasingly vulnerable to the drought included famine which had by 1983 begun to affect many Sudanese. O’Brien, (1984).

In South Kordofan and according to Abdalla, M. El Hassan, evidence suggests that villages’ schemes are located on poor sites, which included drainage areas and hills.

The prevention of the use of Harig (burning) cultivation method has contributed further to traditional declining productivity. The clearance of communal forest has imposed limitation on population ability to expand their area under cultivation as population increased. In addition, it affected the non-agricultural activities, which center around forests and its products.

3.3. The Sudanese Social Formation:

3.3.1. Modes of Production:

The present social and economic structures in Sudan have their roots in colonial era when new modes of production dependent on new
production relation and wage labour started to evolve in the beginning of the 19th century.

The concept of mode of production and social formation are interdependent. All the processes, which constitute the mode of production are historically and geographically determinate, but implying no historical order of sequences which stretches from the primitive communal mode right down to capitalism as it explained by Samir Amin Amin, Samir, (1976).

To understand and decide upon the dominant social formation in a society at any stage of its development, it is necessary to define the concept of mode of production. In his critique to dependency theory, Laclue asserted that mode of production is not merely unequal exchange; it is an integrated complex of social production forces and relation linked to a determinant type of ownership of means of production.

From among the different ensemble of relations of production, he considered those linked to the ownership of the means of production to be the essential relations. Since they determine the form of canalization of the economic surplus and the effective degree of the division of labour. He defined the mode of production as not merely descriptive enumeration of isolated factors, but as a totality defined by its mutual interconnection within this totality the means of production ownership constitutes the decisive element. According to him, modes of production are incorporated in economic system and derived from the law of motion,
which establishes the unity of its different manifestation Laclau, Ernesto, (1977).

Thus, the concept of the mode or modes of production is a dialectical relations and forces of production. It must be analyzed as the base of the social formation that include all the elements of the system, which must always be conceptualized as relations not as institutions such as kingship or the state, Mohamed, F.B. (1984).

Amin has distinguished between five modes of production the primitive communal modes of production, which constitute the first mode of production that, provide the embryonic class distinct. As it is marked by slow transition from negative (absence of class) to positive (class society). The communal modes of production are many and various, determined by natural conditions. But, collective ownership of land characterizes all with access to all clan members’ weather on individual or collective basis or both, but in accordance with precise traditional rules.

Access to land varies from one community to another. In some communities particularly in the sahel, land ownership system is slightly hierarchical with some privilege to better holding for political and religious authorities. Such mode of production was dominant in Sudan prior to the advent of colonialism.

The second pre-capitalist mode of production is the tribute – paying mode of production. It is marked by the separation of the society
into two main classes. The peasant community and ruling class, which exacts non-commodity tribute from the rural communities. Such mode of production always tends to be feudal.

The third feudal mode of production organizes society into two classes, that of the lords and peasant. Access to land is organized by the lord’s master who appropriates the surplus of peasant as a matter of right with absence of commodity exchange domain. Such mode of production together with the slave-owning mode of production which turns a slave as an essential unit of production had never existed in its typical form in Sudan.

The simple commodity mode of production is market in its pure as we have observed from Sudan history by equality between free-petty producers and the organization of commodity exchange. No society has ever been based on its pure form. However there has been some sphere in which the simple commodity mode of production constituted the principal mode of social organization. Such cases are even more exceptional. It is found only in New England between 1600-1750 in South Africa and between 1600-1880 in Australia and New Zealand. These societies were composed of small farmers and free craftsmen where commodity constituted the principal mode of social organization. Amin, Samir. (1976).
3.3.2. Social Formation:

None of the mentioned modes of production has ever existed in a pure isolated state:

“The societies known by history are “formation” that on the one hand combine modes of production and on the other hand organize relation between the local society and other societies, expressed in the existence of long distance trade relations (Amin, Samir, 1976).

Thus the social formation contains multiple and different forms of the productive forces which corresponded variously to the existing relations of production. Again, Amin has defined social formation as:

... concrete organized structures that are marked by a dominant mode of production and the articulation around this of complex group of modes of production that is subordinate to it. (Amin, S. 1976).

The precapitalist society in Sudan was mainly a traditional one, based on rural subsistence economy with entirely traditional structures.

The first traditional class society in Sudan can be dated back to the Sudanese Kingdom of Napata (77 B.C-350 A.C) where economic activity was based on animal breeding and cultivation. The dominant social relations in the kingdom were dominated by tribute-paying peasantry or nomads and royal, tribute extraction. Production was directed towards self-sufficiency. Internal trade was limited while external trade was confined to royal caravan Amin, Mutwakil. (1970).

However, this static social formation had been maintained without any significant change up to the collapse of the Christian Sudanese kingdom that was succeeded by the Muslim Arab.
With the coming of the Arab during and after the 15\textsuperscript{th} century, the contact with the outside world has increased and expanded. Arab nomadic infiltration from different directions had effectively influenced the Nubian civilization through mix with the original black population and cultural domination. Professor Abdel Rahim notes that:

*Of all those conquerors the Muslim Arabs were the most successful and their culture and religions have replaced those of Rome, Greece and ancient Egypt have been of lasting effect in the Sudan.* (Abdel. R, M. 1971).

The Arabization and Islamization of the population was also associated with economic transformation and social division. The new produced social formation ‘was predominantly pastoralist nomadic with main agricultural activities in the Northern region, based on some basic structure of the Nubian kingdom. Commodity exchange and contact between Egypt and the region to the South were enhanced. With the expansion of commodity exchange, many pastoralist and agriculturalists were involved in internal trade, and some of them developed trade relations with foreign traders. This emerging group acquired economic wealth and social power by becoming leaders or heads of their local tribes and communities. They extract tribute in the form of labour, livestock or crops as part of communal land tenure system. Ali, Galal, (1989).

During the Funj rule, a major trading networking had been established. However, despite the evidence of spread of international trade, the economy of the Funj remained subsistence. The trade was organized and administered by the state and oriented to exotic articles
rather than profit making by merchant class. It was a period of administrative trade as indicated by O’Fahey and Spaulding. O’Fahey and Spaulding (1977).

Similarly, trade activities in Darfur were monopolized by the sultan. The trade was mainly with Egypt along the famous Darb-al-arbain. The principal exports were slaves, ivory, tamarind, rhinoceros horn and ostrich feathers, while the main exports were spices, soap, fine cloth, weapon saddler and jewelers Fadel, Yousef, (1977).

Only in the late 17th century did a new merchant class rose in Sennar, which was in part a cause and in part an effect of the disintegration of the Funj sultanate itself. Spaulding, J.L. (1971). Unlike the Funj sultanate, the system of administrative trade was predominant in the Fur Sultanate until the middle of the 19th century.

The development of land tenure system on private basis was very significant socio-economic factor in social formation in both sultanates. The sultans in both sultanates issued charters allocating land to particular individuals who receive tribute in form of labour, crops and livestock. This system of agricultural tribute extraction was progressively developing into feudal system Abu Salim, M.I. (1965).

However, the embryonic feudalism system in both sultanates was undermined by penetration of foreign capital after the breakdown of both sultanates. The conquest of both sultanates by colonial power has paved the way for the international capital. The most significant influence on
social stratification in Sudan was closely related to the economic and political development during the condominium rule. The aspects of inequality and social formation in Sudan were inherited in the economic structure and policies of colonial occupation. The emergence of the state apparatus as large spending body investing in infrastructure and production had divided the society into those who had the opportunity to benefit from the state and remainder of the population. Most of those who benefited from colonialism were able to reinvest their surplus and hence strengthening their economic and social status. The objective of the government was to win the side of such individuals who were of the better class of nation and had the ability to influence the whole population. Kromer the British council in Egypt instruction to British administration in Sudan was:

... in every country and especially in a country where the reformer is alien you can not afford to alienate the upper classes (M, Bashir, 1974).

The upper class, which was in a position to benefit from the economy and used by the colonial administration was composed of different social elements. These social elements have come from four distinct social occupational, tribal and religious leaders. This in addition, to other two petty bourgeois, fractions, namely the government employers, bureaucrats, and small merchant group who emerged at different eras of colonial rule. Shaeeldin, Elfatih, (1984).
3.3.2.1. The Religious and Tribal Leaders:

The religious leaders were already in a position to accumulate capital through two means. Firstly directly through dues and donation and secondly the agricultural labour services which were usually rendered by the followers for subsistence only. The colonial administration has enabled some of the “Sufia”, sects “Tariga” and “Mahadia” and Khatmiyah” leaders to strengthen their economic position M, Taissir, (1989). Other families were able to make use of their religious positions to strengthen their economic status i.e. Al-Majdahb family of Ed Dammer, Nur al-Din family of Sammaniyyah, Siwar El-Dahab family of Qadiriyyah and El Makki family of Ismailiyyah, (Niblock, Tim. 1985).

Similarly, the tribal leaders had been in a position to extract part of the peasant economic surplus in areas under their influence.

The system of native administration, which was introduced by the condominium rule, had strengthened the economic and political role of the tribal leaders. It has legalized the leadership and hegemony of tribal leaders. The tribal leaders were given the power and authority to regulate and administer their tribal territories. The tribal administrations were organized according to a hierarchical system and titles of Shaykhs, Omads, Nazirs and Makks were imposed on the tribal leaders according to the leader position. Their political power was fully dependent upon government support, which enabled them to use pre-capitalist means of capital accumulation. Moreover, the expansion of their authorities gave
them some control over land in some areas. The process of land registration and distribution carried out by the condominium rule and successive government, made it possible for tribal leaders to establish ownership right over land, which had been communally owned. This was particularly so in the case of Gezira scheme and pump schemes Barret, Tony, (1975) Niblock, Tom, (1985).

However the way was open for both the religious and tribal leaders to reinvest the accumulated capital in pump schemes. The official and social position of tribal leaders had given them access to government assistance and ensured access to commercial banks loans for agricultural schemes. Consequently, several rich families emerged as a distinct class. The most prominent among them are the Habbania family, traditional leaders of the Hassania tribe, Malik al-Zubair tribal leader of Dongola, family of Surur Ramli tribal leader of the Ja’aliyin, family of Mohamed Ahmed Abu Sin tribal leader of Skhokria, Adlan of Funj and Agab of Rufa. The majority of them established pumps and mechanized schemes devoted to production of cotton and other products Niblock, Tim. (1985).

3.3.2.2. Merchants and Bureaucrats:

The merchant’s class had been continuously growing since the Funj sultanate as we have mentioned earlier.

With the integration of Sudan, economy into the international market, commodity production and distribution has been accelerated in different parts of the country at different scales. Similar to the capital
expansion, commodity production development was uneven in the
different regions of Sudan. Commodity expansion and peasant
differentiation was more significant in central and eastern parts of Sudan
and to some extend in western region. Due to historical factors and
resistance of the Southern tribes to colonial rule, the development of
commodity production in the South was very slow.

However the increase in crops production and exports had
flourished and expanded marketing activities. Consequently, some towns
had emerged corresponding to the flourishing commodity circulation. By
1955-1960s, at least seven towns had emerged as commercial centers
with population of more than 30,000 Shaaeldien, Elfatih. (1984).

In Northern Sudan, agricultural commercial production was faster
than the other parts of the country. This could be attributed to the long
history of cash crops production and trading activities and the relative
improvement in communication system. In western part, the process of
commoditization was progressively replaced or competed food
production. In 1911 season, commodity production had competed food

However, since 1925 the economy had been witnessing strong
trends shifted towards transformation of production into increasing
capital accumulation. In addition, labour commercialization and wage
labour relations in some part (particularly central region) replaced the
family and communal production. Consequently, a process of
proletarianization and social differentiation began and let to disintegration of the peasantry.

The considerable increase in local and foreign trade had resulted in emergence of numerous petty traders. This local petty traders fraction was integrated into the world market through foreign capital, while export and import sectors were almost in the hand of British and foreign traders. Mahmoud, F.B., (1984).

Historically certain commodities played significant role in private capital accumulation. The most important of these commodities were gold, ivory ostrich eggs and feathers, livestock, gum Arabic and oil seeds. Particular regions acquired significance and prospered due to the opportunities they offered to the immigrant capital. Example of such regions are Suakin, Messalamia, El Gabsha and Soukin and in later period Port Sudan, Gedarif and South Darfur and South Kordofan. Such trade played significant role in the development of merchant’s class throughout the history of Sudan.

As production and trade during the colonial rule were directly related to the international demand, only certain commodities acquired significance for the export sector. The main of these commodities during the colonial era were cotton, gum Arabic, livestock and oil seed. The development of transport during that period had strengthened the link with the international market effectively. When the railway reached Elobied, the town emerged as the biggest gum Arabic market in the
world. The market was organized by Sudanese traders operating at local level, export process was left to British companies. An importance of the expansion of gum Arabic trading, has led to the emergence of big traders and increasing capital accumulation in Kordofan. (Mahmoud, B.F. 1984).

Livestock export grew steadily throughout the condominium rule. Unlike most of Sudanese crops the livestock net activities was exclusively organized by Sudanese traders. As with gum Arabic, the local net of livestock collection involved a chain of petty trader’s brokers and merchants. The export was mainly confined to Egypt through Wadi Halfa and with less proportion to Saudi-Arabia through Suakin or Port Sudan. The Second World War had constituted a turning point in the history of most Sudanese traders in western Sudan. That period had witnessed the largest amount of livestock export in the colonial history, mainly to feed the British and allied armies in North Africa. The major role for establishing and maintaining livestock export during that time was played by small group of big merchants. The biggest four livestock traders had come together and established “Al Sharika Alrubaya”, the company of four. They were famous traders, Mohamed Ahmed Al-Berair, Abulela, Kardaman and Abdel Hameed Al Mahed Niblock, Tim, (1985) and Mahmoud, B.F. (1984).

The oil seeds production and trading increased progressively under the condominium rule. The relative position of Sudan share in the international oil seeds market increased progressively until it became the
biggest oil seeds exporter in 1953 (Mahmoud, F.B. 1984). The chain of oil seeds trade was operating along the same line as the gum Arabic and livestock organization. Only a few prominent traders dominated the market in the production areas of Kordofan and Darfur, partially as suppliers to foreign exporters companies and also as exporters in their own.

Unlike the other export commodities cotton production and export was mainly monopolized by British investors. In addition, it was the first commercial activity organized on capitalist mode of production from the outset. The role of Sudanese merchants in the cotton trade was very limited and was confined to only a few merchants, who in most cases, the owners of pump large schemes. The main prominent name in cotton production during that, period were “Dairat El-Mahdi,” Abulela, Abdel Moneim Mohamed, Osman Salih. Also, similar to pattern of oil seeds capital circulation, the merchant and companies of large cotton schemes invested substantial part of their income accumulated in cotton production in ginning factories. The private ginning factories work was not confined to the processing of owners product, small scheme producers were also dependent on them. The dependency was also extended to purchase of their product and provision of loans.

In fact, the capital accumulated in the different spheres of commercial activities during the condominium rule was reinvested in expanding the commercial activities and some processing industries. The
reinvestment involved processing some primary products and new field of petty manufacturing such as flour milling, printing and production of soft drinks, sweet etc… with the expansion of commercial network many merchants made their capital in Darfur, Kordofan, Blue Nile and Red Sea and then transferred their operation to Khartoum in 1950s. Niblock, Tim. (1985).

3.3.2.3. Civil Servant and Professional Group:

Another distinguished social fraction, which was created by the colonial administration, was the high-ranking servants and professionals in the government and private sectors. The inception of this group, which was called by the people “El effendia”, refers back to the early days of colonialism when it was confronted with the high cost of administration and budget constraint. Despite of the political risk of employing Sudanese, the colonial administration was forced to open some schools for training Sudanese to take over some junior posts. In 1902, the Gordon Memorial College was established as an intermediate and technical college. With the economic development and expansion in administration, the education was expanded and varied significantly. The early admission to these schools was almost confined to the sons of tribal and religious leaders and merchants. Gordon College was enlarged and developed to become the University of Khartoum in 1951. Others secondary schools were opened in different towns. The university college of Khartoum and the other schools continued to graduate the bureaucrats
and professionals who replaced the foreign government employers. With the increased number of the graduates, they organized themselves in social clubs as they called themselves. The graduates or the “affendia” class constituted a distinct group. It developed class-consciousness from the early period of its formation. Following the independence and Sudanization process, the class acquired effective position in moulding the economic and social framework of the country Niblock, Tim. (1985).

However, despite the frequent political changes, the main colonial socio-economic structure remained the same intact. It maintained the articulation of the market economy with the international market and benefited the capitalist group. Some of the officials were able to accumulate funds and reinvested in pump schemes, estate contracting business and other farming activities.

After independence, the class of merchants, commercial farmers, bureaucrats and private business expanded significantly. They had been continuously investing in commercial activities, livestock trade, mechanized farming, export and import trading activities and black marketing and foreign currency speculation. Ahmed, Medani, (1989).

Unlike the case of Europe and North America the money, which had been accumulated in different activities has continuously been used for luxurious consumption and expensive housing rather than productive investment. Ahmed, F.B. study of Sudanese bourgeoisie found that: 96% of the Sudanese businesses have their own established houses. 43% of
that business-men owned between 4 and 10 houses, 29 percent of them own between 11 and 20 houses, 20 percent own between 20 and 30 houses, 4 percent own more than 30 houses and 4 percent of the total own one house each. All the houses were of upper class quality with number of rooms vary between 5 to 15 rooms Mahmoud, F.B. (1984). According to primary investigation of housing in Khartoum and Omdurman, it observed that the first class areas have increased from about 3 in Khartoum and only Elmulazmean in Omdurman in 1970s to many of various grand housing areas in 2000s.


3.4.: Unequal Regional Development:

3.4.1.: Introduction:

The pattern of capital organization, growth, survival and transformation is essential in generating differentiated development at all spatial levels. Uneven geographical development is produced by the spread of forces and relations of production and intensification of both at certain point in space at national and international levels. This geographical expansion is an essential process for capital accumulation, which was stimulated by the low of motion. It is a dialectical relation
between production and circulation, which together sustain the development of capital Alain, J. and Carlos, G. (1977). Thus, the ability of an economy to grow is determined by its capacity to produce and circulate the commodity from which the surplus is realized. This process is a universal phenomenon of capital in its quest for profit maximization and hence capital accumulation, which is the main principal nature of capital. The capital expansion is usually realized through a process of undermining substantially the geographical areas, which it penetrates. Consequently will result in large areas of labour reserve and market able to response to the spasmodic unequal and contradictory development of capitalism. Ernet, Mandel, (1968).

To expanding commodities, circulation capitalism has to penetrate pre-capitalist modes of production and transform the self-sufficiency communities into cash production. It is an essential process for increasing surplus profit through commercialization and incorporation of subsistence communities into chain of capitalism mode of production. This process entails divorcing large sector of use value and petty commodity producer from the ownership of the means of production and turning them into labourers to maintain capitalism survival and development.

As the geographical transfer of value (periphery-center) is the spatial essence of the capitalism accumulation, then capitalism generates and intensifies regional differentiation at all the levels. The uneven
geographical development results in a geographical differentiation in labour productivity, rate of profit, organic composition of capital and cost of variable capital within the social formation E, W, Soja. (1980). Thus, geographical differentiations at all levels are crucial to enhance and maintain capital accumulation. The whole capital world then consists of different levels of productivity arising from the uneven geographical development between nations regions, branches of industry and firms. The geographical transfer of value arising from the differentiated levels of productivity is the basis of centralization and concentration of capital and hence creating and reproducing continuing differences between center and periphery Ernest, Mandel. (1968).

3.4.2. Unbalanced Regional Development Policy:

Many Sudanese and international scholars argued that the establishment of Gezira scheme was the first process in articulating the Sudan economy with the international market and hence the exploitation of Sudan tenants and agricultural labourers through appropriation of surplus value and labour. First through introduction of capitalist production relation in Gezira, and second through transforming the subsistence pre-capitalist economy in the remote traditional areas into cash crops production and market economy Barnet, Tony. (1988) Niblock, Tom. (1985) M.M. Yassin and Abdel Galil. (1973).
Such analysis and interpretation based on the assumption that underdevelopment is generated and maintained through process of articulating the less developed countries with the metropolitan industrial capitalist countries in western Europe and North America. Accordingly, the case of Gezira scheme gives an example of the process and impact of capital penetration in its spatial quest for surplus value. The dominant pre-capitalist modes of production in the Gezira area, have been replaced by cotton production and articulating the existing communities into the chain of international capitalist mode of production. Consequently, the population has no longer been owners of the means of production. The scheme has converted them into agricultural labourers, working according to the Board plan and under its supervision. According to Barnet Tony and others, the expansion of commodity circulation and unequal production relations of the scheme have impoverished the peasants and affected their subsistence negatively. Barnet, Tony, (1975) (1977).

There are ample evidence which have proved that the relatively high income and socially developed regions in Sudan are those with market economy and orientation rather than subsistence one Ali, Gelal el-Din.(1989).

In the other side the other regions, which, still, maintain pre-capitalist modes of production with only recent features of evolving capitalist mode of production, are still trailing at the back of the states.
The situation of relative development and underdevelopment and large disparity of resources allocation and the resulting consequences of such pattern of development can be discussed within the context of capital expansion in the country. The spatial expansion of the capitalist mode of production over the pre-capitalist one has been accomplished through direct colonial intervention. The national planning post independence has maintained the same pattern whether directly or in collaboration with international institutions i.e. World Bank and IMF. Investment in Gezira and irrigated schemes has been a prominent feature of the economic policy among the successive post independence governments. This policy was accompanied by unequal allocation of resources in a way to link local areas of production with high level of consumption and facilitation of import, export trade.

However, this unequal allocation of resources and development disparity could be discussed in terms of transport and social services distribution and agricultural and industrial concentration in the country.

3.4.2.1. Transport:

Transport is essential for all societies, especially when the population is scattered in far remote settlements as the case of Sudan. In such environment a good and efficient net of transport will save time, increase the rate of capital circulation and enhances the process of economic, social, political integration at national level. During the colonial occupation period, transport development mainly related to
occupational expansion and transfer of goods to Britain. Thus during that era railway system linked the capital with major areas of colonial expansion. The main railway which were included Wadi Halfa, Abu Hamed, Karima, Atbara, Port Sudan, Sennar, Elobeid, Kassala and El Hasaheisa. This in addition to the Gezira railways net which linked collection stations with the ginning factories at Maringan and El Hasaheisa, and then directly to Port Sudan. The only railway expansion in the early years post independence was to Nyala in South Darfur and Wau in Bahr el Ghazal in 1961. Ali, M. Galal el-Din, (1989).

Prior to 1970 there were only four roads from Khartoum to Wad Medani and Jabel Awlia southward and to Wadi Seidna and Eljeili northward. After 1970, significant importance has been assigned to construction of roads as a necessary condition for realizing the economic revolutionary slogans, which were put forward by the May regime in its inception. The new pattern of roads construction was also concentrated on the export/import outlets.

The main high way roads constructed included, Port Sudan-Khartoum, which linked the areas of commercial and export production together with the international market. The Wad Medani-Sennar-Kosti road, linking these areas with Khartoum-Port Sudan high way. The Kadugly-Dilling-Debiebat road linking the cotton producing areas of Nuba Mountain to the railway line and Kosti Elobed road which constructed later in the late of, 1980s. The Nyala-Zalingy road linking
these areas with the western railway line. Jabel Awlia-Ed’duiem Kosti road and Sennar El Damazin road serving the southern areas of Blue Nile region. The Gedarif-Gallabat road linking the country with Ethiopia Roads completed or under construction recently induced some roads linking the northern and western regions with Khartoum. This in addition to other roads completed or under construction in South and South-Kordofan for servicing oil production in such areas.

3.4.2.2. Agricultural Development:

Transport and facilitating infrastructure are pre-requisite condition for agricultural development and expansion. Hence, the development of agriculture in Sudan was closely related to the development of such infrastructure.

The table below gives the picture of the large disparities between the different regions in the early years of independence.

Table No. 3.2.4.Estimate regional income Per capita

<table>
<thead>
<tr>
<th></th>
<th>Region A</th>
<th>Region B</th>
<th>Region C</th>
<th>Region D</th>
<th>Region Sudan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total GDP (at factor cost)</td>
<td>75.786</td>
<td>86.033</td>
<td>83.777</td>
<td>38.610</td>
<td>284.205</td>
</tr>
<tr>
<td>Total expenditure (private)</td>
<td>70.854</td>
<td>57.427</td>
<td>82.796</td>
<td>36.443</td>
<td>247.520</td>
</tr>
<tr>
<td>Total investment (exclusive of changes in stock)</td>
<td>11.906</td>
<td>4.178</td>
<td>03.533</td>
<td>1.616</td>
<td>21.233</td>
</tr>
<tr>
<td>Population</td>
<td>2.319</td>
<td>2.070</td>
<td>3.091</td>
<td>2.783</td>
<td>21.233</td>
</tr>
<tr>
<td>Per capita GDP</td>
<td>33</td>
<td>42</td>
<td>27</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>Per capita</td>
<td>30</td>
<td>28</td>
<td>27</td>
<td>13</td>
<td>24</td>
</tr>
<tr>
<td>Per capita investment</td>
<td>5.1</td>
<td>2.0</td>
<td>1.1</td>
<td>0.6</td>
<td>2.1</td>
</tr>
</tbody>
</table>

The table divided the country into four geographical and administrative regions. Region A and B constitutes the Eastern region which was included Kassala Northern, Khartoum and Blue Nile Province. Region C the western region included Kordofan and Darfur. While region D is the southern Sudan. This division has brought together the provinces, which had similar pattern of development. The accurate picture of the unbalanced regional development in the eve of independence can be obtained by comparing the distribution of the GDP, investment and per capita over the regions. Khartoum and the irrigated schemes of the present central region in addition to Kassala were the most developed. As can be inferred from the table the western and south regions, which are predominantly subsistence, were lagging far behind.

Nevertheless, the balanced growth issue has been the center of the debate among the post independence governments, but they maintain the same pattern of geographical expansion of agricultural commodity production. The first main development was the establishment of the Managil extension, which add-up another million fedan to the Gezira Scheme for expansion of cotton production and export.

Some settlement sedentarization schemes were established in different regions. The main and the biggest one was the Khashm El Girba scheme, which is irrigated from the Atbara River, attribute of the Blue Nile. The main objectives of the scheme are resettlement and compensation of the people of Wadi Halfa whose houses and agricultural
plots were affected by the construction of the Swan damp at Egypt. Also the scheme used for the settlement of the nomadic tribes in the area who had claim on the scheme land. The objectives of this settlement are to modernize the economy of the whole area and transform the life style of the main nomadic tribes in the area. These tribes included the Beja, Shukriyya and Ahamda. Other objectives of the scheme included commodity production for the domestic market and production of some cotton and groundnut for export.

The other main settlement schemes included the Sag El Na’am in Darfur, the Babunosa project in western Kordofan and Gerih el Sarha scheme in northern western Kordofan (Kababish area) for settling the Kawahla nomads. None of such schemes attained its objectives in transforming the life style of the use value producers in these areas. However all the schemes were either of limited success or of complete failure United Nations Report, (1979a).

The other field of agricultural development was the introduction of mechanized rain fed farming. This pattern of agricultural production has begun during the condominium rule. It has expanded greatly in post independence and both public and private sectors were involved in this type of agriculture. The Mechanized Farming Corporation (MFC) had been a significant state agent in agricultural commodity production. It was concerned with production of grain on both public and private farm.
The significant large-scale mechanized production has started only in the late 1960s, when rain fed mechanized cultivation expanded into new areas. This new expansion was mainly in Kassala, Blue Nile, Kordofan, Upper Nile and later Darfur International Labour Organization, (1976).

The sesame mechanized farming project was established in the Gedarif area with the aim of production of sorghum and sesame for domestic market and export. The project finance involved both foreign, public and local capital. The United Nations University Report, (1979).

Similarly, a mechanized farming project was established in El Damazin South Blue Nile. A number of state farms were established in southern Blue Nile, Kassala, Upper Nile, Southern Kordofan and Darfur.

The state has also been involved in plantation agriculture following the same pattern of investment in irrigated areas. Such investment included sugar cane production at El Genied and Khashm El Girba in 1960s and the Kenaf plantation in the Blue Nile in 1976. United Nations, University Report, (1979).

Although the six years plan has emphasized the necessity of development and modernization of the traditional sector, the actual implementation has failed to honour its commitment and promises of achieving balanced regional development. The plan continued the heavy investment in the Gezira and irrigated schemes, while the lack of the
appropriate business conditions would induce local and foreign capital to invest in region with an already established infrastructure.

In addition to the Rahad project most of the plan total spending went to public agriculture Nimeri, Sayed, (1979).

However, such allocations of resources and public spending have resulted in worsening the already unbalanced regional situations. This is revealed in the wide disparities in social services distribution and industrial concentration. The most essential social services, which were provided by the government, are education and health facilities.

**3.4.2.3. Education:**

The geographical services distribution is affected by the distribution of population and economic activities. The diffusion of modern education has economic social and cultural influence.

People concepts, values and life style are effectively influence by education. It increases the concern of people, particularly the rural – about social and economic ways of life e.g. social status of women, introduction of new production techniques, consumption and investment. Thus, changes brought about could be partly attained by spread of education especially among the traditional population. But, unfortunately the pattern of education expansion followed the same pattern of unbalanced public investment spending. The table below reveals the educational opportunities expansion in the country during the period 1972-1977.
Table No. 3.2.5:

Changing distribution of pre-college education 1972-1977

<table>
<thead>
<tr>
<th>Province</th>
<th>Population %</th>
<th>Student %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khartoum</td>
<td>07.6</td>
<td>8.2</td>
</tr>
<tr>
<td>Blue Nile</td>
<td>25.2</td>
<td>25.6</td>
</tr>
<tr>
<td>Kassala</td>
<td>10.5</td>
<td>10.8</td>
</tr>
<tr>
<td>Northern</td>
<td>0.9</td>
<td>6.4</td>
</tr>
<tr>
<td>Kordofan</td>
<td>15.0</td>
<td>14.8</td>
</tr>
<tr>
<td>Bahr el-Ghazal</td>
<td>5.6</td>
<td>5.3</td>
</tr>
<tr>
<td>Equatorial</td>
<td>5.3</td>
<td>5.0</td>
</tr>
</tbody>
</table>


As can be inferred from the above table (3.2.5) the distribution of educational opportunities after independence was similar to the income distribution. Khartoum and Northern Provinces with only 7.6% and 6.9% of the total population had 16.1 and 17.4 educational opportunities respectively compared to 8.3 for Darfur and 4.9 for the whole South with 14.5 and 20.4 of the total population respectively. The table reveals that the distribution of pre-college educational opportunities throughout the period 1972-1977 almost remained with the same inequitable distribution. While student enrollment had witnessed slight increase in the South (most likely due to Addis Ababa agreement, 1972) the numbers of opportunities for Darfur had been reduced, Table No. (3.2.5)
With introduction of self-help funds by local government authorities and increased migration to oil countries, the government had not been the only source for funding and expanding social services. The regions with developed economy and cash economic activities had more opportunities for raising local funds for maintaining social services. Some regions with high number of outside migrant had and still have considerable inflow of funds for social services (i.e. Northern region).

3.4.2.4. Health Services:

Like education distribution, health services had also varied considerably among the different regions. Table (3.2.6) below shows the distribution of public health care unit in 1974.

<table>
<thead>
<tr>
<th>Province</th>
<th>Hospital Number</th>
<th>Hospital %</th>
<th>Other Health Care Unit Number</th>
<th>Other Health Care Unit %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khartoum</td>
<td>17</td>
<td>13</td>
<td>128</td>
<td>6.1</td>
</tr>
<tr>
<td>Blue Nile</td>
<td>32</td>
<td>24.4</td>
<td>66.6</td>
<td>31.5</td>
</tr>
<tr>
<td>Kassala</td>
<td>11</td>
<td>8.4</td>
<td>203</td>
<td>9.7</td>
</tr>
<tr>
<td>Northern</td>
<td>19</td>
<td>14.5</td>
<td>353</td>
<td>17.3</td>
</tr>
<tr>
<td>Kodofan</td>
<td>14</td>
<td>10.7</td>
<td>267</td>
<td>12.7</td>
</tr>
<tr>
<td>Darfur</td>
<td>11</td>
<td>8.4</td>
<td>140</td>
<td>6.7</td>
</tr>
<tr>
<td>Bahr-El-chazal</td>
<td>7</td>
<td>5.3</td>
<td>79</td>
<td>3.8</td>
</tr>
<tr>
<td>Upper Nile</td>
<td>11</td>
<td>8.4</td>
<td>88</td>
<td>4.2</td>
</tr>
<tr>
<td>Equatorial</td>
<td>9</td>
<td>6.9</td>
<td>171</td>
<td>8.1</td>
</tr>
</tbody>
</table>


It is observed that the health facilities and particularly the trained staff and advanced facilities have been assigned according to the level of
income and degree of urbanization. In most cases, the two factors grow simultaneously with a very direct impact on both the ability of raising local funds for supporting the existing social services and public facilities distribution.

However, the increased cost of health services requirements and the pattern of resources distribution have led to assigning particular type of health facilities and trained staff to certain areas correspondent with degree of urbanization and population concentration. Moreover, the inability of the successive governments to maintain such services has increased the self-help finance burden. Table (3.2.6) shows that Khartoum has the lion share of health facilities. The high level of health facilities in central state is explained by the fact that the Gezira Board has long been involved in provision of social services in the region. Moreover, the relatively high income in the Gezira area has let to a wide coverage and high level of health facilities. This could also be true for the Northern region where the cash economy and high numbers of region population working abroad have consolidated the self-help role in provision of social services. The other low-income regions, which are basically populated by subsistence communities, have less share in the over all health facilities. Nevertheless, the traditional communities were able to provide some social services through self-help support system. But, the successive drought hits and economic crises during the last three decades have weakened their capacity to maintain such services.
3.4.2.5. The Industrial Concentration:

The other field of revealing the unbalanced regional development is the industrial concentration among the different states. Similarly the over all sectoral and geographical distribution of industry displays even wider disparity among the regions.

The process of industrial investment in Sudan has started in the late 1950 and 1960. When the government established some industries in different regions. This process included establishment of two sugar factories at El Geneid and Khashm El Girba, two fruit and vegetable canning plants at Karima and Wau, milk products factory at Babanosa, an onion dehydration plant at Kassala and a cardboard factory at Aroma. Since then the public and private industrial investments have been expanding in the country following the same prevailing pattern of national development.

The geographical expansion and concentration of industrial activities are even more unbalanced among the regions than the other fields. This is shown in the table below, which gives the number of plants, value of manufactured products and capital investment in the different states compared to the population distribution in the country in 1977.
Table No. 3.2.7:
Geographical Distribution of Manufacturing in the Sudan 1977

<table>
<thead>
<tr>
<th></th>
<th>No. of Plants</th>
<th>%</th>
<th>Value of pro</th>
<th>%</th>
<th>Capital Investment</th>
<th>%</th>
<th>Pop.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khartoum</td>
<td>276</td>
<td>44.62</td>
<td>59.433</td>
<td>66.3</td>
<td>55.52</td>
<td>48.7</td>
<td>9.69</td>
</tr>
<tr>
<td>Blue Nile</td>
<td>332</td>
<td>25.72</td>
<td>14330</td>
<td>16</td>
<td>27.618</td>
<td>24.0</td>
<td>32.04</td>
</tr>
<tr>
<td>Northern</td>
<td>101</td>
<td>07.82</td>
<td>2468</td>
<td>2.8</td>
<td>5.055</td>
<td>4.4</td>
<td>8.12</td>
</tr>
<tr>
<td>Kordofan</td>
<td>108</td>
<td>08.37</td>
<td>2105</td>
<td>2.4</td>
<td>3.981</td>
<td>3.5</td>
<td>18.55</td>
</tr>
<tr>
<td>Darfur</td>
<td>45</td>
<td>03.49</td>
<td>308</td>
<td>0.3</td>
<td>535</td>
<td>0.5</td>
<td>18.37</td>
</tr>
<tr>
<td>Total</td>
<td>1291</td>
<td>89.643</td>
<td>115.024</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Compiled from Ali, M. Galal el-Din, 1989

The table shows that in 1977 44.62 and 25.72 of the total number of industrial plants were located in Khartoum and central region compared to 9.99, 7.8 and 8.37 in Kassala Northern and Kordofan respectively, while the share of Darfur was only 3.49 of the total. Similarly Darfur share in value product and capital investment were very modest and amount to only 0.3 and 0.5 percent respectively compared to Khartoum which amount to 66.3 and 47.7 (the highest level) and Kordofan 2.4 and 3.5 (the lowest level) respectively during the same period. While plants in most regions produce a wide range of manufacturing, in Darfur and Kordofan manufacturing was concerned mainly with durra and millet flour during the same period. Ali, M. Galal el-Din. (1989).
The investment also varied in terms of ownership and employment. The largest plant, with big capital and trained labour force were confined to the areas where infrastructure and capitalist forces are more developed. Table No. (3.2.8) gives the concentration of industrial capital among the different regions during the same period.

**Table No. 3.2.8:**

**Geographical distribution of plant by size of investment 1972**

<table>
<thead>
<tr>
<th>Province</th>
<th>Less than Ls.100,000</th>
<th>Ls.100,000 – 500,000</th>
<th>Over Ls.500,000</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khartoum</td>
<td>463</td>
<td>94</td>
<td>19</td>
<td>576</td>
</tr>
<tr>
<td>Blue Nile</td>
<td>315</td>
<td>7</td>
<td>10</td>
<td>332</td>
</tr>
<tr>
<td>Kassala</td>
<td>116</td>
<td>6</td>
<td>7</td>
<td>129</td>
</tr>
<tr>
<td>Northern</td>
<td>97</td>
<td>2</td>
<td>2</td>
<td>101</td>
</tr>
<tr>
<td>Kordofan</td>
<td>103</td>
<td>4</td>
<td>1</td>
<td>108</td>
</tr>
<tr>
<td>Darfur</td>
<td>45</td>
<td>-</td>
<td>-</td>
<td>45</td>
</tr>
</tbody>
</table>


Most of the large industries in the country are located in the three main regions Khartoum, Blue Nile and Kassala, which together amount to 93% of the total investment. For Darfur, it had only 3.5% of all plant with only 0.5% of the total investment.

Table (3.2.9) shows that even the small share of Darfur in the total industrial investment is provided by private sector only. This is in
addition to the wide variation in private investment and labour size among the different regions with Darfur trailing far behind as usual during the same period. The distribution of plants in term of capital investment size shows that Darfur had only 45 plants with less than 100,000Ls for each compared to 43 in Khartoum and 97 in Northern during the same period. While every Northern region had more than hundred medium and large size plants, Darfur had not even a single one as shown in the table during the same period table No. (3.2.9).

Table (3.2.9)

**Distribution of Industries by Mode of Ownership 1972**

<table>
<thead>
<tr>
<th>Province</th>
<th>Private</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plants</td>
<td>Labour force</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Investment</td>
</tr>
<tr>
<td>Khartoum</td>
<td>542</td>
<td>21,508</td>
</tr>
<tr>
<td>Blue Nile</td>
<td>324</td>
<td>3.477</td>
</tr>
<tr>
<td>Kassala</td>
<td>124</td>
<td>1.423</td>
</tr>
<tr>
<td>Northern</td>
<td>98</td>
<td>484</td>
</tr>
<tr>
<td>Kordofan</td>
<td>103</td>
<td>1229</td>
</tr>
<tr>
<td>Darfur</td>
<td>43</td>
<td>394</td>
</tr>
<tr>
<td>Total</td>
<td>1,236</td>
<td>28.515</td>
</tr>
<tr>
<td>%</td>
<td>95.7</td>
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The maintenance of colonial heritage and concentration of the investment in the regions with already established infrastructure, have widened the gap between the Central Sudan and peripheries i.e Darfur.
The concentration of infrastructure in the irrigated and urban centers has limited the investment opportunities in the traditional sector to trading and specialization on traditional export cash crops. Moreover, the policies of privatization and trade liberalization have created new economic conditions working for the benefit of the parasitic capitalist class as well as furthering the center – periphery gap.

In Darfur, the impacts of the economic crisis compounded by the intensification of drought have resulted in sharp decline in the traditional resources productive capacity. Consequently, the people of rural Darfur reacted to the local resources decline in two ways vis-à-vis cultivation and nomadic activities. Both forms of adjustment in economic activities have increased competition over resources, which accelerated the skirmishes and social tension between the cultivators and pastoralist. The sedentary cultivators have shifted from Goz to Wadi cultivation using new irrigation techniques including water harvesting and well irrigation techniques. For the pastoralists they have been adjusting by shifting the pattern and directions of their normal movements. This new pattern of pastoralism have violated the regulatory customs, which organize land use, and hence led to conflict within pastoralist on one hand and ethno-conflict between Arab pastoralist and the non-Arab sedentary cultivators on the other hand.

With the development of tribal conflict and escalation of war situation in the region, the picture has been even dimmer. The
deterioration in the poverty situation and lack of social services and others development aspects in the recent time have been documented by many Sudanese economists and social analysts, mainly Mohammed El-Zeen, AbdulJalil, Adam, Umbada Siddig, Sief El-Tigani, (2003).
4.1. Climate and Conflict in the Sahel:

4.1.1. Introduction:

For many decades, people of Africa have faced frequent periods of drought. The most affected area in Africa was the Sahel region where the drought has pushed the marginal and fragile environment to its limit. This, compounded by the growing pressure and increased competition over resources and land use, has resulted in famines and other social and political upheavals. In some areas, people abandoned their way of life and adopted new coping strategies, and many people have been displaced by drought or conflicts resulting from drought. The refugee’s camps and shantytowns have been dominant phenomena throughout the drought zones in Africa.

The diminishing and depletion of natural resources and competition over their use has increased violent conflicts within pastoralist communities and between pastoralists and sedentary cultivators, which are becoming more and more tense in the Sahel.

4.1.2. Politico-ecology of the Sahel:

Sahel is an Arabic word meaning shore. It refers to the marginal land between the Sahara desert and tropical forests of Africa 500-1000K.M wide and stretches 7000 K.M from west to east. It extends
from the Atlantic beaches of Senegal across to the mountains of Ethiopia and Somalia.

Ecologically the Sahel refers to the border of the Africa tropical desert, the Sahara. It can be defined as the dry zone that stretches from the fringe of the desert further south. It comprises the arid zone with rainfall less than 100 M.M per years and the semi arid zone with an annual rainfall between 100 and 500 M.M. per year south of the Sahara fringe.

The Sahel is sometimes defined as only the semi arid zone from Atlantic to the Red Sea. The area is also politico-ecologically defined as the semi arid vegetation belt in six West African countries via, Mauritania, Senegal, Mali, Niger, Burkina Faso and Chad. More broadly, it could refer to the dry zone in these six countries B. Baubakar, (1991).

Politically the international news media have used to use the word Sahel to refer to these six countries, which have been affected by the recent drought in Africa Sen. (1988).

The region is politically divided into two parts. In 1983 the western part of the region had established an organization for collective action against drought; the Inter State Committee for Drought Control in the Sahel (CILSS), defined as the Sahel organization. It includes the francophone states and the western region in the linguistic boarder.

Alternatively, in 1985 the eastern Sahel countries have established the (IGADD): the Inter-Governmental Authority on Drought and
Desertification as an equivalent body. The IGADD members included Uganda, Somalia, Kenya, Djibouti, Ethiopia, Criteria and Sudan.

4.1.3. The Sahel Climatic Change:


The measurement and evaluation of rainfall and its variation, since the late nineteenth century has shown a permanent deficit in rainfall since 1968. The beginning of the twentieth century was relatively dry with only 1906 and 1909 being above normal in 21-year period. The 1980’s was also generally a period of a relatively wetter era, which witnessed an increase in both human and livestock population comparable with the period since 1968.

The recent prolonged spell of dry years in the Sahel has been explained by many hypotheses, but none of them is conclusively proven.

However, the obvious and immediate reason put forward to explain the successive periods of the drought is a rainfall deficit. This deficit could be attributed to one or more factors basically, an absence of available moisture in the atmosphere, large scale subsidence (which suppresses convective activities), divergent air flow in the lower troposphere, a decline in atmospheric stability and an absence of rain-bear
Changes in such factors effectively influence changes in weather system through different mechanism with impact on many spatial scales and from local to global.

First, the local causes of the persistent drought condition refer to over-grazing and removal of woody vegetation. Such vegetation loss is hypothesized as causing changes in either albedo reflectivity of the ground surface or/and the soil moisture with biological feedback mechanism on the same factors and hence perpetuate the drought mechanism. The large-scale changes in heat sources and sink resulted in less rain, which means less vegetation and so the cycle goes on. Charney, (1975), Rasoal, (1984).

A similar case exists for soil moisture Walker and Rowntree, (1977) the reduced soil moisture gives less evaporation resulting in a net reduction in upward motion reducing connective activity. This leads to less rainfall, reduces moisture level and reinforces the initial cause.

The mechanism of both hypotheses is interrelated since they operate through changes in the radiation budget of the surface.

The second spatial scale assumption of short rainfall in the Sahel is the consistent rise in the Atlantic Ocean temperature since 1970. The relation between Atlantic surface temperature and variation in the Sahel rainfall has been hypothesized through various statistical works, Folland
Lough (1981) Lamb (1978) while statistical linkages are very sound and very promising; the physical mechanism is more elusive.

The third assumption is the uneven cause related to the quasi-periodic El-NINO, Southern Oscillation (ENSO) phenomenon as possible cause for rainfall deficit in the Sahel.

However, in a global series study Ropelewski and Halpert (1987) found no link between Sahel rainfall and index of southern oscillation.

The global increase in the level of carbon dioxide and other green houses gazes, which causes global warming, is also seen as having effect on Sahel rainfall.

However, the green housing effect has not yet been demonstrated because of problems of worldwide demonstration of such large term effect, which is characterized by fluctuation and other empirical problems Wigley and Jones (1981). Nevertheless worldwide climatic influences caused by such factors are expected to influence Sahel rainfall Wigley (1985).

4.2. Drought and Conflict in the Sahel:

In the arid and semiarid land of the Sahel drought is a frequent natural disaster, which often causes frequent large food and resources deficit, famines, immigration of people and others economic and social problems.

The degree of vulnerability of the Sahel communities to the negative impact of drought varies from country to another according to
climate and prevailing environment and national policy in the country concerned. Moreover, the economies of the Sahel countries rely mainly on the export of rain fed agricultural products and livestock, which are seriously affected by drought and short rainfall. Thus, drought usually causes severe economic problems in the Sahel countries, which negatively affect the ability of communities and nations to cope with the socio-economic impacts of such drought or natural calamities.

Apart from the socio-economic environmental adaptation among the Sahel communities, different groups have developed strong indigenous cultural and emotional ties to the pattern of livelihood they have traditionally followed. This specially the case for the pastoralist who is heavily loaded with cultural ties to pastoralist way of life and disdain manual labour. F.A.O (1973) mainly the cultivation activity.

On the other side there is strong anti nomad morality among settled people and officials in the Sahel countries whom with exception of Somali and Mauritania tend to be drawn from peasant ethnic groups. Thus, most of African governments and officials share in anti nomad morality. It is generally agreed that overstocking and competitive grazing pattern in the Sahel are the most important causes of desertification in the region Ferguson, (1977). The FAO argued that:

“Pastoralists are ... caring for nothing ... balking at paying taxes and being unwilling to sell their animals they do not make the economic contribution to their countries that is rightfully expected of them” FAO (1973).
This anti-nomad morality preceded modern attack on pastoralist attitude and value system at least 600 years. The fourteenth century Islamic historian Ibn Khaldon elaborated the basic attack on pastoralist. He argued that civilization always collapses in places where the Arab nomads are settled. This fact attested by the relic of civilization in the place where they took over and conquered i.e. Tunisia and the Maghrib in the beginning of the fifth century and the whole region between the Sudan and the Mediterranean. Ibn Khaldon (1967-304).

Similarly writing of E.H. Palmer, (1977) about the Sinai Peninsula and the Neger in the late nineteenth century accused the Bedouin wherever he goes, he brings with him ruin, violence and neglect. He elaborated that half of the desert owes its existence to him.


Contrary to anti nomad morality Horowitz M, and Little D, Peter argued that anti nomad morality finding the causes of environmental degradation in the attitudes of herders rather than in the conditions under which pastoralist operate. It seems that in place of data and analyses anti nomadic writers are just quotes on other or simply invoke common knowledge. The argument concluded that such anti nomad is rarely found among anthropologists with first fieldwork in pastoralists. Horowitz M. M. (1972).
The main modern argument against pastoralist rest on two main assumptions. First is that range lands are communally owned, secondly the livestock are privately owned, given the biological law of carrying capacity Hardin, G (1968), maximum productivity can be achieved only when range and livestock reach equilibrium state. Any addition of stock above equilibrium state leads to over grazing and destruction of the whole common. Hardin argued that only one person needed to act irresponsibly to bring disbenefits to all and that one person would always exist, so that only enlightened private ownership could protect the common.

Similarly, it seems that in place of data and environmental effects of communal ownership, the assumption just rests on unproven common knowledge.

First, there is considerable uncertainty around the concept of erosion via obtaining accurate and widespread data, long established and reliable data. Secondly, it is very difficult to single out the effect of humans on environment from other effects Blaike, P., (1984). Also there is little evidence that private ranges are better than communal ones. In the contrary there is some evidence that environmental deterioration and overgrazing appear to be common and serious in some areas of private range land, as in parts of USA and Australia where both land and livestock are privately owned Cossin N. J., (1985) Sandford, (1983).

In fact, the notion of private ownership among pastoralist implies subdivision and organization of tribal socio-economic activities rather
than individual ownership. Individual ownership is abided by customary regulations, which ensure socio-economic communal participation. Literatures on pastoralist in Sudan point to restriction on both access and use of communal range and use and disposition of private livestock.

However, pastoralists in the Sahel have always competed to some extent with farmers over land and resources, but in many cases, the relationship between them is mutually beneficial.

In Lake Fitri in Chad, the relations between the farmers and the pastoralists who come from the northern area in dry season were cooperative and reciprocal. Usually the pastoralists bring their animals to graze on harvest residual in the dry season according to customary regulation that govern the arrival and routes through which the animal could pass on their way to lake and grass. Thus, land of the sedentary cultivators can be improved by animal’s excrement, while the animals are well nourished by the harvest residuals. While both groups exchange their products of milk and dairy product and millet, ground-nut or sesame, some sedentary cultivators entrusted their cattle to the nomads who would take them north with their own herds in the wet season.

With the expansion of cultivation into traditional grazing areas, the mutually accommodating relations between the farmers and pastoralists have deteriorated. The 1970-85 droughts have intensified the population concentration and resources utilization around the lake. Many people from different areas adjacent to the lake have been driven from their
home by drought to the lake. Thus, the mobility of population has disrupted the situation in the lake area. Consequently many conflicts and disputes between the farmers, and mobile herders and fishers have risen. Mohamed Hissone (1991).

Similarly, the Beli River along the border between Mali and Burkina Faso shared by settled cultivators and semi settled herders along the river. The Agacher strip is of fertile land extending 134 km long in Burkina Faso, has its source in neighboring Mali and ends by joining the Niger River in the Republic of Niger. Most of the people living along the strip are Muslims, thus there is sense of unity overriding ethnic differences along the behaviour. Although the people belong to three different ethnic groups Tuareg, Bella and Fulani, they speak “Tamashek” Tuareg language, which is widely spread, particularly among Fulani whom some of them have dropped their mother language. Because of the variability of rainfall and absence of development irrigation, cultivation remained very poor. Consequently herding of camels, oxen, sheep and goats remained the main economic activity along the strip. Throughout the area, animal rising had significant social and economic value as well.

In the dry season i.e. from March to June, the Beli River dries up completely and hence the herders move in search for other grazing and water point areas. For the other eight or nine months of the wet season the herders move across the frontier villages without causing any difficulties or conflict.
With the coming of drought and the increased competition over resources, the settled people of Mali along the strip complained that livestock could damage the shrub and vegetation. However the intervention of agricultural official department with protecting vegetation from migrating livestock, have resulted in minor conflicts. With the increased impact of drought and loss of animals, animal’s theft has appeared and it became a crucial problem in the region. As animal is very important among people and around, around which marriage revolves, festivals and other social ceremonies and events, the act of increased animal robbery across the boarder has aggravated economic and political conflicts between Mali and Burkina Faso. The drought had made the Beli water and Agacher strip more valuable for both Mali and Burkina Faso herders and cultivators.

The normal practice of Mali herders of free access along the strip had been threatened by Burkina Faso authorities. In 1974, the conflict between the two countries had developed into a political problem, which developed into an open war between the two countries.

In 1986, the presidents of the two states met in Coted Ivoine and agreed upon judgment of the International Court of Justice, which defined the strip as scarce natural resource, and it ruled that it should be divided into equitable manner between the two states.
However despite of that, the Agacher strip has been a constant source of dispute between successive Malian and Burkinable governments regarding the boarders limits and herders mobility.

The traditional competition between pastoralists and farmers, which is a normal feature in the Sahel, has always been a source of potential conflict during shortage of resources periods. The Agacher strip has dense plant cover with population, which belong to the same or similar ethnic, on either side of the boarder live families who obtained different Burkinable and Malian nationalities. The drought impact and tension has not only upset the close and mutually beneficial relationship between the pastoralist and farmer, but has also created political problems between the two countries. Maiga, K. Sheik, (1991).

In some cases, the competition over resources conflict is far beyond close kinship or ethnicity that is conflict and fighting in many cases breakdown among the same ethnic groups. This is illustrated in Somali case conflict, where the destructive war and conflict among different groups seem incompatible with the apparent religious and ethnic homogeneity.

Somalis are one ethnic group with one religion and one language. With few exceptions, all Somalis belong to one of main six groups. Each of the six groups is subdivided into smaller clans whose average size is over 3000 and the clan itself is subdivided into small extended families.
The economic, social and political organization among Somalis is usually organized on clan level bases.

Every clan has a regulatory pattern of movement, usually loosely defined. As there is overlap in traditional passage of different clans, usually the subgroup settles together to reduce the inevitable clashes under such conditions.

The cycle of drought and short rainfall in the Somali region is more frequent. During the dry season pastoralists concentrate around the limited number of wells, which are usually dug and obtained by clan families. The decline of resources usually forces some clans to intrude upon others’ land leading to frequent mutual clashes and hostilities. Given the loosely defined traditional territories and overlap in the trickle of different clans, these mutual clashes and hostilities between different clans have always lived as normal accidents of life. One of the disastrous competitions over resources conflict among Somali clans is the war between the Habrje’o clan and the Dhulbahanta clan in 1951-57. The Habarje’io clan area extends from the east to the west of the northern country and part of the eastern Ogaden region of Ethiopia. The Dhulbahanta clan neighboring the Habarja’lo to the South almost through the length of its territory.

The conflict began when some eastern subgroups of the Habarje’lo intruded further south into the territory of Dhulbahanta. When the Dhulbahanta asked them to withdraw, the Habarje’lo claimed that the
valley was indispensable for their animal’s survival and that they had certain right in the disputed area since the clouds, which rained there formed first in their northern high land. The issue could not be resolved, consequently the two clans engaged in fierce fighting and raids, which lasted for seven years.

Then the conflict has been resolved after long processes of negotiation and pressures from the government. Mohamed, Omer (1991).

It is clear that drought has intensified competition for resources and upset the organization of resources allocation and uses among people. When clan’s very survival is at stake, the response has to be vigilant to maintain their livestock or protect their right against others driven by the same need. Therefore, competition over resources has always been a significant element in a complex web of causes, which intensifies conflicts among the Sahel communities resulting in massif socio-economic and political crisis. The poor groups with weak power structures are the first and most to feel the effect.

In some cases rather than generating conflict, drought impact unifies similar ethnic groups in confrontation of the others whom they blame for causing land depletion or other problems. This including the states, which are also, blamed for adopting policies against pastoralists interests. In many cases, the negligence of drought affected groups and lack of effective action to compensate for resources losses led to violent protests and political discontent. However, this is more apparent among
Sahelian pastoralists who lack political voice and inadequate official response to their problems.

The Tuareg or “Tamashek” pastoralists are one whose economic and political discontent led them to follow violent protest. They are mainly pastoralists indigenous to three African countries; northeastern Mali, central and northern Niger and Algeria. Tuareg is an Arabic word with social implication meaning the abandoned of God. Because of these negative connotations, they call themselves the Kel-Tamashek, i.e. the people who speak Tamashek. In reality, the Tuareg pastoralists live in the far desert edge separated from urban centers with limited contact with the official authorities and administration. Therefore, they had no effective participation in public life and decision-making. Following the drought of 1984-85, several thousand Tuareg from Mali and Niger moved further north of the Sahara in search for pasture in Algeria. In 1990, the International Fund for Agricultural Development (IFAD) has established a program for settling the Tuareg in Mali in collaboration with Algeria, Mali and Niger. At the same time following the promises of Niger government of digging wells and reintegration the pastoralist Tuareg, many of them returned to Niger from Libya. Following the failure of Niger government to fulfill its promises, some young Tuareg attacked independently the police post at Tchin Tabaraden. They wanted to draw attention to the conditions in which they were living and the inadequate government concern and the deteriorating conditions and food shortage in
the provisional camps around the town, which was thought to be a temporary condition. The military response against the police post attack was very cruel; the pastoralist claimed that many people were massacred with machine guns. The conflict soon extended to Mali.

The boarder between the two countries has always been artificial for the pastoralist and the Tuareg have no respect for the political boundary. Similar to the case of Niger, Malian government responded violently against the rebel pastoralist. Then the situation escalated and the Tuarge stated that they were fighting for the entire Tuareg pastoralist people and announced the Sahara state for pastoralist people stretching from the Atlantic Ocean to Chad.

Although the responses of both Mali and Niger were suppressive, the development of events and politicization of the drought impact has led to a search for political solution. Thus in June 1991 the Malian government and the rebels reached an agreement that gave Tuareg region autonomous rule. Aken, B. Nhial, (1991).

However, it is observed that most of the competition for resources among Sahelian communities took the form of rivalry within pastoralist and between pastoralist and sedentary cultivations. Competition within sedentary cultivators is very limited as land use and tenure tradition among African peasants is more systematic and formally defined. In some cases governments’ intervention aggravate ethnic rivalry for resources and hence led to socio-political and ethnic antagonism. This
was quite clear in the ethnic conflict events of 1989 between Mauritanian and Senegal where the competition over resources has aggravated the economic and social crises in the two countries.

The Senegal River formed the boarder between Senegal and Mauritania. Many people from both countries straddle both sides of the river and passage regularly from one side to another. The river valley had been populated by black Africans of Senegal and Mauritanian origins. Some black Mauritanians inhabited on the Senegalese side while generations of Senegalese farmers had cultivated field on the Mauritanian side of the boarder.

There are four ethnic groups in Mauritania; Arabs who are pastoralist and other three groups of non Arab Africans, historically Arab influence is more evident. However, the four ethnic groups have intensive intermarriage, which drawing mutual enrichment from their differences for centuries.

The people in the upper and middle reaches of the Senegal river valley are generally black Africans where as the people coming down from the North are Arab. After Mauritania became independent in 1960 the land control and use became a part of the political competition and power control between the two broad ethnic groups, Arab and Black Africans.

With the increased drought effects, competition over land use in the river valley has intensified rivalry, and hostility between the different
ethnic groups. The seven drought hits and inappropriate approach to environment and the apparent ambition of the Mauritanian government to modify the balance between the communities to the advantage of the Arab has resulted in severe conflict between Arab and the other black Africans in Mauritania and Senegal.

The conflict had started in 1989 when two Senegalese villagers were killed on the island of Doundou “Khore” in a dispute over grazing right. Then it was followed by the kidnap of another thirteen Senegalese.

These events accompanied by intensification of competition for living space have greatly aggravated the relation between Mauritania and Senegal. Violence between the two ethnic groups escalated on both sides.

In Senegal where three hundred thousands of Mauritanians had been living and 85% of the petty commerce sector was Mauritanian owned. Many of them were killed, beaten and their shops were looted by large crowds of people in Dakar. Consequently, up to 200,000 Mauritanian flooded back from Senegal.

Similarly, in Mauritania, many Senegalese people were killed and thousands were forced to take refuge in official and religious building having lost every think they had. But, the violence in Mauritania was not confined to Senegal people, the Mauritanian government along side the events rounded thousands of black Mauritians and shipped them across the river to Senegale bank after stripping them of their possessions and identity cards. Ba, Baubakar, (1991).
The relations between the two countries were greatly aggravated resulting in complete cut of diplomatic and economic relations, and small arm fire post was stationed across the river.

Both the pastoralists and agricultural economy of the Sahel region was severely affected by the drought. Throughout the Sahel natural resources were diminishing, the competition over their uses has violated the traditional resources regulatory rules. Consequently, the conflict over resources uses have been increasingly tense and violent. In some areas where conflict over resources took place within a context of economic and social crises the competition over resources, usually developed into a political and ethnic problem. This can be seen in the political and social crises throughout the Sahel across Somalia Mauritania, Ethiopia and other Sahelisan communities. International community often sees such conflicts as political and ethno-cultural conflict over power control without deep investigation of interaction of root causes leading to political and social instability. While there were factors other than the drought across most of the Sahelian conflicts most apparently power control, it would be superficial to neglect the environmental factors.

The Sahel, economic, social and cultural formations are shaped by environmental adaptation and population interaction. In most areas of Sahelian conflicts, periodic droughts have pushed environmental degradation effects across economic and social boarders. In Somalia Mauritania Burkina Faso Sudan etc… governments are failing to adopt
appropriate approaches for the environmental problems; instead, they resorted to short-term solutions for mitigating the drought effects.

However, while the environment degradation may not solely or even directly be responsible for many social and political conflicts that occur during drought episodes, its combination with other factors specific to a country at a given time can worsen the situations further. In Somalia war and drought spread through the country, simultaneously in Sudan the 1985 drought famine followed by political crises and overthrow of Nimeri regime, and political conflicts in Chad and Ethiopia in 1990 followed by overthrow of the governments in these countries.

4.3. Darfur, Drought and Conflict:

4.3.1. Ecology and Development:

In Sudan, environment and climate have been playing an increasingly important role in the complex web of causes leading to economic and ethno-cultural conflicts among communities.

Until the recent drought in the Sahel, climate has been presented in the scientific and popular literature as a boundary condition, that is as unchanging pre-condition affecting society development. Thus, there is little to do to alter the drought or its impacts. Glantz (1976).

However, many scientists discussed the effect of climate on human activities. The most known among others are Ibn Khaldun, (1967-304) in his book “Magaddimah” and Ellsworth Huntington, (1915) in his book climate and civilization. Both scientists hypothesized about the effect of
climate on levels of development of different cultures. They concluded that the Northern world climate and temperature is favourable to a high level of civilization and development, while the climate factors in the tropical areas is unfavourable to development and sapped the desire and energy of population there.

Similar to Huntington and Ibn Khaldun views the geographic determinism tends to reduce development problem to climatic differences between the developed and underdeveloped regions. Brooks (1926) Markham (1944) Mills (1963). Most of the authors who adopted or modified those views were challenged by many as being at best ethnocentric or at worst racist. Horowitz, M. and Little, D, (1972).

After the World War II, the discussion on the development and climate shifted from explanation of climatic and temperature factors impacts on development to how to develop tropical countries given their climatic boundary conditions. Hence, a new optimism had emerged and suggested that development can be achieved by supplying some missing economic elements.

In 1950, the USA Council on Foreign Relations carried out a study on climate and economic development in tropics. The study report discussed climate in terms of its effect on soil, human and livestock health, plant and other economic factors; however, neither climate variability nor drought was mentioned in the report. Lee (1957).
In 1969 Bernard Quary an economist with World Bank, noted that in spite of the significant impact of climate if not control the progress of civilization, professional economists generally give little interest to climatic factors in development. Quary (1969). However, unlike the previous views, earlier writings of the last century did not reduce all LDCs problems to climatic factors. Most of the recent writing views climate as neither has a mechanical one to one relation to economic development nor its effect is the only ruling constrain on economic development.

Although, the old writings of some scientists and geographic determinists had over estimated the effect of climate on human activities. Huntington (1915) Ibn Khaldon (304). Earlier students of economic development Quary (1969) gave little interest to climatic factors, yet it is important to consider the direct and indirect impact of environment in socio-economic problems.

However, the examination of the different impacts of environment on economic development is beyond the scope of this thesis. What will be examined is the role of environment and climatic boundary conditions among others causes leading to social and economic variation in Sudan and socio-economic and ethno conflict in Darfur in particular.

4.3.2. Ecological and Development Variation in Sudan:

The environment definition in term of physical factors like climate soil and topography is believed to influence substantially all aspects of
human activities including economic, social and cultural activities and organizations. Glacken, (1967).

In Sudan the environment does not only constitute climatic boundary conditions, socio-economic structures but also vary with the environment variations of the country. In the climatic regions, the indirect impact of climatic and environmental conditions has been consistently neglected by most Sudanese academician and politicians, only recently some authors have investigated the impact of droughts periods in the tribal conflict in Darfur Suliman, M., (1993).

Throughout Sudan, environment and resources are diminishing from South to north. Therefore as far as one goes south environment and climate are richer and more stable, while the further north the drier and more fragile is environment. Consequently, unlike the arid and semi arid land inhabitants life style, making a living in the South part of the country is easier, more stable and more reliant on subsistence activities. For the Northern parts of Sudan traditional economic activities have never been easy, floods, drought or other natural afflictions can destroy the fine line between plenty and scarcity. Thus people in the Northern parts of Sudan learned more to live by diversifying the means of living and moving around and outside their climatic boundary.

Poor environment in the Northern region “Shimallia” have obliged rural people to pursue strategies that maintain proportional relation between labour force and the limited land and productive resources.
Unlike most of Sudan rural community systems, land in the Northern region is not a commonly owned resource. It is privately owned resource, and its ownership is vital for making a living and maintaining household subsistence. Given the limited land and underdeveloped other natural resources in the region, seasonal and permanent migration for long remained an essential mechanism for countering the low of marginal diminishing return.

The large-scale movement and migration of population have long been a characteristic of the Northern riverian from primary rural areas to the capital and other urban and rural centers outside the region. These migratory movements had far-reaching effect on the migrants and their original push areas. It offered migrants new prospect on making new living and ability to support socio-economic conditions in their homeland.

Thus the historical mechanism of migration, which was put in motion over many decades ago triggered off by the harsh ecology of the region has indirectly generated disparity between the Northern region and some other rural communities in different ways. First, the consistent migrations to Khartoum and other urban centers over many decades have given the migrant families better opportunities for education and hence high civil servants and power control in the center.

Secondly, nationalism and national society development was closely associated with the development of the Greater Khartoum where politicians, high-level bureaucrat’s, senior military, educated professional
and wealthy merchants lived and worked. The Northern riverian had long recognized the usefulness of migration and maintaining a presence in the capital and urban areas. Being the first educated generation and had populated the capital and central Sudan, their social and cultural feature has dominated central Sudan. However, the power, wealth, and influence generated by the first Northern migrant have been carrying greater weight in the present Sudan.

Thirdly, the process of cutting of public spending, which started since the 1970s, has assigned greater role to popular spending for development and expansion of social services. Consequently, the regions with more developed cash economy and high numbers of migrants had better opportunities for expanding and maintaining social services than the others subsistence and ecologically rich regions.

Similarly the trickle down effect of environmentally caused consistent migration had generated relative disparities among other traditional communities. However, the trace back of population movements caused by the climatic boundary conditions warrant a separate study, which is beyond the scope of this study. But, we have observed that, environmental conditions had triggered off population movement in two ways. Firstly, slow and consistent population movements caused by low environmental productive capacity with positive trickle down effect on migrants and their clan or tribal home. The trickle down effect vary from one area to another according to the environmental conditions,
availability of land and other local economic opportunities, geographical distance from urban centers and other socio-economic and historical factors. Not only is the trickle down effect caused by climatic boundary conditions existing between different regions, but also it is found within same regions like Kordofan where the environmental variation and development gap has generated development variation between North and South Kordofan and also within North and South of South Kordofan as it observed by the researcher during his work as administrative officer in different councils of Kordofan for seven years.

Secondly, sudden inflow of migrants within rural areas or toward near-by towns caused by fast and drastic environmental change. Such population movements across rural communities boarder is usually accompanied by conflicts and resistance against migrants, particularly pastoralist whose livestock intrude into peasant fields. The most apparent case of such population movement is the migration of North Darfur pastoralist caused by change in the climatic boundary conditions of the region towards more drier conditions.

4.3.3. Ethno-ecological Distribution in Darfur:

The current environmental changes in Sudan have been adversely influenced by the different economic activities and hence social and political events in the drought affected areas.

Drought is an inherent feature of Northern Darfur climate, the region was stricken by drought for several times during the last decades.
Many studies have been carried out into the social and economic impacts of drought on the affected people and in the affected areas, Holy, L., (1987) Waal, A., (1989) El Nur, I., et al (1992) El Bashir, H., (1993) Ibrahim, F., (1999). Yet only a few studies have been given to the impact of drought and environment on tribal conflicts in the drought affected areas Suliman, M. (1993) Suliman and A. Osman (1994). This has resulted in confusion of conflicts causation and their manifestations. While most of studies on drought impact have emphasized on the socio-economic consequences of drought and environmental degradation, the resulting competition and conflicts are usually explained in terms of tribal ethnic or even political conflicts. Thus, conflicts in the drought affected areas i.e. Darfur is viewed in terms of their tribal or ethnic manifestation rather than effect that is the competition over resources, which causes the conflict rather than the tribal or ethnic differences.

The notion of division of people into “Zorga” Black and Arab induced by the diverse ethnic cultural background and diversity of economic activities of each group have led some writers and official to misinterpreted the intrinsic causes of conflict among the different ethnic groups in Darfur. But historically ethnicity in Darfur reflected a situational phenomenon rather than ethnic identification as Abdel-Galil (1994) notes that the ethnic identification process “… involves the evaluation by the actors of the situation they find themselves in”. However,
ethnic division and distribution in Darfur is closely associated with the ecological variation and economic activities within which they developed.

As we have pointed earlier in chapter one, the region is divided into three main ecological boarders, which demand different adaptations. Due to the historical factors and land tenure system the ethnic and tribal distribution, also constitute ecological and socio-economic production systems boarders. Thus, the variant ecological conditions and socio-economic adoptions produce corresponding contrast in material cultures. As the ecological boarders and socio-economic activities are not clear cut, ethnic distribution are also not that clear as noted by Suliman, M. (1997).

Ibrahim (1984) distinguished between two broad ethnic groups each is a rich spectrum of ethnic and social diversity. He has adopted cultural orientation in his classification. According to him, Darfur is divided into the Arabs, the fully Arabized, and the partly Arabized on one hand and the non-Arabized on the other hand. The Arabs are the present Arabic tribes of Darfur who resulted from intermarriage of migrant Arab with the Darfur people. The fully Arabized refers to the tribes who have been Arabized and lost their native language, mainly Berti and tungar. The partly Arabized are the tribes who speak Arabic language in addition to their main native language, the most among others are the Fur, the Zaghawa and the Medob.
Abraham describes the non-Arabized tribes as the tribes who speak mainly little Arabic such as Massallet some sub-groups of Zaghawa the Bergid, the Mima and Tama.

O’Fahy (1980) argued that the genealogical approach, which classifies the people of Darfur in terms of Arab, non-Arab is rather ambiguous and unworkable. Alternatively, he adopted a historical, cultural and economic approach in his classification. According to his classification, the ethnic structure in Darfur can be identified according to the historical migration linguistic and occupational factors.

Suliman, M. (1997) has adopted genealogical, occupational and cultural area approach to define ethnicity in Darfur. According to him, the population can be classified into three main groups. The first group is the nomadic and cattle breeders who identify themselves as Arab. The Arab nomads have high self-esteem with the tendency towards violence and have a feeling of superiority over the other natives, not only ethnically but also culturally. They looked down upon sedentary cultivator culture and its life style. Each group of them has their own military leader “Ageed” to defend the Dar and also constitute anti-destitute strategy in times of major natural calamities through robbing the despised farmers.

The second group comprises the sedentary farmers and small-scale cultivators. They are mainly non-Arab and predominantly subsistent
cultivators. Unlike the other nomadic group, they did not need to have a military organization and traditionally inclined to peaceful life.

In spite of economic interdependence and co-operation between the farmers and nomads, both groups engage in skirmishes over animal’s intrusion in the field and harbour a degree of mutual animosity and mistrust.

The third group consists of urban dwellers including traders, government officials, and absentee landlords and urban based professionals. This group has the important role in the political life of the region. Suliman, M. (1999).

However, classification of ethnic structure along genealogical, historical cultural and occupation may be relevant to distinguishing different ethnic groups, but economic factors remain more important to explain tribal and ethnic conflicts.

As already stated, Darfur can be broadly divided into three main eco-ethnic zones or (Dars), varied with the ecological variation. “Dar” Fur of the peasants Fur community in the central region and “Jabal Marra” Dar Rezeigat of the Baggara semi pastoralist in the South and eastern part of the region where cattle breeding and small-scale subsistence cultivation are combined together in a mixed economy. Dar Zaghawa of camel nomads including both Arab-nomads and Zaghawa semi-nomads in the north.
The population can also be divided using socio-economic and cultural classification into two groups. The first group is the Fur and Baggara in the central rich zone and eastern and southern semi-arid zone. As we have explained earlier, the activities of cultivation and animal keeping in these zones are more complementary rather than competitive. The Fur and Baggara have a long history of interaction and mutual co-operation. In fact, as Abdel-Galil noted, eco-ethnic boarder is a situation phenomenon Galil, Abdul (1984). That throughout the history of this interaction, many Baggara left pastoralist and have been adopting sedentary lifestyle, while some Fur transformed to Baggara in response to expansion of their herds. Like the case of similar eco-zones activities skirmishes and conflict over animal intrusion is a normal feature of life, such events are usually overcome and surmountable by native administration and history of intermarriage and customary rules.

The second group are inhabitants of the upper northern band in the edge of the desert “Dar” Zaghawa. Unlike the people of the first zones, the people here are both Arab and non-Arab camel herders scattered in the semi isolated eco-ethnic groups. The interaction between different ethnic groups inside and outside the zone is limited. This could be attributed to the nature of camel breeding activities, which is characterized by two main factors. First the ecological zone is relatively far away from the Fur and other sedentary peasants locations. Secondly, the need to exchange dairy products and other goods including camel-
offspring and other urban good is relatively less frequent than the case of Baggara.

In the case of Fur/Baggara interaction, it was a part of normal economic relation between them that the Arab Baggara pastoralist rear herds of wealthy Fur peasant for an agreed income, which is never found among camel-nomads. Thus, the situation of being far remote isolated and less in need to exchange goods and services has limited the interaction and co-operation within different pastoralist on one hand and between them and the sedentary cultivators on the other hand.

During my field trip, I have observed that the interaction between the migrant Zaghawa and other sedentary groups in some sites we have visited was almost confined to economic exchanges and co-operation. In Sag El Neam area, the “Shiek” complained that the Zaghawa migrants who settled in the area have been constituted closed society, and reluctant to intermarriage with other ethnic groups in the area. This could be attributed to the cultural continuity factor among the recent migrant groups whose cultural background is characterized by indigenous marriage.

Close investigation of the ethnic composition and social structure of different tribes indicate that ethnic distinction in Darfur is not that clear-cut or consistent. It is observed that ethnicity is closely associated with the ecological zones and the forms of socio-economic adaptation with environment.
Thus, ecological boarders in many cases are also socio-economic boarders. These ecological boarders between different ethnic communities were areas of co-operation and socio-economic interaction and mutual cultural assimilation.

The mutually accommodating relationship between some pastoralist and sedentary cultivators is often involved shifting pattern of life. The constantly shifting pattern of alliances and rivalry over resources has moved some individuals or groups of individuals across their ecological boarder for earring a new living or maximizes certain benefit i.e Baggarization of some Fur. Adoption of new economic strategies means the loyalty to the new ethnic group with which individuals or group of individuals’ allies. However although loyalty to the new system need not contradict with sense of tribalism, the conscious loyalty to new economic order necessitate following the values which stem from that form of economic organization.

Thus, ethnicity and ethnic formation in Darfur cannot be explained in term of tribalism or Arab and non Arab socio-cultural manifestation. It can only be understood within the context of economic and ecological interaction among different actors, which constitute a process of reformation with dominant ecological socio-cultural characteristics.

Similar to Baggarization of some Fur, some Arab tribes settled among sedentary cultivator in Jabel Marra and other areas transformed into cultivator not only economically but also ethnically, mainly some Bi
Halba in addition to some Messaria who obtained local language and has been known as Messaria Jabel. It is not surprising that they have joint the liberation movement against the government and pastoralist militia.

However, the increased competition over resources, their use and the struggle for a large share of local administration authority have constituted a significant factor in underminding the constant process of the ethnic reformation in the state.

4.3.4. The Competition over Resources Conflict Impacts:

For decades the environmental adaptations followed by pastoralist and sedentary cultivators have developed and maintained peaceful co-existence and co-operation among them. The ethno-ecological boarders are boarders of co-operation rather than confrontation; the Arab and Fur fought skirmishes but never engaged in large-scale warfare or antagonism.

The drought has profound impact on both sedentary cultivators and animal herders in both North and South Darfur.

In North Darfur, the drought has led to short rainfall and degradation of vegetation cover, which put both sedentary cultivators and pastoralists under very difficult conditions. The way the people have responded to the intensification of drought impact differs from one ecological zone to another according to potential resources. The sedentary cultivators in North Darfur have successfully diversified income sources and developed new types of cultivation in the clay soil
through development of new water harvesting methods. However, this new form of Wadi cultivation, which is dictated by drought impact has constituted structural adjustment in traditional cultivation and would have positive impact for the local economy and new social organizational arrangements.

Thus, while the Northern peasant adopted different coping strategies including seasonal flood irrigation and year round well irrigation in addition to other measures, pastoralist environmental adaptation to drought effect is limited by the depletion of forage and water resources, which is generated by the drought. Therefore, the ways the pastoralists have responded to the drought have followed the way in which the drought affected the resources.

Similarly, the escalation of conflicts among the various ethnic groups in the two main zones arises from the way the people in the two zones have responded to the drought.

The sedentary cultivators and semi pastoralist of the rich and semi arid land have responded by expansion in cultivation, while the nomads of the arid zone responded by changes in pastoralist transhumant movement. Under conditions of resources scarcity and competition, the pastoralist movements in search of scarce pasture and water have been accompanied by more frequent violation of traditional land use rules and inter-tribal customs as shown in table No. (4.3.1).
Camel nomadic are more affected by the drought, it has disrupted the pattern of their movements in search for pasture. They have tended to move further south towards the rich central zone infiltrating through the Wadis and valleys of “Jabel Marra”. This deviation from the defined traditional routes has become rather arbitrary and did not follow the traditional customary rule, which organizes the right of passage.

The increased effect of drought and competition over resources has put pastoralist into conflicts, both with other pastoralists and with sedentary cultivators. Consequently conflicts and skirmishes among sedentary cultivators of south Darfur and camel pastoralists, which prior to the drought and violation of customary rules, were rarely observed have became more frequent. Table (4.3.1).

The intensification of drought and competition over the limited resources has aggravated the security and socio-economic situation in the region in two ways. First the concentration of productive resources land beyond normal pastoralists trickling and violation of customary rule that organizes and governs the land use and right of access to water and free range, have led to the breakdown of co-operation between the cultivators and pastoralists.

Consequently, the pastoralist have revived and reorganized their tribal military institutions.
Table 4.1:

<table>
<thead>
<tr>
<th>Year</th>
<th>Conflict Parties</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968</td>
<td>Rezeigat against the Ma’alia</td>
</tr>
<tr>
<td>1969</td>
<td>Zaghawa against the Rezeigat</td>
</tr>
<tr>
<td>1974</td>
<td>Zaghawa against the Birgid</td>
</tr>
<tr>
<td>1976</td>
<td>Bani Helba against Northern Rezigat</td>
</tr>
<tr>
<td>1980</td>
<td>Northern Rezeigat, Um Jalol and other Northern Arab</td>
</tr>
<tr>
<td></td>
<td>against Beni Helba, Birgid, Dajo and Fur</td>
</tr>
<tr>
<td>1980</td>
<td>Taaisha against the Salamat</td>
</tr>
<tr>
<td>1984</td>
<td>Misseria against Rezeigat</td>
</tr>
<tr>
<td>1984</td>
<td>Zaghawa against Arab</td>
</tr>
<tr>
<td>1987</td>
<td>Gimer and Mararreet against Falata</td>
</tr>
<tr>
<td>1989</td>
<td>Fur against Zaghawa</td>
</tr>
<tr>
<td>1989</td>
<td>Fur against 27 Arab tribes</td>
</tr>
<tr>
<td>1990</td>
<td>Gimer against Zaghawa</td>
</tr>
<tr>
<td>1997</td>
<td>Zaghawa against Rezeigat</td>
</tr>
<tr>
<td>1996</td>
<td>Arab against Massalit</td>
</tr>
</tbody>
</table>

Source: Suliman (1997) Field work 2004

4.3.5. The Ethno-political Impacts of the Conflict:

Traditionally the military militia is inherent in pastoralist socio-economic environmental adaptation. It automatically organizes and stands-by under request for tribal protection against different types of risks and threats. Given the loss of livestocks and lack of income opportunity outside the sector, some Arab militias have been acting independently particularly raid SPLA and Southern tribes. A professional militia known as the “Jan Jaweed” was formed. It consists of Sudanese
and Chadian Arab nomads. In the beginning, the militia was engaged in some skirmishes and armed robbery against the settled peasants independently. However with the escalation of the conflict and ethnic polarization the “Jan Jaweed” militia has incorporated into Arab federation and hence the competition over resources among pastoralist and peasants turned to be open ethnic war.

The second way, in which the security situation is aggravated in the state, is that, armed robbery and raids on, pastoralists, and passengers have constituted survival strategies among some individuals from different ethnic groups. As we have mentioned the resources scarcity and deterioration is structurally induced process generated by the Sahel climate changes towards drier conditions and/or increase in human and livestock populations, under conditions of absence of socio-economic and environmental development program. Suliman, M. (1999) has proved that there is strong co-relation between drought and tribal conflicts. He divided the armed conflicts in Darfur into two major phases in their development. The first phase is the low intensity characterized by sporadic tribal disputes, many skirmishes and raids following the sporadic drought from 1950-1970s. The second phase is the persistent and large-scale armed conflicts that have been fought since the mid 1980s. Table No 4(.3.1) While the early conflicts over resources were easily surmounted and resolved by the Native Administration and official mediation, the present conflict has aggravated by other factors mainly
intensification of drought effect and outbreak of civil war in Sudan and the neighboring countries. The outbreak of civil war in the neighboring countries of Central Africa Republic and Chad since early 1970s and mid 1980s had a direct impact on Darfur as new weapons entered the region into the hands of individuals and tribes. The power struggle in Chad spell over into Darfur in two ways. First, the Chadian opposition headed by Chadian Zaghawa was aligned with Sudanese Zaghawa who straddles the boarder. Secondly, the civil war in Chad has pushed many Chadian Arab nomads into Sudan trickling in the Jabel Marra rich valleys and using modern automatic weapons against the Fur.

Colonel Ghadafi of Libya has also contributed to the proliferation of arms through his encouragement and support of notion of an Arab corridor into Central Africa. In response, Hissene Habre of Thad helped to arm the Fur against Arab incursion into fertile Jabel Marra.

The government of Khartoum has also contributed to the proliferation of arms into Darfur since 1980s under Sadig al-Mahadi government, which armed the Southern Baggara Arab as a militia to fight SPLA and also armed the northern nomads who were loyal to Umma partly.

Thus, the power politics and armed power deterrence have added a new dimension to the competition over resources management in the area. The competition over resources generally arises from pastoralist pattern of herding which is characterized by land communal ownership. The
operation of this pattern under conditions of unproportional natural increases in livestock, due to veterinary services development and low off-take among camel pastoralist in North. Darfur) and limited environmental productive capacity, has contributed to population of tribal boarders. Indirect access to communal rangeland is freely open without limitation. Accordingly, extended households or individual community members tend to make maximum utilization of tribal communal ranges rather than optimum uses for preservation land carrying capacity. This harmful pattern of herding in Northern Darfur, is noted by Al-amin, Khalid (1999); he explained that land tenure and use among pastoralist of North Darfur is rather vague and of imprecise nature, and this mainly arises from the communal ownership and absence of clear boundaries between different tribal lands. This form of communal grazing tends to concentrate individual herds in the most favourable and productive range, which constitute pressures on rangeland with damaging consequences on the environment. According to Al-amin even before the drought, the form of communal land tenure is harmful to environment and does not encourage the individual normal community member to care for the preservation of resources. Thus, competition over resources has increased and led to violation of customary rules that harmonize access to free range, which in turn resulted in social disruption and breakdown of inter-communal peace. Al-amin, Khalid (1999).
The arbitrary encroachment of nomads into the others’ lands and widespread of disarray have exacerbated by other two factors, mainly the unregistered land act (URLA, 1970) and the abolishment of the system of Native Administration in 1970. The 1970 unregistered land Act abolished customary right of land use and transferred the ownership of all unregistered land in the country to the state. The act effectively enabled the government to allocate part of the fertile land in South and North Darfur to mechanized agriculture and state development projects. But, the traditional land tenure system remained as it is, unaffected by the act. The wide movements of drought-affected population in the fertile land of South Darfur have affected the population and generated conflicts over the right of land accessibility and use. Some people particularly among the Zaghawa and Arab drought affected areas of North Darfur have started to claim that all unregistered land in Darfur is common property to all Sudan. However, while some limited cases of such claims and conflicts had emerged in Dar Rezeigat between some landowners and some drought affected migrant Zaghawa, and settled for the favour of the Rezigat, the case of Fur/drought affected Arab pastoralist is quite different.

Thus, the drought has reinforced the notion of the act, which undermined the principal of tribal home and on which order and regulation of land use was based for centuries.
The abolishment of the Native Administration has led to an administrative vacuum. It was to act as an effective institution for regulation of land and management of conflict over resources. After decades of Native Administration absence, the Salvation regime has revived the system, but it has remained weak and ineffective in setting conflicts and management of people and resources as we have observed during the fieldwork.

On the other hand, the Local Government System and other government organs in Darfur are already weak and poor as consequences of decades of negligence. Therefore, the absence of alternative institutions capable of regulating grazing activities and lack of effective official institutional arrangement for resources management and settling disputes have further re-enforced the environment of conflicts and disarray. Consequently, the sprite of co-operation and tolerance between pastoralist and peasant cultivators has inverted to enemy and skirmishes.

In nutshell the development of the present military and ethno-political dimension, refer back to late 1980s, when 27 Arab tribes formed an alliance against the Fur. The Arab congregation was formed to attract official and financial support from both the central government and the national politicians. The perception that this alliance was backed by the central government has generated dissent among the Fur and led to some revolutions against the government mainly, the 1992 invasion of Darfur by Daoud Bolad.
The participation of Arab militias in crushing Daoud rebellion and the rising dissent in the region has been rewarded with local administrative gains. Some of such administrative rewards have been at the account of the historical rights and customary rules, which govern management of people and resources in the state. For example, the state governor “Wali” of Western Darfur state has reallocated Dar Massalite administrative unit for the favour of the Arab pastoralists. The new administrative division of Dar Massalite has given the Arab pastoralist Nine “Nazara” against only four for the Massalite, which override the historical right of the original Dar owners.

However, the drought impacts accompanied by the other factors have populated the rich Dars of settled non-Arab cultivators with influx of Arab pastoralist. Information generated from the fieldwork and official sources reveals that, since the late 1980s the Arab pastoralists, mainly camel nomads, have shifted their traditional seasonal movement’s routes into the central rich zones, mainly Jabel Marra and Dar Massalite. According to Abu Sin and Takana, (1999) the tension between the Arab and peasants cultivators broke into damage war in 1988-1998 in Jabel Marra and Dar Massalite in 1995 when the pressures on land and water resources became beyond the capacity of the peasant Dar.

Because the conflicting tribes came from diverse ethnic background and the government did not interfere effectively to protect the peasants against the armed Arab militia, ethnicity became a fueling
element. Moreover, the perception of the non-Arab tribes that the government is favouring the Arab has put a political face on the competition over resources conflict. This political change began when two regional opposition groups, the Sudan Liberation Movement Army (SLMA) and the Justice and Equality Movement (JEM) have taken arms against the government. The rebels put the blame for the conflict on the government. They argued that the government has marginalized and empowered the region by consistent favouring Arab. The rebels demand greater political autonomy of the region and share of country’s resources (Amensity International Feb. 3.2004). The government has reacted by call on Darfur people to defend their Dars. Consequently, the Arab militia mainly the “Jan Jaweed” has been acting freely under government support.

This politico-military action against the government has masked the root causes of the problem, and gave the rivalr party a golden chance to achieve his agenda. The “Jan Jaweed” is fighting for driving the settled cultivators from the rich land, and they found that they are doing it with the government support. Thus, they have attacked the villages of civilian from the Fur, Massalite and Zaghawa tribes with a ruthlessness that has never been seen in Darfur before. They have killed, robbered lootd and burned down great numbers of villages and displaced many people inside and outside the country. However, all information reveals
that the “Jan Jaweed” is found responsible, from the human dimension, of the Darfur’s current violence.

Some scholars have hypothesized that drought affected livestock breeders occupations of the settled subsistence cultivators rich land is a government option or policy induced by livestock export flourishes versus backward subsistence economy.

However, whether this is true or not the proliferation of arms among the Arab-nomads to fight the rebel has empowered them to practice more systematic drive of Fur and other sedentary cultivator tribes, which aggravated the human dimension of the conflict.
CHAPTER FIVE

THE NORMATIVE RESPONSE TO DROUGHT

AMONG NORTHERN DARFUR FARMERS

5.1. Introduction:

Like other parts of Sudan Darfur has experienced successive drought hits in the last decades of the last century. The immediate impact of drought was very severe; it led to deterioration of environmental system and undermined its productive capacity. However, the deterioration of environment in North Darfur can generally be attributed to a number of factors:

In fact, the current drought has longer fuelled the debate between climatologists about whether Africa’s weather is getting dry and those in support are talking about very gradual changes. Many scientists agreed that drought is partially responsible for the desertification of Northern Darfur and Kordofan. Man miss use of the natural resources is considered to be an important factor of environmental deterioration (Galal, Hassan 1987).

The frequent short rainfall and harvest failure and reoccurrence of famine are a normal feature of Darfur climatic fluctuation. People in Darfur typically explain such events in moral idiom, that is the increased evil sign and hence the end of the globe. Scientifically the drought, which causes famine, has been gaining more interest among the specialist’s scientists as well as economists and social analysts and politicians as well.

The early sign of environmental impacts in Darfur has been noticed by two social anthropologists Tubiana and Tubiana, (1977), the study has
explained the people interaction with the environment and how wisely they maintain harmony through environmental adaptation in conditions of inhospitable environments.

The environmental adaptation during the early periods of short rainfall has varied between combining cultivation and pastoralist, collection of wild food and migration Tubiani and Tubiana (1977) Ladisla, Holy, (1980).

While the anthropological studies of Tubiani and Tubiana and Ladislay Holy, (1980) focused on the impact of drought on the local community of Northern Darfur, Elbashir, Hamed (1993) has described the coping strategies adopted by the people during the famines of 1985 and 1990. He explained the different traditional coping strategies with food shortages, which aimed to rationalize and optimize the use of food.

The vulnerability and adaptability among the drought-affected communities vary from one area to another according to the frequency of short rainfall and drought, nature and pattern of prevailing economic activity (pastoralist and semi-pastoralist and sedentary cultivation) regional location and land carrying capacity.

In response to the prolongation and intensity of frequent short rainfall and ecological disasters in Northern Darfur and to maintain living, the farmers have invariably followed new pattern of economic activities mainly, developing new water harvesting methods and mobilizing livestock and commercial sectors. Consequently new market
economy trends have evolved with trickle down effect paving the way for new socio-economic structural adjustment in the traditional structure.

However, only few works have emphasized the importance of the new environmental adaptation in mobilizing the economic and social traditional institutions towards more effective interaction SCF (1999-2001).


However, with the successive hits of drought in North Darfur during the last decades, some progress has been made in the rationalization of consumption, optimization of resources use and introduction of new life style.

The initial progress in developing new life strategy was on food production and consumption at household and community levels. Thus, it can be grouped into two categories.

1- Economic coping and survival strategies, which refer to a set of mechanisms and environmental adaptation aim at creation and improvement of the use of existing resources to maintain lowest level of sustainable existence.

2- Social or community response, which includes varied social activities, aims at economic effort and resources reciprocity and
transfer of resources between the rich and poor during the
drought and in acute food shortage periods.

However, the people reaction to the sharp decline in the available
resources depends on the magnitude of the drought and crises. Under the
condition of sharp decline in resource and existence shortage of income
and food, the buffering mechanism allowing affected people to survive
involve high risk. The people under such conditions have only the
minimum potential for survival. In the case of coping mechanism,
strategies of resources creation and improving the use of existing
resources try to maintain a reasonable level of consumption. Both
survival and coping strategies follow similar pattern of life style during
the acute food shortage periods. While the cost of survival strategies
failure is likely to be left for death or fate, the consequence of coping
mechanism failure is dramatic falls in sustainable resources and
deprivation and destitution.

The natures of coping or survival strategies vary according to the
drought effect and duration, environmental and geographical location and
composition of the affected area. Certain survival strategies like
wood cutting and charcoal production, extensive cultivation of marginal
land have negative environmental impact on the long run even if it may
bring immediate benefit to the people adopting as such survival
strategies. On the other hand, some long-term coping strategies like
water harvesting cultivation could constitute or imply long lasting
structural adjustment and transformation in the household and community as well as a whole life style

Coping strategies are not confined to agricultural or local activities during the drought, traditionally the socio-economic structure of the production system allows for activities other than cultivation whether inside or outside the area i.e. seasonal migration hand craft making.

5.2. Coping Strategies in North Darfur:


The geographical and environmental composition of Darfur provided substantial adjustment to permanent cultivation. That is the availability of clay soil and varied sources of water have developed new pattern of cropping with normative trickle down effects.
5.2.1. Consumption:

Food rationalization is well known and practiced in times of food shortage in the traditional sector. Before the drought the Northern Darfur population had used millet as the main staple food, sorghum was for fodder and brewing beer.

With the coming of drought and shortage of food and income, food preparation and consumption habits have changed significantly. People adapted their consumption by reducing the amount and frequency of meals, substituting expensive food types for cheaper choices and resorted to wild food.

During the 1985 the amount of flours served was reduced, the quantity of food presented and meals frequency was also reduced to only one or two meals per day to rationalize and economize on food consumption. All the interviewed rural people in North Darfur reported consumption of less than three meals during the 1985 famine, while more than 25% of them had survived on one meal only. This is particularly for the people of El Syah. Economization on food consumption included changes in food preparation, that is fewer flour is used for “Assida” porridge preparation.

Such types of cooked porridge are softer or liquid-like than the normal thick porridge. New food preparation also included frequent consumption of some types of food, which are easily accessible and not commonly used. This particularly in the far northern villages where
people used to use watermelon liquid to serve specific cook called “Bajbajay”. Other measures, most people abandoned consumption of food that requires expensive and large amount of items.

It is observed that the 1985 famine has effectively influenced consumption behaviour of North Darfur population. All the interviewed individuals replied that the consumption of sorghum during 1985 and the successive food shortage periods. Some old respondent reported that their first experience with consumption of sorghum “Assida” has only started with the harvest failure of 1985-84. Nowadays the strategy of substituting the expensive millet for comparatively cheap durra is widely practiced among low-income groups in rural and urban areas of North Darfur.

The introduction of clay soil production has developed new consumption behaviour among the rural communities. Vegetables and other types of fruits and new Wadi crops, which were not known before, have been increasingly expanding as supplementary food among household farmers.

5.2.2. Wild Food:

One way of diversification of food sources during drought and acute food shortage in most parts of North Darfur was the resort to wild food. The most commonly used is “Mukheit” which some times called “Kurrssan”, the seeds of *genagalensis* shrub. The other types of wild
food included fruits, seeds and leaves of specific types of surrounding environment.

Most of such types of wild food were already known in Darfur, but since 1984-85 famine have been playing significant role in mitigating food deficit among poor families during food crisis. According to Dewaal, (1989) the wild food impact in mitigating the initial effect of harvest failure in 1984, 85 were greater than food relief. Most of the interviewed officials and local leaders confirmed that most of the people had eaten wild food in 1985 famine.

The wild food consumption varies from one area to another according to famine intensity and surrounding environment. However, all evidence indicated that wild food consumption is a function of income level in drought times, that is no one of high income group reported consumption of wild “Mukhiet” in 1985 famine and successive rainfall failure.

The list of the traditional wild food is fairly lengthy, but the most important one, which maintained many poor people during the famines of 1985 and 1991, is “Mukhiet”. Its processing for consumption takes long time, soaked in several water exchanges over long period before being edible. It is either mixed with grain or use in its pure form. Most of the people who used “Mukhiet” during drought reported dilution of grain with “Mukhiet” cereal. Only a few poor households’ respondents reported consumption of pure cereal, but it was only for short period.
The “Mukhiet” seed are very small and its shrub spread over wide area. Therefore, its collection requires long marching for long periods. Its collection was not confined to own or immediate consumption, stocking and sale of “Mukhiet” is reported post 1985 famine in different parts of North Darfur.

The other source of cereal during the same periods of food shortages was the internal cover of watermelon, which dried and used for porridge preparation “Assida”. The other types of wild food are of less importance than “Mukhiet” for life saving during the acute food shortage periods. With the exception of “Abdieb”, which is sued by poor households as substitute for dried okra, most of the other types of wild leave; fruits, berries and seeds are traditionally used as cash generating activity and delicious food.

However, with the successive drought hits, and climatic changes, in the Sahel zone some writers have assumed greater role for wild food particularly “Mukhiet” within Darfur economic and environmental crisis De Waal (1989). Elbashir Hamed (1993) has pointed out that:

...and God knows if it will one day be calculated as part of the regional Gross Domestic Production by economists (Elbashir, H. 1993).

It seems that such analysis stems from the investigation of the traditional coping strategies in their initial process of formation rather than deep investigation of the potential capacity and prospect of human interaction with the environment.
Nowadays collection of wild food in Northern Darfur has been confined to delicious consumption and sale in the urban centers. The people of Darfur have been able to solve the problem of frequent food shortage in the area in more dignified way, mainly expansion into Wadis and clay soil cultivation and mobilization of the other potential capacities in the region.

5.2.3. Drought and Changes in Cultivation:

Agriculture in North Darfur is traditionally subsistence organized on household labour and mutual assistance between villagers. Prior to the introduction of clay soil cultivation, most of the rural population practice subsistence millet cultivation. While most of Darfurican keep combination of livestock, in the far northern part, the main economic activities for the majority of the population is raising animals.

In the South the main economic activity for the majority is animal rearing and sedentary cultivation for the Fur of Jabel “Mara”. Apart of the human trance movement of the South Darfur pastoralist Baggara is moving into North Darfur. Both economies of North and South Darfur complement each other. Usually the sedentary cultivators of the North provide the pastoralist of the south with grain and other agricultural products, while the pastoralists sell animals’ products to the sedentary cultivators of the north.

Crops cultivated in the north included only millet as main food staple crop in addition to oil seeds; sesame and ground nuts, and other
minor food and cash crops mainly watermelon lubia *lablab niger*, karkadeh (Hibiscus sabdarifa).

Clay soil cultivation was not unknown in North Darfur; traditionally clay soil of the Wadis was used for cultivation of okra, tomatoes and cucumbers in small plots “Jubraka” for supplementary consumption.

The clay silty soil in valleys is also utilized in small scale for cultivation of durra, sweet sorghum and other minor crops for subsistence consumption. Such plots were usually very small and were managed by women and children.

The role of such “Jubraka” in the traditional economy varies from one area to another. In some areas the land put under cultivation of such products was relatively varies between $\frac{1}{2}$ - 1 mukhamass as in Eid Elbida Golo Wad Kota and Abu Suekeen of North Darfur (field work).

Other areas have a long history in tobacco “Tombak” cultivation, in small plots, mainly in Shingili Toby and to less extend in Sheggra and Tawella. Both areas were known “Tombak” prosperous areas in North Darfur.

However, the variation in the size and distribution of the clay soil cultivation in North Darfur before 1985 had no specific pattern other than the Wadi beds distribution and level of rainfall and capacity to release excess labour supply.
5.2.3.1. Drought and Changes in the Goz Cultivation:

There was an already established traditional resilience system, which was functioning effectively under conditions of frequent short rainfall and natural afflictions in the traditional sector of Darfur. With the increased and intensification of drought hits in Northern Darfur, the traditional resilience measures have no longer been effective in managing resources deficit. The immediate response was survival strategies and migration. The long term coping strategies included introduction of new cultivation methods and techniques, first in the Goz land and later shift to Wadis and clay soil cultivation. There is no specific date for the evolvement of these changes, but according to fieldwork investigation, it refers to post 1985. However it is observed that they have been gradually experimenting with these new methods of cultivation.

The main changes in Goz cultivation included expansion of land put under cultivation and diversification of plots into different directions. Most of the people interviewed reported cultivation between 10-15 mukhamass compared to 5-7 in the past when the soil was more fertile and life intact as old people commented.

Cultivation of more than one plot in different directions to cope with spatial variation of rain was already known in North Darfur, but it was not commonly practiced. Nowadays cultivation of more than one plot has been a common strategy to compensate for low productivity and risk diversification. The distribution of plot over wide directions is
limited by the household labour supply and ability to finance wage labour. This strategy is also followed by new technique of economization on seed use, which tends to increase space between pits and rows and reduction of number of seeds in each pit so as to reduce the competition over soil fertility. Other risk minimization strategy, which was historically in use and have been revitalized included expansion in dry sowing “Tar meal”, that is sowing a month before rainfall with the aim of expanding plots and saving time for other income generating activities. Moreover intercropping has been commonly and intensively practiced in the Goz cultivation. This strategy mixes some early maturing crops with the cultivated millet. Such crops do not require much effort and provide a source of cash to support households before harvest season. Thus the season of early maturing crop “Darrat” have no longer been the season of delicious consumption only, a quick market simultaneous to the quick maturity season has been developed.

In some parts of Southern North Darfur where animal raising had substantial role in the subsistence economy, new strategy of commercial cultivation in the Goz land has developed. With the death of cattle and release of labour the common strategy among semi-pastoralist household has been cultivation of more land to offset the livestock loss. This is particularly in the villages in between North and South Darfur where the agricultural potentialities in term of land and rain are better than the deep further northern villages.
However the socio-economic changes facing rural communities in the traditional sectors are not only an outcome of cumulative environmental hazards, but also as some studies have pointed out were the result of trade liberalization policies which effectively influenced the traditional economy in Sudan. Elfaki, A. Izzeldien, (1995). The weakening of subsistence structure and the unproportional increases in the cost of living and cash crops prices has caused significant expansion in the traditional commercial cultivation.

Unlike the traditional cash crops of the Goz land, commercialized millet prices is determined by the local market mechanism operation rather than the international market. Therefore, the demand-pull inflation in the region is partly caused by millet deficit and absence of government monopolistic control over millet trade as the case of Oil Seeds and Gum Arabic companies, which monopolized oil seeds and Gum Arabic trading.

Moreover, the expansion of millet cultivation in the area to the south of state is partly due to the increased migration from the north mainly the Zaghawa and partly to the introduction of land rent. The cheap migrant labour has flourished wage labour market and mobilized agricultural market in both the Goz and Wadis. The average area put to millet cultivation in the South part has been amount to 10-40 Makhamass compared to 10-20 Makhamass for the North part, only a few farmers from the North reported expansion in commercial millet cultivation (fieldwork 2004).
The proportional increase in commercial millet cultivation vis-à-vis the other traditional Goz cash crops confirms the assumption that local market is steadily growing.

However although investment in millet cultivation in the Goz involves some risk, the cheap labour and remunerative prices enhanced by cheap land rent yet is stimulating more risk takers.

Another major change in the Goz farming, which mobilized by the process of the economic monetization is introduction of improved melon varieties and expansion in traditional watermelon cultivation.

Traditionally watermelon is a supplementary food and cash crop. It is either intercropped with millet or cultivated in separate plot. With the successive short rain, watermelon has been playing significant role in supporting household income and consumption. It is less affected by drought and need only minimum level of rainfall. Its durability is very high and characterized by multi-uses. Its flesh is eaten fresh; its internal cover is usually dried and grinded to diluted flour. Its seeds and juice are also having several benefits; several types of food are served with both components. This in addition to the high national and international demand for its seeds.

**5.2.3. 2: Expansion of Wadi cultivation and change in modes of Production:**

As we have mentioned earlier, the clay soil cultivation in the North Darfur was limited to small plots of okra and tomatoes in the Wadis for
own consumption only. This in addition to some plots of durra in the valley for animal fed and limited human use. The successive short rainfall and millet cultivation failure in the Goz have mobilized Wadi and clay soil cultivation as new coping strategy triggered by the consequences of the process of economic liberalization in the country.

However, the development of clay soil cultivation was neither accidentally nor externally motivated. It has gradually emerged out of human interaction with the environment induced by food shortage and lack of cash to secure subsistence.

Traditionally only a few areas in North Darfur were already known with limited pattern of cash cropping in the Wadis. This is particularly so for tobacco “Tombak” along Wadis sheggra – Wadi Kafut, Tawella and Shingly Tobay.

With the persistence of the drought and shaken-up of the Goz economy, people started to allocate more of their labour and time to Wadi cultivation as risk diversification strategy. The inherent high fertility and capacity to maintain moisture for longer period in the Wadi, has assigned more importance to the strategy of Wadi cultivation.

Unlike production in the Goz land, growing cash crops on Wadi land is mainly for market. It includes various types of cash and food crops including traditional Goz products such as sorghum, sesame and even millet. Moreover, Wadi cultivation is guaranteeing a higher output with more certainty. Therefore, the gradual shift from Goz to Wadi
cultivation has been steadily growing among households adjacent to Wadis.

This shift has been accompanied by a new pattern of cropping and labour organization including innovation of new irrigation and water harvest methods, introduction of year-round cultivation, commercialization of the different agricultural processes and wage labour. In the beginning, the Goz economy collapse has led some of the people to turn to Wadi cultivation as supplementary or primary activities, and due to inputs and technical factor the area put under cultivation was small, it amounted to ¼ - 2 Makhamass per household plot. Nowadays and with the development of the agricultural techniques production of different types of vegetables and some other clay soil crops mainly “Tombak” for the market have become practiced among the majority of households in villages near Wadi and valley lands. Some private large-scale schemes have developed in the out skirts of Elfasher.

However there is no official estimates of the clay land that is put under cultivation in responses to the drought, but the development of water harvesting methods and significant increase and spread of the traditional and mechanical well irrigation may give indicators to the sizeable expansion of such types of cultivation. What is certain this expansion in clay land cultivation would have implication for the prospect of the socio-economic development among North Darfur household-farmers. This agricultural shift has been as well accompanied
by structural adjustment in the modes of production, which was based on household labour supply and communal assistance. The changes have involved considerable adjustment in the economic and social organization. However, these changes vary from one area to another according to the options available for cultivation including Goz and Wadi cultivation, water resources, labour and marketing facilities.

The inherent higher Wadi land fertility and ability to use different water harvesting and irrigation methods, have successfully turned the risk minimization coping strategies in the Wadi into sustainable production capacity, which in turn involved structural adjustment in cropping pattern.

Two main types of Wadi cultivation have been developed by the household farmers’ post 1985 famine. Seasonal flood irrigation and permanent well irrigation according to the characteristics and topography of the land and water resources endowment.

Following the successive short rainfall several methods of flood irrigation were developed for expansion in Wadi and valley lands cultivation mainly terraces irrigation and run off harvesting.

For the terraces irrigation, the people in North Darfur, were used to collect and retain local precipitation for small plot in the Wadi. The construction of such bunds or terraces was carried out with traditional hand tools i.e. hoe and shovel, soil cultivation is done after water evaporation.
The traditional terraces are characterized by irregular rectangular shape with weak bunds which cannot withstand high water flows. The agricultural adjustment has included modification of such traditional terraces in a way to withstand more water flow. The new terraces have a U shape facing in the opposite direction of water run off to tap water and maintain moisture for longer period. This new development in terraces irrigation has been widely adopted in the Wadi and clay soil lands for cultivation of variety of food and cash crops. Most of the interviewed households reported having more than terrace in the Wadi and valley. “Dura” and vegetables cultivation have expanded in many parts of North Darfur using terrace irrigation methods.

"Tombak" cultivation and trading using these methods of irrigation has expanded and flourished very significantly. Some villages have grown as big center for “Tombak” cultivation and trading mainly Shingly Toby, Sheggra, Tawella, Coram and other small centers. Vegetables and to less extend fruits cultivation and trading have also been the main activities of some villages near Elfasher i.e. Kafut. Abu Skeen, Golo, Eltena, and all other small villages adjacent to urban centers in the North Darfur. Subsistance cultivation in such areas is limited and confined to small poor household with no clay soil land.

Beside terraces irrigation innovation, the water run off harvesting techniques have also developed among Wadi cultivators. There are basically two types of water run off harvesting that have been widely
applied in the clay soil. The first one is natural basins surrounded by high dikes without spillways or water control facilities. Such basins are widely spread in the clay soil valley. It is locally called “El Neel” the Nile land, cultivation is done when the water dried up from the surface. Although “El Neel” used to be practiced before the drought in limited plots, the flourished market of “Tombak” and vegetables has led to wide utilization of “El Neel” irrigation method as additional source for income generation.

The plots of such irrigation methods vary in size and types of products, crops grown in small plots usually include some vegetables such as okra, cucumber, cucumbus and watermelon. The relatively extended “Neel” outward Wadi bed and “Khurs” usually put under cultivation with “Tombak”.

The second type of run off harvesting technique is construction of wild embankment terraces dikes to harvest water run off for cultivation of relatively large plots.

There are two types of this strategy, which are widely practiced in the valleys adjacent to the Wadi. The first is that a simple embankment constructed to enclose the plot and tap water run off for durra cultivation usually for subsistence. The other type of earthen embankments is bigger and requires a relatively high capital and technical facilities. It is mainly built by tractors or bulldozers and includes diversion of the water run off from the Wadi to the basin. The most commonly cultivated crops in as
such large-scale method of cultivation is durra for market, which has been highly demanded as substitute for millet. The size of such commercial farming is varied in size and distribution. While the commercial cultivation of durra is limited in the north of North Darfur many large scale schemes of durra cultivation has established in Elfasher province and to less extend to the southwards. In an interview with the General Director of the State Ministry of Agriculture, he reported registration of more than (50) fifty large-scale scheme, in rural Elfasher. The information generated from the fieldwork reveals that such schemes are mainly run by “Hakura” owners, merchants and government officials and professionals including some physicians, engineers and university professors. The size of the schemes varied between 50-200 fedans, and they are mainly oriented to durra and vegetables production, which has been highly demanded among Elfasher urban population who turn to consume durra and bread as staple food instead of millet. Moreover some medium scale constructed embankments widely observed along wadi Golo, Wadi Elku and Sag El Neam. They are usually carried out with collectively rental tractor or bulldozer under supervision of survey technician. Most of the fertile lands along these Wadis have been occupied and put under cultivation by the “Hakura” owners and small numbers of better-off family’s fraction who have access to high capital and technical inputs.
Perhaps millet, by far the most important crop in North Darfur, is generally cultivated as monoculture crop. But, recently the increasing adoption of flood harvesting irrigation systems has expanded the production of other cash earning crops in addition to durra either as food or to sell in the market. As the new methods of water, harvesting cultivation is less vulnerable to low and erratic distribution of rainfall, it has gained substantial importance among the household farmers in villages along the Wadis and near valleys. Consequently, the lands put under cultivation in clay fertile sedimentary soil, which formed in Wadis have expanded very significantly. This is widely observed in Wadi Kutum, where the floods expand over a large area creating extended silty alluvial soil along the Wadis.

The area stretching away from the Wadi bed is also characterized by high fertility as a result of sediment deposited by annual water runoff. In some areas almost all of the available alluvial soil along the Wadi beds are utilized by household farmers for either “Tombak” and vegetables or durra cultivation i.e. Golo, Kafut, Sheggra and Tawella.

Along Wadi Kutum, nearly all of the available alluvial area is exploited with either vegetables or horticulture including date palm trees or durra. In areas like Sheggera and Tawella where “Tombak” cultivation is highly successful, it is usually grown at the expensive of food and other cash crops.
In some areas millet cultivation has been taking place on the alluvial terraces mainly in the northern Wadis of the State. Sometimes it is mixed slightly with sorghum. This is observed in Wadi Kutum and Wadi Kafut, while sorghum cultivation practices are wider in other Wadis like Wadi Elku, wadai, Khazzan Gedidid and Abu Zerega. The distribution and alteration of crops among small household farmers is largely influenced by the level of market facilities and market economy development.

The other important agricultural form of environmental adaptation in response to the successive short rainfall and failure of millet cultivation is year-round well irrigation. Traditionally wells in North Darfur provide villages inhabited near Wadis with drinking water, deep wells are only constructed and controlled by the government for human and animal use. Irrigation from wells prior to the advent of drought was limited and only reported in Kutum, Lemeina, Kafut, Abu Sikeen and Wadi Elku.

Deep well irrigation was only practiced on two public projects in Sag El Neam for Sorghum and vegetables production and to less extends in Golo for citrus plantation. However due to the high cost of water pumping in Sag El Neam, the project did not maintain and we have found only one working well which provides drinking water for human and animal population around.

Similar to the traditional flood irrigation methods, shallow well irrigation methods; have developed very significantly as another form of
coping with short rainfall and food deficit. Shallow wells are constructed along the Wadis into or near by the sandy beds. Unlike flood cultivation, shallow well irrigation is only practiced along the Wadis watercourse in the expansive upper reaches of the Wadis, which is characterized by availability of surface water and fertile soil.

The useable shallow ground water is usually situated in sandy fragile soil at a depth fluctuate between less than one to four meters shortly after the rainy season and 6 to 8 meters at the end of the dry season – (fieldwork). The shallow water distribution and levels along the Wadis beds are not similar; therefore, the irrigation methods are not as homogeneous as flood harvesting methods. Thus, year-round cultivation is confined to villages adjacent to the Wadis watercourses.

Two methods of well irrigation have developed very significantly during the last two decades, traditional water hand lifting method-using bucket “Dalue” and modern water pumping method using pumping machines. Both methods are intensively spread in all Wadis where shallow water is available.

As such ground water is usually found in fragile sandy Wadis soil, the shallow well mostly requires lining, which is locally called “Adad”. It is a process of constructing wooden or stone frame round the well from the top to the ground depth so that the sandy soil throughout the depth will not collapse. As such method of lining have environmental bearing El Amin Khalid, (1994), some water pumps owners have introduced new
method of modern lining in which the sandy soil is held off by constructing light concrete frame. This method has been widely spread and subsidized by some organizations in some areas mainly along Wadi Kutum (fieldwork).

With the introduction of subsidized cement lining and improved financial situation of well irrigation cultivators, the traditional “Adad” lining has been decreasing steadily and hence leads to less environmental hazards. In Kutum and Fatta Barno where traditional “Adad” lining using wooden or stone frame had been widely used, the German Embassy has funded a local project for construction and distribution of subsidized concrete well frames.

The majority of the mechanical well using water pumps have altered traditional “Adad” frame with subsidized or commercial concrete lining frame, while about 60% of traditional water lifting irrigation methods have been changed into cement lining (fieldwork).

Unlike the modern concrete frame the traditional wooden lining, which is fixed inside the well to hold off the fragile soil requires continuous maintenance and should be replaced every 2-3 years. Therefore, the majority of the farmers we have met in Kutum and satellites villages were registered for obtaining subsidized cement lining. The list is fairly lengthy and beyond the project capacity.

However, many of the household nearby Wadis are small-scale producers distributed in small pieces of land along Wadis beds. Due to
lack of inputs and market facilities, they cultivate such small pieces by vegetables for cash to obtain grain and other essential consumption goods. Most farmers of them are poor cultivators using “Dalue” without access to subsidized or commercial cement frame. They usually lin their well with the Adad as the only possible method for lining, which involves continuous maintenance and replacement cost.

The development of well-irrigated cultivation has been the most significant adjustment to short rainfall and failure of millet production. The shift from the Goz millet cultivation to permanent well cultivation, mainly vegetables, has important implication on household income and subsistence during normal and short rainfall periods.

Normally most of the well-irrigated plots are grown with cash crops, which are sold to obtain grain and used as supplement to household consumption. The surplus income generated is either reinvested in cultivation expansion or accumulated to acquire water pump device. It is interesting to notice that despite the low level of consumption, the marginal propensity to save is relatively high to the consequent incremental increase in incomes among the small-scale Wadis cultivators.

The lesson from drought and food decline during the last times has developed economization and rationalization of resources use as part of the new socio-economic set up among poor households. Most of small well irrigated cultivators reported economization on consumption and
other expenditure to obtain capital for buy of water pump device, which would have significant future implication for cultivation expansion and hence income and food security among poor households near Wadis beds.

The expansion of water pumps have also led to expansion of horticulture production. In interview with the cultivators trade union in Kutum, (which is recently established) they informed the author that the numbers of water pumps devices have increased from 8-10 before 1985 to more than 3000 pump devices inside Kutum district.

Information generated from the interviewed agro forestry producers reveals that introduction of horticulture crops was somewhat random, as people had no preference to as such field of production. It is observed that some producers in Kututm have started to replace grapefruit and orange trees by lime, which can be sold fresh and dry. The same farmers reported that the removal of some fruit trees was due to low domestic demand for such products where as outside markets could not be easily accessed.

The shift from the Goz to Wadis and clay soil cultivation using the different techniques and methods of irrigation has been accompanied by significant adjustment in cropping pattern, land tenure system, labour and migration, market and socio-economic transformation.

5.2.3.3. Cropping:

Prior to the advent of drought, all households’ farmers in north Darfur devoted all their efforts to produce their own annual subsistence
crops requirement. Millet as the main staple crop gets priority over all others food and cash crops. Sowing of a mixture of major and minor crops was not unknown, but recently has been widely and intensively practiced as crops diversification and risk minimization strategy in the Goz economy. But despite the wide adoption of this strategy, millet by far is generally cultivated as monoculture crop in the Goz.

With introduction of terraces and well irrigation in the Wadis real new cash and food, crops were developed as a new more secure pattern of production. This development has constituted structural adjustment on cropping pattern and crop calendar with future implication for transformation of subsistence production structure towards market economy production.

The adjustment that has been adopted in the Wadis and clay soil differ from the Goz cropping in term of crops and vegetation period. The first step for cultivation of the millet and other crops in the Goz is the clearing of the field, which starts in May, while the normal sowing starts after the first intensive rainfall. If the rainfall is promising and well distributed the farmers will continue to cultivate more plots, otherwise they will seek other coping mechanism earlier. The successive low rainfall period has compelled the households’ farmers to turn to vegetables and durra cultivation in the Wadi following different methods and crop calendar.
Two methods of durra cultivation are adopted among small cultivators in the clay soil. The first method is that small plots sown by rainfall later than the millet and the second type are relatively medium size plots irrigated by surface water, which starts after the water has been drained off. Unlike millet cultivation, the agricultural process of durra cultivation requires a longer vegetation period, which takes place after the first processes of the Goz cultivation. Harvesting of the durra specially irrigated plot also takes place distinctly later than that of the Goz crops. Therefore, the adjustment to durra cultivation could be combined with the Goz millet cultivation. Thus, durra has been commonly used as substitute or additional staple food among household farmers in North Darfur.

While the durra cultivated by small household’s farmers is mainly produced for family consumption, the other crops of the Wadis are mainly produced for the market. The first working step for cultivation of vegetables and “Tombak”, which is irrigated by flood, starts immediately after the water surface has drained off usually in September – October. On the other hand, the season for crops irrigated by shallow wells starts after the rainy season and usually lasts up to the beginning of the next season.

The expansion in vegetables production has in turn involved change in consumption pattern and additional food items, which was not used or even known previously, have been commonly used cooked and fresh vegetables.
5.2.3.4. Changes in the agricultural tools and equipment:

The shift into clay soil cultivation was also accompanied by introduction of new agricultural implements and tools. The new pattern of cultivation in the clay soil required new different types of tools. The old traditional Goz implements have been replaced by animal traction and other new implements i.e. Torriya (handled hoe). Most of the interviewed household near by Wadis of Shiggera Golo and rural Elfasher reported using camel ploughs for cultivation of the alluvial soil and Wadi land. In Shiggera, the use of the animal plough is reported since the beginning of the 1980th. With the expansion in Wadi cultivation, the use of camel plough has spread among the village farmers.

Due to widely common camel robbery in many parts of North Darfur, other animals such as donkey and cows have replaced the camel in drawing the plough. By using an animal drawn hoe the weeding process in the clay soil has been easier and time and effort are reduced to nearly third of the time necessary when using the old weeding tool “Hashasha”.

Most of the new agricultural tools and equipment have found their way to North Darfur traditional farmers through farmers’ outside visits and contacts. However despite the lack of references and technical know how of applications of such technology among the farmers, they have quickly adapted to their use and maintenance. In addition to the use of
tractor plowing the author have seen a Land Rover vehicle traction during the field work.

The new capital-intensive technology is positively valued and has been steadily diffused among cultivators; some of local black smith and handicraft are now specialized in different types of ploughs replication and have been capable of repairing or replacing screws or whole parts of the different tools and equipment. It is not only the fact that the use of new agricultural tools and methods have reduced the work inputs and saved time, but also the common appreciation of the usefulness of it have developed common attention and interest in new innovations.

5.2.3.5. Change in land tenure and use:

Similar to many other African communities in the Sahel, land tenure system and use in Darfur vested in the community with individual households having only the usfructory rights as it is explained previously in chapter two. The right of use is granted by the sultanate since 1917th century to individual who remained the landowners. Every landowner controls the communal use of “Hakura” according to traditional regulatory customs. A Hakura in Northern Darfur entitles a definite piece of land, which incorporated certain communal or tribal right of use. Communal control of land by the “Hakura” owner may cover village, several villages or a whole tribal area.

Historically the “Hakura” system involved socio-economic and political structure, that the Fur sultans allocated “Hakuras” (Hawakeer) to
royal family and other social, political and military leaders as reward for their allegiance to the sultan. The “Hakura” owner collects agricultural tribute from the farmers on the land and a portion of it goes to the sultan. Thus “Hakura” system was functioning as hierarchical administrative system for collection of taxes and to reward the political allies and sanction the opponents.

Despite the frequent cases of transfer of “Hakura” titles from the political opponents to political allies, usually the sub-”Hakura” titles “Sid El arid” position did not change “O’Fahy’ 1977. Thus the direct “Hakura” allocation on land use and retention among communities remained inherited with the “Sid El arid” tribal leader families throughout the history of Darfur.

Change in political or tribal leadership after the abolishment of Fur sultanate did not involve changes in “Sid El arid” or “Sheikh El arid” position in control of land allocation and use. But it remained confined to the traditional Fur land regulatory system. However, land tenure system in North Darfur is closely associated with political and social leadership, since political and tribal leadership changes is limited. Only a few cases of such separation is observed among the community farmers during the field work.

5.2.3.5.1. Drought impact on land tenure and use in the Goz:

Traditionally the farmers of North Darfur adopt a prolonged fallow system, usually every household farmer had two plots, put under
cultivation with millet and gum Arabic trees “Hashap”. The two plots are replaced by each other every 10-15 years with private right of gum Arabic collection from own gum Arabic trees on fallow. That strategy of environmental adaptation was providing a source of cash from gum Arabic trees on one hand and regaining land fertility when fallow land opened again on the other hand. With the diminishing productivity and expansion in millet cultivation that system no longer exist which led to further land fertility decline and hence increased demand for land to offset the diminishing productivity, consequently land use has been effectively influenced by the new measures to compensate for food deficit.

Given the traditional land regulatory customs, individual use of communal land is confined to members of the community whether households or individuals. Non-community members or foreigners who reside among “Hakura” tribe or community are allowed the right of land use, but limited by unconditional right of land retention. Thus the right of access to land among rural people of Darfur is a function of social entity that is full usfructory right is only confined to the recognized members of “Hakura” social group whether clan, tribe or community village or villages regardless of ethnic root. This right of use and tenure depends to great extend on the size and capacity of household labour supply or ability to put sizeable land under continuous cultivation. The impact of the drought on land use is closely related to the newly adopted coping
strategies. The risk minimization and increasing farms size have expanded the area put under cultivation into wide directions with an increase in the farm size from 2-5 mukhamass prior to the drought to 7-15 mukhamass after the drought. This is mainly due to the revival of dry sowing “Tarmeal” strategy, which incorporated all the household labour supply including children into the cultivation processes. This strategy has also involved new organization of household labour supply that is a part of the labour is concentrated on the more promising harvest, usually women and children, while the able-bodied members migrate southward or elsewhere in search for agricultural labour opportunities. The new technique of spacing between plant and wide practices of intercropping have also contributed in the expansion of area put under cultivation in the Goz. The consequent general rises in the price, which accompanied the short rainfall and drought have motivated traditional cash crops and millet commercial cultivation very effectively. Millet commercial expansion is clearly observed in Dar Elsalam rural District where the permanent and seasonal migrants provided cheap agricultural labour compared to millet prices soared up – as shown in the table below.

Table No. 5.1: Millet Prices On Darfur 1983-1993

<table>
<thead>
<tr>
<th>Year</th>
<th>Ls. Per Sack</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>Ls.0230</td>
</tr>
<tr>
<td>1984</td>
<td>Ls.0250</td>
</tr>
<tr>
<td>1989</td>
<td>Ls.0150</td>
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<td>1990</td>
<td>Ls.0300</td>
</tr>
<tr>
<td>1992</td>
<td>Ls.1025</td>
</tr>
<tr>
<td>1993</td>
<td>Ls.3800</td>
</tr>
</tbody>
</table>

5.2.3.5.2. Drought Impact on Land Tenure and Use in Wadi and Clay Soil:

Land tenure and use in the Wadi and clay soil prior to the drought was very limited. With exception of small plots of okra and tomatoes in the Wadi, most of the interviewed individuals reported that Wadi land was usually utilized for domestic animals rearing. In some areas people more used to cultivate small plots of durra in addition to construction of limited small earthen bund for okra cultivation for the local market.

The discovery of the clay soil capacity to maintain production using rainwater and run off harvesting techniques has mobilized vegetables, “Tombak” and durra production very significantly. Consequently, claim to clay soil land has increased very significantly after the development of the new irrigation method following the failure of the millet production to meet the subsistence needs of the farmers. Information generated from the fieldwork has shown that the size of Wadi land cultivated by the household has increased from ¼-2 mukhamass to 3-5 mukhamass after the development of agricultural implements and techniques. Improvement in the construction of terraces has also brought large area of alluvial clay soil under cultivation.

The wide spread of Wadi and alluvial soil cultivation among the household farmers has been accompanied by changes in the form of cropping and land use and tenure. Unlike Goz millet subsistence
cultivation production on the clay soil is mainly for the market, which would have implication for the development of market economy and hence evolvement of new market production relations.

Although the initial adjustment to Wadi cultivation was mainly triggered of by need to obtain cash to secure subsistence, strong trends towards agricultural investment has evolved among better off and small household farmers. The shift to Wadi cultivation and changes in the cropping pattern has resulted in some changes in land use and land tenure pattern in many areas of North Darfur.

Individual access to clay soil “Hakura” follows the basic principal of the traditional regulatory land customs. Individuals and households access to fertile Wadi land is limited by the size of their labour supply and types of simple implements and tools, which are used in the different cultivation operations. Although there is no restriction on the size of land for any “Hakura” member as long as it is permanently put in use, most of the nearby fertile land along the Wadis are owned by the Shiekhs and their extended family members who usually have access to agricultural inputs more than the others. In Wadia village sub-council of Dar El Salam District, about 20 households of Sid El arid extended family hold the largest better fertile land in the Wadi bed and expansive silty soil nearby the village. Similarly in many other areas the “Hakura” owners “Ahl Al arid” obtain most of the better fertile lands.
Access to the clay soil following the traditional regulatory customs requires access to the necessary capital to provide fixed and running cost and maintain cultivation. However, most of the poor households adjacent to Wadis and clay soil land do not have access to the necessary input to maintain both subsistence and investment production. Therefore most of the large investment production in the clay soil is carried out by small better off families of Native Administration, merchants and also some individual from outside the community, which disturbed the harmony of the traditional land use mechanism.

Thus while before the drought land right associated with subsistence production under communal form of use and tenure prohibit land sale or rent, the new established pattern of cash cropping and tendency to establish exclusive right over land have strengthened the individual control over land. This deviation from the communal control over land use particularly in well-irrigated Wadis has commercialized land usufruct right and tenure and now in many areas land could be acquired by purchase or rent. This new evolving trend of land commercialization is still adherent to the customary rules governing the right of Sheikh El arid to collect land tribute as it explained in chapter two. In the cases of sizeable land and large-scale production, the Sheikh usually paid small portion of the produce rather than the full customary tribute.
The land commercialization has taken two main forms. The first one is in rural areas where sale or rent of land is contracted between individuals under supervision of the Sheikh given that the new users maintain tribute payment. The value of sale and rent is varying from one area to another depending on land fertility and location. It is observed that such form of commercial use and tenure is more dominant in some areas of shallow water and alluvial fertile soil with marketing facilities such as Kabkabia, Kafut, Golo, Shangili Toby, Sheggera, Tawella, Rural Elfasher, and the Tina. The land rent and sale values in such areas vary between 15,000SD – 5,000SD Mukhamass for one season and 100,000SD – 350,000SD for Mukhamass consequently. In Fatta Barno where the shallow water is abundant and land is scarce the rent varies between 20,000 – 50,000SD per Mukhamass while a fedan sale commercial value may amount to 500,000SD.

The rent in the terraces lands is directly related to supply of land, which is determined by the level of flood and size of saturation. When there is good flood and number of sizeable terraces the rent usually does not exceed 10,000SD per Mukhamass, whereas in the short flood periods the rent may amount to 50,000SD per Mukhamass for saturated land.

The second form of land commercialization is manifested in the establishment of vegetables and dura large-scale production particularly in Tawella, Rural Elfasher and Kabkabia. Such schemes are usually either run by the “Hakura” owners themselves or leased by some of “Hawakeer”
owners to some individuals on conditional contracts registered at the local council under the supervision and approval of Range and Forests departments. Though information generated from the Hawakeer owners and officials revealed that the payments received by the Hawakeer owners for exclusive usufruct of the land were very small relative to the land size and locations, the process of land registration at the local councils involved defacto recognition by the local Government Administration.

The shift from the Goz land to Wadis and clay soil land has effectively influenced land use and privatization with significant implication for development of the prevailing modes of production and hence social formation. The adjustment in the traditional pattern of production and the corresponding changes in land tenure also imply fundamental changes in the socio-economic and political structure and ownership entitlement. Land regulatory mechanism among communities functioning at two levels, the tribal or communal and the households or individuals levels. As a general rule no individual can obtain or keep more land than he is able to put under cultivation. Therefore, traditional mechanism allocates land on demand, which depends on household labour supply under the traditional subsistence system and the allegiance to communal tenurial arrangement. Thus, traditional customary arrangement functions as a measure against individual’s monopolization and control over land and lead to communal security with regard to
access to land use for subsistence production security. As there is no restriction on the land size for any individual as it is permanently in use and the local customary obligations are met, better off individuals may put sizeable clay soil land to cultivation using intensive capital compared to other individuals of community. This would have far reaching future implication on traditional land use and land tenure on one hand and economic, social and class classification among rural communities on the other hand.

5.2.4. **Animal Husbandry and Pastoralist:**

Animal husbandry is very an important economic activity in Darfur, its importance differ from one area to another. Within the study area, North Darfur livestock population composed mainly of camel’s sheep, goats, and some cattle’s. Camels and sheep are more common in the area where the cattle are concentrated in the southern part. This distribution is mainly governed by the factors of animals’ environmental adaptation. Among all the livestock, population goat is more adaptable to the different environments and therefore is to be found in the whole region.

Traditionally there are mainly two types of animal keeping in North Darfur namely pastoralist communities in the far North and sedentary rearing all over the region. However, there is no clear distinction between these two forms of livestock keeping as in most cases both agriculture and livestock are combined as minor and major
economic activity supplementing each other. Therefore, semi nomadic livestock and semi sedentary cultivation are the more dominant and widely practiced. However, while pastoralists in the far North keep large herds of camels, sheep and some goats, sedentary cultivators in the South part of the state hold numbers of goats and sheep in addition to some cattle as subsidiary to subsistence cultivation and store value of agricultural surplus.

Livestock constitutes the main source of pastoralist income, for them the keeping of animals performs several functions, mainly, reliance on animals for home consumption, milk, dairy products and meat and sale of animals to obtain grain. This beside reliance on others by-products for construction of mobile houses and variety of handicraft items for both household use and market sale to obtain other requirements.

Livestock in North Darfur are significantly affected by the successive, drought hits during the last two decades. Following the rain failure and drought of 1985, the pastoralists have lost all or most of their animals particularly the cattle and sheep. According to the interviewed sedentary cultivators, every household owned numbers of cattle, sheep and goats amounted to 2-10, 5-15 and 5-20 respectively, this in addition to one or two camels for only a few households. The animals were constituting the main stored value or assets upon which they were relying in food shortage periods. Unfortunately, livestock was the most drought-affected sector. The immediate impact of 1984 drought was loss of
animals; about 60 percent of livestock was lost either through desperate and panic sale of animals or death due to shortage of grass and water. Salih, (1991). In 1991, famine the loss of animals was even more dramatic. According to Elbashir (1993), the rate of loss in 1991 was amount to 84%, 98%, 60% and 85% for camels, cows, sheep and goats respectively for Darfur as a whole.

The form of adjustment and changes in the pattern of animal keeping adopted by pastoralist and sedentary differ from one area to another according to herd composition, environment, insecurity situation and level of market economy development.

Among all types of animals’ cattle is the less drought resistant. Thus significant shift in cattle keeping has taken place in North Darfur particularly the northern part of the state where is animal species has been very poor. According to the interviews and information generated from the officials, the cattle now disappeared from the northern area and more or less fully replaced by sheep and goats. In Kafut, Kutum and Fatta Barno the numbers of cattle held among pastoralist and semi pastoralist amounted to less than 20% than in the past before the drought (fieldwork). Sedentary cultivators in the South part of the state have relatively considerable numbers of cattle. Most of the household in Dar Elsalam rural District reported raising numbers of cows between 2-10 for home consumption and trading to accumulate capital or buy food in times of crops failure.
Herd structure is also affected by the aggravated insecurity situation in the state. Due to frequent camel theft accompanied by murder in some areas of North Darfur, most of the sedentary households have stopped camel keeping.

Camel nomadism is also affected by the insecurity situation and intra-tribal conflict, which are caused by different socio-economic factors. Unlike before the drought pastoralists have been trickled further south, which caused many socio-economic and political problems in their new passages (Chapter 4).

Following the rain failure of 1985 and loss of livestock new, pattern of animal keeping have developed among pastoralist and sedentary cultivators. The decline in agricultural productivity consequence of the drought and implementation of economic liberalization policy in the country has resulted into gradual commercialization of livestock among animal keepers. With the flourished and expansion of Wadi cash economy, value store in livestock has increased and enhanced by the remunerative animal prices due to the successive devaluation of the national currency. The majority of households’ Wadis cultivators reported that they tend to own female goats and sheep for the purpose of restocking and sale to supplement household consumption.

Apart from the new food security, coping strategies adopted among sedentary cultivators all over the area is incorporation of livestock in
household subsistence and expenditure. Livestock sale among household vary according to the different season within the course of the year. Sale of goat is more frequent throughout the course of the year to meet frequent household expenditure whereas sheep are kept to be sold during the rainy season when food stock decline.

While before the drought livestock among sedentary cultivator was mainly used as store value and to supplement household consumption, in the post drought and increased agricultural surplus of cash cropping, investment in livestock particularly sheep has gained significant importance. All the interviewed Wadi cultivators reported devoting part of their agricultural surplus income to sheep trading. Surplus income devoted to sheep breeding and trading vary from one area to another according to the level of income, availability of other investment opportunities and security situation. Some interviewed Wadis cultivators reported adjustment to sheep breeding and trading as the major activity, this is mainly in the southern part of the state.

The process of sheep commercial herding has also been accompanied by the introduction of new breeding techniques. In some areas particularly to the South of North Darfur sheep has been developed into a new drought resistance cross breeding hypred, which combine a desert and mountain types. Some skilled shepherds have specialized in techniques of breeding, specially the “Fakk” technique, a process of artificial incimation, which breed the commercial flock in one time.
Unlike the sedentary cultivation, the livestock commercialization among the far northern pastoralists has not yet developed enough. This low response among pastoralists to the increase in the rate of exchange and export policy indicates that the cultural factor (as it explained in chapter 4) has limited the response and scope of coping with the flourishing market and process of livestock commercialization. On the other hand the increased cost of living, particularly millet prices have affected the herd annual off-take. It was very small varying between 6-7 small animals (sheep and goats) or 1-3 of the big animals off springs usually in the pre harvest season for meeting food deficit. Recently the sale of animal among pastoralists has been more frequent, but only a few of them has sale for trading and income generation.

5.2.5. Migration and Labour:

Labour in western Sudan was predominantly self sufficient as production was mainly for household consumption. Prior to the advent of colonial rule, there were some traditional household industry and handicraft for home consumption including textile, clothes, shoes, tools etc… Fadel, Ali (1977).

Following the advent of colonialism and establishment of Gezira and other large scale schemes in central Sudan, western Sudan labour were recruited to provide cheap labour force for the large-scale capitalist plantation schemes in the Central Sudan.
The recruitment of labour force from rural Darfur was initiated through different arrangement during the period between 1925-1940 before it had gained its own dynamism and become self-perpetuating. Amongst the arrangements was the use of native structures to recruit adult male for the strategic national crops i.e. cotton in Gezira and sorghum in Gedaref Elbashir, (1993) wages were paid in both forms cash and in kind. Thus western labour was implicitly incorporated into production relations in the Gezira scheme as cheap labour for supplementing Gezira tenants. According to Yousif, Abdel Majed. The seasonal labour that carry the bulk of the work get the least wage. He pointed out that out of the 3796 work hours required for cotton production, seasonal labour work hours amount to 3083 on average compared to 713 work hours for the tenants.

The economic exploitation of the western seasonal labour has even more implication on class formation and ethnicity and regional dimension Shepherd (1983), which had led to the rise of regional political movements in Darfur in 1960 and early 1990 where both were agitating imbalanced development problems Elbashdir, (1993) this is in addition to the present military conflict in the state.

Seasonal labour migration from Darfur to central Sudan has gained its dynamism from the structural features of Darfur subsistence economy and society. Two aspects of this internal socio-economic structure have maintained the self-perpetuating seasonal migration. First, because labour seasonal migration is usually among male household members
during slack period, minor activities are delegated to women and children during the absence of some or all household able bodied. The social structure and clan relations among communities constitute social insurance for household under conditions of household head absence or migration. Secondly, the subsistence socio-economic structure, which have only minimum cash requirement has as well implication on the Gezira peasant low cost of maintaining the seasonal labour.

Thus, seasonal migration to Central Sudan is designated and triggered by the colonial administration to provide cheap and flexible source of labour force.

Other reasons for frequent migration in North Darfur were more frequent due to frequent irregularity of environment, which has influenced the traditional pattern and destination of migration.

Different migratory coping strategies are invented to cope with the traditional economy collapse and adjustment to clay soil cultivation. However the shift or adjustment in the pattern of migration has taken three forms of migrations, 1) rural-rural migration 2) rural-urban migration inside or outside the region and 3) migration outside Sudan.

There are two main forms of inter-rural migration within the region. Migration from the far northern part of the state to South Darfur state and migration within Northern Darfur from the areas that are not located nearby Wadis to Wadis areas.
Migration from North to South Darfur for food and wage labour was traditionally practiced during the frequent food shortages, particularly women seasonal labour migration for millet harvest. This form of migration has been intensified by depletion of food resources in the far north. Most of the interviewed household in the far northern areas reported seasonal migration of part of female household labour for millet harvest in the far South or South Darfur state usually from November to October. It seems that the increasing numbers of migrant women from North Darfur has contributed to the expansion and commercial millet production in the South part of the state. Usually the income of this form of labour is received in kind to supplement household consumption during the summer season.

Inter-rural migration also included labour migration during the rainy season. Usually poor households when incur food deficit during this period, they allocate part of their labour supply for wage within the village or in near-by villages and Wadis to offset food deficit.

However, with intensification of drought consequences, most of the traditional frequent rural forms of migrations have been intensified on regular pattern. The season and periods the migrants stay in work destinations vary according to migrant household labour supply distribution, food availability and harvest expectation.

Perhaps one of the most important impacts of Wadi cultivation expansion on the mode of production in the North of Darfur is the shift
from cotton collection migration to wage labour search within villages in Wadis or near-by clay soil valleys. The development of method of irrigation and continuous year-round cultivation process in Wadis and clay silty soil in valleys have generated wage labour opportunities for household that are not in the proximity of Wadis.

The wage labour market in the North Darfur followed the spatial location of the Goz and clay soil fertile land. While the Goz cultivation is easy and requires simple implements and minimum number of labourers the rudimentary nature of tool, and implements used in Wadi cultivation has made the agricultural operations rather labour intensive.

Labour supply usually provided within village poor household or migrant from near-by villages that have no Wadi land. While the former usually release part time of their labour supply to offset food deficit the latter consist of migrant families or individuals that are affected by the drought or have no other productive resources or activities when millet harvest ended.

Labour opportunities in the clay soil vary from one area to another according to degree to which cash cropping has developed. Given the low level of technological innovation and development among clay soil cultivator human factor represented by the labour potential have constituted an essential factor in the different agricultural operations.

The flourishing wage labour market mainly caused by market expansion contributes to the slowly, but steadily transforming subsistence
economy and traditional production relations. Thus the depletion of resources consequences of drought and corresponding gradual changes in the production structure have even more implication on the socio-economic reformation and future development of class stratification. This has been clearly noticed in the emergence of small rural agro business fraction on one hand and agricultural semi-proletariat group on the other hand.

Development of agricultural wage labour has taken four forms, 1) Payment on mukhamass basis 2) day wage labour 3) share cropping 4) Payment on permanent basis. The first two forms of agricultural wage labour are predominant in both Goz and Wadis cultivation all over the state. Most of the poor Goz cultivators usually restructure their labour supply to release some members for wage labour within or outside the village during and after the rainy season when they incur food deficit. This form of labour particularly flourishes in the Goz during the weeding season, which is more labour intensive and labour demanding agricultural operation triggered of by millet commercial expansion.

Similarly casual agricultural day labour is flourishing in the harvest season where poor households and drought affected acquire cash by hiring themselves out for wage within the village or near-by Wadis. There are rapid increases in the wage labour during the different agricultural operations i.e. plowing, weeding, planting, and harvesting.
The forms of payment in the Goz land vary from one area to another while cash payment on mukhamass basis is more dominant within villages or near-by, women seasonal migrants for millet harvest in the South receive their payment in kind, which amounts to 1/10 – 1/12 of the produce.

Agricultural wage labour in the alluvial soil in contrast is more intensive and organized on several bases.

Unlike the Goz cultivation operations, which last only for a few days, cultivation operations in the Wadi soil is usually maintained all the year round.

The first step for the Wadis and clay valleys cultivation is construction and preparation of flood and well irrigation methods, which generates technical and casual wage labour in the beginning and end of the rainy season. Construction of terraces in the clay soil is usually followed by weeding demand. Most of the cash crops cultivated in the clay soil require multi-stage of weeding, usually about two weeks after planting the crops are weeded for the first time, and other subsequent weddings are carried out as necessary and according to the availability of labour sources. Other agricultural operations in the clay soil are also important labour intensive operations. The harvesting of the Wadi and clay soil crops usually last some weeks depending on the ripening process. Usually the seasons for crops irrigated by wells and flood
methods last up to the time of early terraces construction and Goz agricultural preparations.

Similar to wage labour in the Goz, poor households and drought affected individuals move within the Wadis and terraces lands in search for wage labour opportunities. Information generated from the fieldwork reveals that the numbers of wage labourers from outside the labour market areas are usually more than labour supply within the area, which reflect spatial differentiation among rural communities in the state.

A part from the changes in the production relations in the Wadis areas is the development of sharecropping as a main consequence to the land and production commercialization. According to this form of share cropping agreement, the farmer provides the land, the seeds, the agricultural implements and tools. The sharecropper has to provide labour for all agricultural operations starting from clearing the land, weeding and harvesting the crop. In return for the performance of the agricultural operations the sharecropper gets third of the crop. In some cases where the sharecropping agreement between relatives individuals the sharecropper gets half of the crop. A sharecropping also may involve three parties, landowner with an already established infrastructure i.e. water pump, labour and financer. In such case, every one gets third of the net produce. Some times the deal involves farm owner and financer who pays the total running cost and each get half of the net crop produce.
In the areas adjacent to central markets and urban mass consumption farms rent has newly developed mainly in Kabkabia Sheggera, Tawella, Kutum, Kafut and Shingly Toby. The rent is for both either land and water pump or land only where the investor, brings his own water pump. Also there is a wide rent of water pumps where some merchants with no land invest in water pumps rent.

However, most of farms rent was normally between the farms owners and their relatives and closed people. With the expansion of market rent has been negotiated and strict between different individuals.

New agricultural permanent labour has developed recently in commercial farm adjacent to Wadis beds and towns where cultivation is practiced all the year round in addition to expansion of horticulture production, mainly in Kabkabia. Most of such agricultural cash earning jobs are usually perused by younger youth from drought-affected areas. The permanent employed labour carry out all agricultural and related operations for monthly wage and a part of the crop, usually ¼ of mukhamass produce.

Due to provision and expansion of labour opportunities all the year round, seasonal migration for cotton collection has ceased very significantly among the North Darfur rural farmers. Most of the poor interviewed individuals and household reported limited migration to South Darfur for groundnut harvesting. Many younger youth from drought affected area reported frequent migration for job and non-
agricultural wage labour in Khartoum. The numbers of domestic women servant working in the smaller towns, which was very limited has also increased in the area.

However, it seems that wage labour development in North Darfur would have some implication for cotton collection casual labour from North Darfur. Some interviewed farmers and official from Gezira scheme reported significant decrease in casual labour migrant from Darfur. But, this may partially attributed to the economic difficulties among the scheme peasent and incorporation of all household members in the cotton collection process.

The numbers of migrants abroad have also effectively been influenced by drought impacts and clay soil cultivation development. Sudanese migration abroad dates back to early 1970s, which corresponded to oil boom in Arab oil exporting countries. For Darfur, inter-boundary population movement always existed, and took different forms, mainly trading, and smuggling or social contact.

The successive Sahelian drought has mobilized the migration to Libya across the Sahara desert using camel and mainly for short or medium period and smuggling.

With intensification of drought impact in North Darfur, Libyan connection has increased very significantly among young adult males. Most of the interviewed households reported having migrant members or
member in Libya, only a few of them have migrant members in the other oil exporting countries mainly Saudi Arabia.

The contribution of migrants through remittances was very significant in the successive drought period after 1985 famine. However the restriction on money transfer enhanced by the food embargo imposed by UN on Libya and the consequent economic deterioration have affected remittances transfer to households, but it has been compensated by inflow of different types of commodities mainly food stuff. These changes have flourished boarder trade between Libya and Sudan. Zaghawa in the North of Darfur who have been hit hardly by the drought since the 1970, many of them have abandoned animal raising and migrated to Libya and many other went into other activities. Most of the Zaghawa migrants in Libya have formed tribal associations in different Libyan towns to relieve their kins and relatives in Dar Zaghawa. The early connections with Libya have given the Zaghawa advantage over other groups in Darfur. They have dominated trade and many other economic activities in Darfur and Central Sudan (Suk Libya in Omdurman, Port Sudan and other towns in Sudan).

With the economic recession and political problem of Libya, migration has declined considerably. Most of the migrants reported short-stay in Libya for accumulation of sum of capital to run small work or petty trade at home. It is observed that contrary to the normal pattern, the number of migrants from Wadis and clay soil areas is much more than
the number of drought affected areas in the far north of the state. However this shift in the pattern of migration is influenced by the process of clay soil cultivation mobilization and need to acquire a water-pumping device.

5.2.6. Market and Marketing Activities:

The cash crops cultivation in the Goz is traditionally mainly used for household consumption and international market export. Compared to the Goz cash crops, the clay soil crops are mainly produced for the local market. Before the wide expansion in vegetables and other Wadis consumption crops, local market and marketing activities were very limited and confined to collection of cash crops in small amounts such as *Hibiscus sabdarifa* “Karkadi” sesame and other “Darat” crops. Among all the cash crops gum Arabic and oil seeds are the most important ones.

Historically gum Arabic trees grow to generate cash through sale of the product to export companies and local “Jullaba”.

There are two main characteristics that distinguish commodity production in the Goz land vis-a-vis market. First production organization among Goz cultivators of North Darfur does not take the form of wage good. Usually the different cultivation process based partly on family labour and partly on mutual assistance “Nafir”. Thus it is this form of social organization of production and the limited need for cash, which maintained the cost of commodity production very low. The small subsistence producer, usually under prices his family and social
reciprocity labour time, for him prices of his products are not set by the factors of production nor the average profit of capital, but instead by the small scale socio-economic structure, and human and social dimension of production among them which devalue the cash value of commodity.

Secondly the monopolistic regulation of gum Arabic and oil seeds trading, which is set by the state through the oil seeds and gum Arabic companies have even intensified the exploitative exchange relation with the peasants through monopolistic control over their cash crops.

Unlike Goz cultivation, the clay soil crops production takes the form of commodity for sale rather than use value i.e. “Tombak”, vegetable. Thus, the shift from the Goz to Wadi cultivation has been accompanied by changes in the forms of market organization. There are a number of factors related to the new coping strategies adopted by the households, which have led to changes in market and market activities. Firstly the failure of millet cultivation has mobilized remittances from outside and flourished food substitutes trading i.e. dura. Secondly, the adjustment to Wadis cultivation and development of monetized use value produced for the local markets have expanded domestic market further. Thirdly the privatization of ownership of the means of production mainly land, expansion of year-round cash cropping and provision of wage labour opportunities have mobilized monetary exchange and velocity of money circulation among the rural communities all over the state. Money as a means of exchanges now has been a common means of labour
payment and also remittances among inter-villages migrants labour has been in form of cash rather than food.

Moreover the adoption of trade liberalization policy particularly devaluation has effectively influenced livestock commercialization among semi nomads and sedentary cultivators. Consequently, livestock markets have expanded very significantly during the last two decades.

As the traditional reciprocity and exchange relations, which are associated with the traditional subsistence economy have started to dissolve, traditional modes of production have been steadily paving the way for new market relations. This development has manifested itself in both quantitative and qualitative changes in trading activities.

It is observed that the majority of the households in the visited sites have turned to the market to satisfy almost all their subsistence needs. The production of millet and dura in some areas of South, North Darfur has been wholly devoted for the market such as the new schemes of dura and vegetables production in rural Elfasher and expansion of commercial millet production in Dar El Salam rural councils.

The main quantitative changes included both increases in the size and numbers of market units and activities. Market and marketing activities differ from one area to another according to 1) availability of Wadis lands and year round crops. 2) Availability of transport facilities 3) Level of development and concentration on clay soil cropping
particularly tobacco production 4) water points and range and security situation.

The proximity to market and availability of transport are the main factors affecting cash crops and market expansion. Thus most of the cash crop central markets have developed in Wadis, near Elfasher and Kabkabia. This in addition to “Tombak”, central markets in Sheggera, Tawella and Shingly Toby.

One of the most important markets, which developed in its own, independent of Elfasher market, is Kabkabia market, where cash cropping has generated forward and backwards linkages. Prior to the shift to clay soil cultivation there were only 20 permanent and weekly markets in Kabkabia. With the expansion in cash crops and availability of transport to Darfur central markets and Central Sudan Central markets, the numbers of various shops amounted to about one thousand specialized shops and workshops, this include production of simple agricultural implements, poultry products, tomato’s paste and other fruits and vegetables processing units, soap and oil local producing. This in addition to other agricultural related goods such as pesticides, fertilizers and improved seeds. Also it is observed that the market operations in the central markets have been involving the different levels of the transaction chain where the numbers of mediators and sale agents have increased. Increases in the numbers of shops, periodical markets and frequency and
permanent market has also been observed in the central and satellite villages all over the sites we have visited.

Specialized markets have been covering almost all types of agricultural products in Darfur. In addition to Elfasher market, Kabkabia town has grown as a bigger center for specialized markets. The following are the main specialized agricultural crops markets observed in Kabkabia central market:

Millet market.
Dry tomatoes and okra market
“Tombak” market.
Dura and Sorghum market
Vegetables market
Horticulture products market
Agricultural equipment and tools market.

Similarly, in Tawella, Sheggara, Kutum, Shingly Toby and some other small towns specialized “Tombak” and vegetables market have developed and flourished very significantly.

The village’s shops have been including a wide range of agricultural foodstuff and durable dried vegetables and other items produced by local farmers as well as Black Smith and small agricultural workshops.

Petty trade activities coping strategies have been a common feature of rural communities. Both women and men have been increasingly
involved in, handicraft production and marketing, sheep, and goats stacking and trading.

Tomatoes and other perishable products drying and processing is an old tradition in Darfur. Apart of the shift towards market economy is commercialization of local food processing activities. Every type of locally produced fruit and vegetables now has been locally processed for domestic and local markets. In addition to the flourished agro processing, other types of urban food have been also produced for local markets including tomatoes paste, paste making, “Shairy”, sweets and candies ready recipes such as lentil soup and other soups.

These economic changes have been accompanied by social transformation as well. Most of the traditional social institutions and values have changed. As food changed and became scarce, also its preparation consumption and presentation in the ceremonial feasts and celebration became remarkably different from the past days. For instance the place of collective daily meals “Dara” has turned to be limited, it has been confined to the extended families and villages inhabited by the same clan households. Another significant adjustment with food shortage and increasing marginal propensity to save is that all the communities have ceased the vaunt spending and presentation of some food items and plenty amounts of expensive food in all the ceremonial feasts and celebrations. Also the system of collective work and support has been affected by an overall change in the production. The most significant
change was in the Wadis and clay soil cultivation areas, mainly mutual assistance and reciprocity mode of production. Prior to land privatization it was difficult for wealthier and better off families or farmers to become capitalist farmers because they could not acquire absolute title to large land under the prevailing mode of production nor could they expropriate the land from the poorer peasants. Given the incomplete institutionalization of private property in land, both rich and poor farmers particularly in the clay soil cultivation areas constituted classes’ in formation process. The poors did not become a rural proletariat and the rich clay soil cultivators did not become bourgeoisie. Nevertheless, the beginning of class differentiation can be seen in the wide material and social disparities among clay soil cultivators on one hand and between clay soil cash croppers and millet Goz cultivators on the other hand.

The new manner of material differentiation manifested in the tendency of newly emerging rich farmers to accumulate sufficiently to invest in production through the purchase of developed means of production and labour power. Thus, it initiated and maintained a cycle of reproduction based on accumulation and hence formed a category of capitalist farmers. Poor farmers on the other hand have been increasingly subject to disintegration from the traditional mode of production, which is undermining their access to communal land, and hence would have significant future implication for the economic security among them.
The social differentiation has further been manifested in the development of new life style, consumption behaviour and the use of every urban and luxury product items. In Tawella, Shingly Toby, Sheggera, Kabkabia and many other small towns, all the big “Tombak” cultivators and traders have replaced their traditional houses with new urban or modern concrete ones. However, the consumption take off is yet limited by the high marginal propensity to save (MPS) among poor and middle groups of Wadi cultivators.

The shift to Wadi and clay soil cultivation has constituted significant changes in the life style among the population of the study area. It has provided new income sources over the whole course of the year. Unlike the traditional modes of production, the reorganization of Goz-clay soil cultivation has enhanced commodity circulation and sustained labour intensive market production.

The market production relations have been steadily paving the way for development of capitalist mode of production in the area. This would have positive implication on the development of subsistent and tradional modes of production, given that peace agreement to be reached and coverment and NGOs help to reinforce the on going process of transformation.

It is very evident that the shift into Wadis cultivation and cash cropping has been accompanied by social transformation as well. Most of social institutions and values have been more flexible and adjusted to
the new modes of production. The people reacted to the new situation in
different ways. In the Goz areas where traditional modes of production
are still dominant, the values and social institutions imply more solidarity.
In the cases in which Wadi cultivation is flourishing and expanding, the
response was towards more individualism. Most of social institutions
like the “Dara” and “Naffir” have disappeared in the Wadi cultivation
areas.

However, the economic cost and social and human dimension of
the current conflict between the pastoralist and sedentary cultivators have
slowed down the processes of the ongoing socio-economic
transformation in the area.
Chapter Six

Conclusion

SUMMARY AND SOME POLICY REMARKS

The people of North Darfur have responded to the drought impact in three different ways, according to the way in which it has affected them: (A) the sedentary subsistence cultivators have shifted into Wadi and clay soil cultivation. (B) The semi nomads Zaghawa of the study area have adopted different coping strategies, mainly migration to Libya and South words and practices of petty trade activities. (C) The nomads of the far North have changed their migration patterns.

(A): Sedentary Cultivators:

For sedentary cultivators the shift into wad and clay soil cultivation has constituted a very significant socio-economic change among them. However, these changes vary from one area to another according to resources endowment. Unlike traditional Goz cultivation, the new pattern of cultivation is characterized by cash cropping and being labour intensive. Consequently, the production process and labour organization has been organized on bases other than the traditional pattern, mainly new modes of production have been evolving.

Commodity production in North Darfur is traditionally subsistence with limited surplus products and very limited circulation of cash. Production is organized on household units, which act as basic unit of
production with free access to land and other income sources. The households usually preserve the use value and other income sources surplus into commodities i.e livestock, jewelry and other valuable articles. This system of direct use values has been going on for centuries maintained through the same Fur organizations and simple technology without significant changes in the traditional models of production including both the production relation and production forces (i.e. Fur-communal production relation and traditional technology). With the increasing effect of market influence and commercialization of production process in the country, through colonial and postcolonial policies such production of use value has been weakened with tendency towards commercialization of production. However, no pure form of direct use value production organization is observed or identified all over the sites we have visited.

The successive short rainfall and declining productivity in the Goz land have affected the market in the Goz on two ways; first, the supply deficit and proportional increase in the millet prices has modified millet production into both petty commodity and large-scale production venture.

Secondly the introduction of new improved traditional cash crops, mainly improved watermelon for the local markets.

The expansion of monetized use and sale values in the Goz has been enhanced since the early beginning of the traditional economy collapse when new coping strategies were introduced and some of them
eventually developed as major cash crop (i.e. improved melon). However production of use and sale values through pre-capitalist relations in the Goz has been organized on new division of labour and opportunity cost via., types of crop cultivated, expectation of rainfall level and other income sources opportunities.

The re-organization of labour force in the Goz has sustained labour intensive market production in the clay soil in two ways; first most of the household with no clay soil land have restructured their household labour supply in a way to maintain their own Goz cultivation and wage labour. Usually women and children are left for maintaining the easy agricultural process during the rainy season, while the able-bodied household is assigned the jobs of wage labour in the field of clay soil activities. Secondly, the low productivity and lack of other income opportunities in the Goz during the slack period provided high supply of labour force competing for wage labour within the nearby clay soil areas to support their household consumption.

The historical root of development of monetized production for local and international market in Darfur lies in the colonial and postcolonial policies, which mobilized pastoralist and small-scale cultivators to release part of their surplus products for the international market.

The influence of international market and steady improvement in standard of living have developed local market and strengthened the link
with the international market through progressive use of imports. This was achieved mainly, through progressive use of textiles, sugar, material articles and other durable goods and export of local crops i.e. gum Arabic, groundnut. However, despite of that commodity production in the area has not yet been penetrated by the international capital, which is an indispensable condition for the transformation of pre-capitalist economy into peripheral capitalist one. Where as transformation along the Nile was brought about by investment in permanent irrigation, the investment in the Goz economy is limited by the high risk of the fragile environment. However, the Goz economy traditional structure and the new coping strategies adopted by the peasant cultivators do not fit into the periphery-metropolitan model. That is we can not say that the traditional economy is well articulated with the chain of the international market as it hypotheses by some Sudanese and forgin authors as it explained earlier in this research.

In fact, this link is the process of development of the traditional chain of transaction rather than articulated mode of production. However, the weak link of the traditional economy with the international market stem from the nature of the traditional economy itselfe which characterized by the following:

1- The international cash crops are mainly cultivated as minor subsistence and/or cash crops. It allocate only small proportion of the land put under cultivation, usually not more than 1/4 of the cultivated field.
2- most of the used international goods among local communities inflow through outside migrant supplement and smuggling from neighboring countries with prices lower than Khartoum cost, include clothes, important food stuff, soap and variety of durable consumption goods and luxuries.

However, the majority of interviewed Goz households informed that only small part of the income generated from cash crops is devoted to purchase of such goods, most of these items usually come from abroad or are obtained by internal or external remittances.

One of the most important impacts of the 1980s successive short rainfall on North Darfur was the acute food shortage as a result of millet production failure and disintegration of the Goz economy. The people have responded to the problem by different ways, but the most important is the readjusting of the traditional cultivation towards expansion into Wadi cultivation. This shift has taken different forms with implication for the development of traditional water harvesting and cropping pattern, land use and tenure system, wages labour mobilization, market and modes of production development, migration patterns and other socio-economic transformations.

The inherent high fertility and capacity to maintain cultivation with minimum rainfall and water harvesting methods have mobilized clay soil cultivation very significantly. With the development of water harvesting
methods and techniques, the Goz economy has been increasingly adjusting to Wadi cultivation using both well and flood irrigation.

Well irrigation is characterized by small size, which is adopted by poor households adjacent to Wadi to obtain cash for meeting food deficit that resulted from millet failure in the Goz. While profit making cultivation in the Wadi is practiced by a few well-off farmers, marginal propensity to save (MPS) among poor farmers is relatively high, mainly due to accumulate saving for cultivation expansion.

Seasonal flood irrigation is widely adopted by poor households and well-off farmers. These methods of flood irrigation are less vulnerable to low and erratic distribution of rain and hence combine ability to both food and cash cropping.

The development of water harvesting methods has taken different forms corresponding to the development in the pattern of clay soil cultivation in the area. The two main types of irrigation have developed corresponding to the land topography, rainfall level and distribution in the state. Flood irrigation depends on different techniques of water harvesting, rainwater harvesting and run off water harvesting.

Traditional rainwater harvesting to collect and retain local precipitation has developed very significantly in the villages'. The construction of the earthen bunds and terraces has been designed according to technical survey and carried out with mechanical machines i.e. tractors, and bulldozer instead of the traditional hand tools.
The most commonly cultivated crops using flood irrigation methods is dura. Many large-scale schemes of durra cultivation have been established in the state using different techniques of flood irrigation.

Similar to the flood irrigation, well irrigation has developed very significantly as another form to meet food deficit through direct consumption and sale in the market to buy food. Unlike flood irrigation, well cultivation usually practiced along the Wadi watercourse beds, which are characterized by availability of shallow water and fertile soil.

The development of well irrigation is the most significant adjustment in the production structure among households adjacent to the Wadi. It has constituted structural adjustment on cropping pattern and household income and consumption both during normal and short rainfall periods.

These new cultivation strategies have some implication for traditional land tenure and use system. It has influenced land put under cultivation in two ways; first, the land put under cultivation in the Goz has expanded into different directions as risk diversification strategy.

Secondly, the shift into Wadi and clay soil cultivation has expanded very significantly using both traditional and modern water harvesting and irrigation methods.

The increase in the area put under cultivation in the Goz has taken different forms; firstly increasing the numbers of plots which are
diversified in different directions. Secondly, expansion into minor cash crop oriented for the local markets.

Thirdly, the large expansion of millet production further south of North Darfur was caused by the following:-

1- Successive migrations of drought affected population of the far North including both sedentary cultivators and semi nomads who lost their resources and herds.

2- Expansion of millet commercial production in response to increased millet price and cheap labour of the displaced drought affected families.

However, despite the significant expansion of both subsistence and profit seeking production in the Goz, the traditional customary control over land use and tenure is still dominant among the different communities. Unlike the pattern of production in the Goz, the shift in the clay soil cultivation is characterized by agricultural activities over the whole course of the year. Prior to the advent of drought, Wadi cultivation was confined to small supplementary subsistence “Jubraka” and some limited “Tombak” cash cropping. With the advent of drought and shaking-up of Goz economy traditional and modern irrigation techniques methods have been developed to expand both vegetables and dura for cash to supplement household consumption. The relatively secured production in the clay soil has further mobilized cash cropping in the area.
Access to clay soil is determined by being adjacent to the Wadis and ability to provide the necessary money for cultivation. Therefore, access to large holding is confined to small fraction of better off families. The year round and continues use of land in the Wadis has generated tendency to establish exclusive right over land in the clay soil. This has influenced modes of production and land commercialization in the clay soil areas very considerably.

The cash cropping has influenced rural forms of migration in two ways; first, while the traditional pattern of inter-rural migration has been intensified, out side migration for cotton collection and wage labour in large-scale production schemes has been effectively influenced by the flourishing labour opportunities in the Wadis. The adjustment in the pattern of inter-rural migration has taken different forms mainly inter-rural migration for both wage labour to generate income and migration to southward of the state during the rainy season for food wage to meet food deficit. Both forms of migration are usually practiced by poor household of the Northern part of the state.

Secondly, the development and expansion of cash cropping has developed wage labour market followed the distribution of the Wadis and clay soil lands in the state. Labour opportunities in such areas are usually available all the year round.
The forms of wage labour are varied according to the type of soil and location, level of rainfall and floods, season activities and markets and marketing activities.

However, the development of cash cropping and wage labour in the study area has influenced production relations and communal modes of production among the majority of population. This has manifested itself in the emergence of new commercial and agribusiness group among the clay soil cultivators and sheep breeders, while share cropping and different forms of wage labour, has been the main relation of production for cash cropping.

There are two main characteristics of Wadi cultivation, which have contributed to monetization of production and expansion of the market. First, the crops of the Wadi are cash crops produced for the external market consumption; consequently, the cash inflow among the population exceeds the cash out flow, which generates high marginal propensity to save (MPS) and capital accumulation tendency for investment expansion. Secondary, crops cultivation in Wadis are labour intensive cultivation, which provides wage labour opportunities for poor households and hence contributes to market expansion as well. This steadily growing tendency towards monetization of the economy has manifested itself in the new forms and organization of the market where the transaction chain has been continuously integrating new inputs and out puts.
The development of local market relations among the rural population is also accompanied by development in consumption and social transformation as well. Moreover, new manners of material differentiation among the rural population have been evolving:

(B): **Semi Nomads:**

The drought also has had a profound impact on communities that practice pastoralism as a major economic activity or in combination with cultivation and other economic activities. Many of the semi pastoralists Zaghawa of North Darfur who lost their animal herds pursued new coping strategies to generate subsistence from sources other than livestock. Many of them have abandoned animal rearing altogether and migrated southwards to practice agriculture for subsistence and wage labour. Some migrated to Libya and many others moved and settled in urban centers inside and outside Darfur practicing trade and other economic activities.

(C): **Nomads:**

Unlike the sedentary cultivators and semi pastoralists the Arab pastoralist of the far north environmental a caption was limited by the poor resources and cultural background of pastoralist. The main environmental adaptation adopted by them is furthering the trance human movement, which put them into conflict with the sedentary cultivators. The intrusion of pastoralists into the cultivated fields and
the prolonged skirmishes between the pastoralists and sedentary
cultivators have intensified the conflict over the resources.

The small sheep stockowners and owners of cattle, whose herds
and flocks have been wiped out, adopted different coping strategies,
mainly settling in villages and near towns.

Camel nomads who got adapted by changing their grazing patterns
have come into conflict with sedentary cultivators of both South and
North Darfur. They have tended to move further south towards the
rich central land and Jabel Mara. In addition to changing migratory
pattern as a result of the drought, Arab pastoralists have also tended to
stay for longer period in the South valleys than they used to do before
the drought. With the development of horticulture in clay soil
production in both South and North Darfur, the competition over the
limited resources has intensified and aggravated the security situations
in the region.

Moreover, the intensification of drought impact accompanied by the
political instability in the neighboring countries, led to population of the
rich Dars of the non-Arab cultivators with influx of Arab pastoralists
from Chad and central Africa.

However, traditionally, the tolerance of other people under
afflictions or severe stresses is deeply rooted in the region traditions. But,
these time competition over meager resources has become so severe and
persistent which led to eruption of conflict between pastoralist and sedentary cultivators with ethnic polarization.

The successive governments did not interfere effectively to resolve the conflict. The perception of the non-Arab tribes that the government is favouring the Arab pastoralist has put a political face to the conflict and hence the competition over resources conflict turned into open ethnic and political war in the region.

The control of drought and ecological deterioration is far beyond a single country's capacity. It requires regional and international co-operation.

For the study area, the people have been able to overcome the economic problem by adoption of different coping strategies. The most significant coping strategy in response to El Goz millet production failure is the shift to Wadi cultivation to meet subsistence needs, i.e. direct production for consumption and sale in the market.

However, the development of this newly evolving production pattern depends on the settlement of the overall security situation in the region and development support.

The official and NGOs concern with indigenous clay soil cultivation techniques in the study area has focused on earth diversion, dams, well construction improvement, introduction of improved seeds and new crops, and some market facilities. The results of all these efforts are still below the existing potential capacity. The agricultural potential
capacity is great and varied, especially when considering the abundance of surface and ground water resources in the region. This huge potential capacity can constitute a base for food security in the state through development of both small scale and large-scale cultivation in the state. The advantage of small-scale cultivation lies in its relevant scale for household or extended household labour supply and private management. The more reliable water sources in Wadi beds permit larger and more diversified yields of both food and cash crops, the encouragement of crops cultivation in the Wadis and valleys by development of means of water harvesting techniques and the use of ground water would not only secure food production, but would also reduce pressure on Goz land and fragile eco-system. Thus, intensive efforts should be directed towards increasing production of food crops in ecologically favoured areas in the State. The, efforts should also include economic activities diversification practices among the community. Development policy support is needed at least at three different levels; the first is the level of the household by promoting its productive capacity, diversity, storage and processing. The second is at the level of the region in terms of basic needs and services by bridging the gap between the region and the rest of the country. The third level is at development wisdom by adoption of integrated development policy. This intends to promote programs for development that will integrate crops, forestry crops and livestock.
Although a considerable amount of external assistance had been received after the drought and in recent time (and probably in the coming years), the actual impact on development appears to be small. One reason for this seems to be due to the fact that development policy has been mainly synonymous with emergency relief, while most of development funds usually allocated to basic project infrastructure (i.e. highway, transport, electricity stations and communication). The long-term development and solving the enormous problems of the region require intervention to mobilize the whole economic sectors and not focus on only basic infrastructures. Support should be given to the full exploitation of rural resources and coping strategies of the community.

Among all coping strategies, the development of water harvesting techniques and expansion in Wadi and clay soil cultivation remain the strong feasible option for development of new sustainable production sector. The reinforcement of the sector requires more external intervention to support underutilized and unused resources endowment. External support should upgrade the small scale infrastructure and develop agricultural activities in terms of potential, choice, experiments and management.

However, formation of development strategy for the sector needs detailed investigation of development potential and constrains to identify the most feasible areas and feasible activities and feasible options. The
study gives some policy remarks and recommendations for further studies.

A- Irrigation:

1- Improvement of rainwater and run off harvesting and water spreading.

2- Optimizing terraces construction (size, shape, and dimension).

3- Introduction of simple method to determine contour by simple implements.

4- Planning and implementation of small scale dams in the suitable and promising areas in terms of scale production potential.

5- Improvement of shallow well irrigation through introduction of appropriate construction techniques and lifting devices.

6- Development of a master plan for exploitation of deep ground water for both human and agricultural uses.

B- Environment and agriculture:

1- Ecological stabilization of Goz area through expansion and intensification of clay soil cultivation at the expense of Goz cultivated areas.

2- Allocation of high proportion of the international funds for regeneration of degenerated Goz areas in the region.

3- Planting of multi-purposes and locally adapted trees and shrub species.
4- Reduction of wood consumption as energy source through introduction and subsidization of fuel saving cooking devices and diffusion of Gas uses among the people of the region.

5- Development of regional strategy for ecologically adapted and resources conservation and land use in both Goz and clay soil.

6- Improvement of soil cultivation methods through introduction of appropriate agricultural implements and ploughing methods.

7- Expansion and intensification of appropriate horticulture production provided that marketing constrains can be alleviated.

8- Adoption of crops diversification and improved cropping calendar.

9- Provision of credit facilities for shift to Wadi cultivation.

10- Improvement of local roads network between intensive production areas and central markets
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