

ENVIRONMENT AND CONFLICT IN AFRICA

Reflections on Darfur

Edited by Marcel Leroy



University for Peace
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Environment and Conflict in Africa



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Edited by Marcel Leroy

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Cover photo: village scene near Muhajeria, Darfur
Photo taken 5 February 2006, Marcel Leroy

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Preface

From its inception in 2002, the Africa Programme of the University for Peace (UPEACE) has focused on stimulating and strengthening the capacity of institutions in Africa in the area of peace and conflict studies. In line with the mandate of the University, the programme has pursued this effort through the development of activities in teaching and learning, research and service to the community in order to mobilise broad support for peace efforts in Africa. In its initial five years, the programme concentrated efforts on developing curricula regarding key themes, producing teaching materials and organising short courses and training workshops. The goal was to reach out quickly to faculties in various African universities, researchers, policy makers and civil society organisations, and to stimulate the development of peace studies in Africa.

Efforts to develop the research component of the programme started in 2007 with the support of the International Development Research Centre (IDRC) of Canada. Through IDRC support, the Africa Programme initiated a peace research capacity building programme with the launch of a peer reviewed journal, the Africa Peace and Conflict Journal (APCJ), and research grants.

It is within this perspective of strengthening peace research that the Africa Programme applied for a grant from the Preventive Diplomacy Programme of the Ministry of Foreign Affairs of the Kingdom of Belgium to conduct research on “Environmental and Resource Issues as Factors in African Conflicts”. The project has followed a dual track, carrying out in-house research as well as working with researchers from different institutions interested in the role of environmental factors in African conflicts.

The project focused in particular on Darfur and contacts were established with the three local universities in El Fasher, Nyala and Zalingei. As such, the project built on earlier activities conducted by the UPEACE Africa Programme in the area, which had culminated in a conference held in Khartoum in December 2004 with Darfur-based and other Sudanese academics. This led to the publication of a book entitled *Environmental Degradation as a Cause of Conflict in Darfur*.

The present project convened from July 20 to 23, 2009 an international conference on “Environment and conflict in Africa, with special emphasis on Darfur”, with the aim of presenting the findings of different researchers and formulating a scientific basis for further discussions regarding environment, social realities, and livelihoods in Darfur.

This book puts together the proceedings of the conference, as well as research carried out by the project team. It is primarily an effort to search for knowledge on

conflict issues and to find a scientific basis for starting a new dialogue, with the intention of contributing to finding durable solutions in Darfur.

Dr Jean-Bosco Butera
Director, Africa Programme
University for Peace

Acknowledgements

The idea of using a scientific approach to examine the Darfur issue came up while I attended the Abuja Peace Talks on Darfur on behalf of the European Union. I am grateful for the encouragement of others who sat through long negotiating sessions at the now famous Chida Hotel, and with whom I discussed the idea. Ambassador Pekka Haavisto, the European Union's Special Representative for Sudan and my colleague from 2005 to 2007, was a strong supporter. Abdul Mohammed, then a member of the African Union Mediation Team and currently Director of the Darfur-Darfur Dialogue and Consultation as well as UNAMID's head of Political Affairs, has also offered encouragement throughout.

Originally, it was the intention to organise a meeting of scientists and academics as a one-off event to inject new thinking into efforts to deal with Darfur. After I joined University for Peace, however, it became possible to develop a one-year project that would include research as well as a scientific conference. With the strong support of Dr Jean-Bosco Butera, Director of the Africa Programme, funding was obtained from the Preventive Diplomacy Programme of the Belgian Ministry of Foreign Affairs and work started in February 2009.

From the beginning, all project-related tasks have been handled in-house by UPEACE staff. Research has been conducted on all facets of the issue of environment and conflict and a conference was held in Addis Ababa from 20 to 23 July, with over thirty participants coming from outside of Ethiopia. The preparation of the manuscript for this publication, which contains overviews of our in-house research, as well as the papers presented at the July conference, was completed in just over two months.

My staff at UPEACE have been the backbone in bringing these efforts to a successful conclusion. Fana Gebresenbet has been with us from the start, and has been a most versatile collaborator. He provided thorough work as a research assistant, looked after the scientific aspects of editing this volume, and contributed one of the papers. Bereket Tarekegn has carried out valuable research and has also written a paper.

Sophia Alemayehu has provided administrative support and was the main force in organising the July Conference, at which most of the material included in this volume was first presented. During preparations for the conference, and later in the collection of material for this volume, Tsedenia Alemu provided cheerful and reliable assistance. Selahaddin Nur-Hussein acted as rapporteur for the Conference, and assisted with various other tasks in preparing this publication.

Last but not least, Islay Mactaggart joined on short notice and has completed language editing for all text included in this book.

To all of them I am deeply grateful.

Marcel Leroy
Addis Ababa, UPEACE Africa Programme
3 October 2009

List of Acronyms

AIACC	Assessment of Impacts and Adaptations to Climate Change
AIDS	Acquired Immune Deficiency Syndrome
ASAL	Arid and Semi-Arid Lands
AU	African Union
CARE	Cooperation for American Relief Everywhere
CBOs	Community Based Organizations
CPA	Comprehensive Peace Agreement
CSO	Civil Society Organizations
DDDC	Darfur-Darfur Dialogue and Consultation
DFID	Department for International Development
DPA	Darfur Peace Agreement
DRC	Democratic Republic of Congo
EM	Environmental Management
FAO	Food and Agriculture Organization
ADR	Alternative Dispute Resolution
FNC	Forestry National Corporation
GBV	Gender Based Violence
GCMs	Global Climate Model
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHA	Greater Horn of Africa
GIS	Geographic Information System
GoS	Government of Sudan
HCENR	Higher Council for Environment and natural Resources
HIV	Human Immunodeficiency Virus
ICARDA	International Centre for Agricultural Research in Dry Areas
ICC	International Criminal Court
ICRAF	International Centre for Research on Agriculture and Forestry
ICRC	International Committee of the Red Cross
IDP	Internally displaced People
IFPRI	International Food Policy Research Institute
INGO	International Non-Governmental Organization
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integration water resource management
JEM	Justice and Equality Movement
LAST	Livelihood Assets Tracking System
MRDC	Ministry of Rural Development and Cooperatives
NCP	National Congress Party
NDVI	Normalized Difference Vegetation Index
NGO	Non Governmental Organization
NRM	Natural Resource Management
OCHA	United Nations Office for the Coordination of Humanitarian Affairs

PC	Peace Committee
PES	Payment for Environmental Services
PIP	Policies, Institutions and Processes
RWDC	Rural Water and Development Corporation
SCLURWPA	Soil Conservation, Land Use and Rural Water Planning Agency
SECS	Sudanese Environment Conservation Society
SL	Sustainable Livelihood
SLF	Sustainable Livelihoods Framework
SLM/A	Sudan Liberation Movement /Army
SPLM/A	Sudan People's Liberation Movement/Army
UN	United Nations
UNAMID	United Nations-African Union Mission in Darfur
UNCCD	UNITED Nations Convention to Combat Desertification
UNCD	United Nations Conference on Disarmament
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UNHCR	United Nation High Commission for Refugee
UNICEF	United Nation Children's Fund
UNIFEM	United Nations Development Fund for Women
UPEACE	University for Peace
VDC	Village Development Committees

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Introduction

Marcel Leroy

While attending the Abuja peace talks on Darfur on behalf of the European Union, I was often struck by the limited range of issues under discussion. Even though three ‘baskets’ of questions were under consideration—power sharing, wealth sharing, and security—most of the negotiations dealt with the division of power or assets between the Government of Sudan and ‘Darfur’, which was represented by two or three armed groups. Issues relating to the future development needs of Darfur, and to the way in which the various population groups would share the region’s resources, were scarcely addressed.

The African Union Mediation Team did recognise that such issues were vital to the future of the region. However, in order not to complicate the talks and not to further postpone an agreement between the conflicting parties, matters relating to livelihoods and to the balance between the many groups within Darfur were relegated to the Darfur-Darfur Dialogue and Consultation (DDDC) which would be activated at an early stage in the implementation of the Darfur Peace Agreement (DPA).

Even while the peace talks were still ongoing—and appeared to have a reasonable chance of success—it became clear that it might also be enlightening to look into issues related to the environment and to livelihoods. If the conflict was indeed one between ‘African’ farmers and ‘Arab’ pastoralists, as the media kept repeating, then land use and access to resources were central themes, which ought to be understood more fully if the foundations for a durable peace were to be put in place.

The idea of researching the Darfur crisis along a different dimension than the way it was approached during the negotiations, would in addition have the benefit of considering the needs of the pastoralists. These seemed to have been placed all in the same basket, and were reviled in the media as the source of all evil happening in the region. Such views were, of course, an oversimplification of realities on the ground. Not all ‘Arabic’ groups were pastoralists, and not all pastoralists had allowed themselves to be mobilised to carry out the misdeeds that put Darfur at the centre of global attention through media exposure. During the Abuja talks, it was clear already that the pastoralist groups had their own concerns, that they too felt marginalised, and also had grievances against the Government in Khartoum.

Understanding the Darfur conflict therefore required more thorough research to explore how resource constraints had created frictions that could easily be exploited by those who wished to inflict further harm on Darfur. Farmers and pastoralists had co-existed in Darfur for centuries, developing a symbiotic relationship that was mutually beneficial. Was this balance disturbed only by environmental factors—drought and desertification—that put an unbearable strain on previously peaceful relationships? Did the conflict result from political factors, inspired by parties from

outside of Darfur? Or did the crisis result from the desire of Darfurians to have a greater say in their own future, and their resentment of being controlled from—and neglected by—Khartoum?

It was this thinking which led to the idea that a meeting of scientists, who had the intellectual tools to examine such questions, could offer a contribution toward understanding the causes of the Darfur conflict. Possibly, a scientific approach could facilitate the search for formulas to allow the various population groups to return to a more harmonious way of sharing the region's strained resources. Research could make a contribution by analysing physical and social realities on the ground, and by showing directions that could be pursued during reconstruction efforts after the end of the conflict.

The European Union Special Representative for Sudan, Pekka Haavisto, proposed to Amr Musa, Secretary General of the League of Arab States, that the EU and LAS could jointly work on organising a scientific conference to bring together researchers from Darfur, and others familiar with the situation on the ground.

As the political situation became more complex after the failure of the Abuja talks, and the subsequent break-up of some of the rebel movements, there was a quest to resume negotiations in order to seek ways of salvaging at least some of the Darfur Peace Agreement that had been negotiated in Abuja. In the scramble to find interlocutors for renewed political talks, a scientific meeting was not an immediate priority.

However, my motivation to look at the Darfur issue from another perspective remained undiminished. As I prepared to retire from the EU, an avenue opened up to work with the Africa Programme of University for Peace, which had in December 2004 organised a conference with the theme "Environmental Degradation as a Cause of Conflict in Darfur", the proceedings of which were later published by Sean O'Fahey (2006).

It was agreed that a research project on environment and conflict would fit well under the UPEACE umbrella. A Darfur focus would serve the continuity of both the UPEACE effort and of my own interests. Support for such an endeavour was obtained from the Belgian Ministry of Foreign Affairs.

Research topics and methodologies: What to research and how to do it

A further incentive to move ahead with this project was that it allowed me to go full circle with the interests I had pursued during my academic career. Returning to more reflective activities after nearly twenty years in active international service, I felt that it might be useful to attempt to reconcile complex world realities—including their social and cultural intricacies—with the narrow and simplified way in which the political arena deals with them.

For twenty years—starting in the late 1960s, when I was a graduate student at Johns Hopkins University—I had looked into the links between population, environment and conflict. The academic conclusions (such as Leroy, 1976a; Leroy, 1978; and Leroy, 1986) pointed to the need to place the analyses in a broad socio-economic framework. It was clear that cultural choices form an important intermediate step between a change in the man-resource equation and the outcomes societies pursue.

The mechanisms a group adopts to address resource scarcity are strongly influenced by cultural factors. The propensity to use violence as a tool for promoting collective interests is related to the perception of how successful previous experiences have been. Social reinforcement rewards behaviour—including organising and carrying out violent acts—that is seen as helpful in ensuring the group's access to sufficient resources (Leroy, 1978, p. 85).

Violence is not the only option for securing basic needs, however. Changes in the productive system may offer societies options for altering patterns of resource use. In doing so, they may diminish pressure on their environment, thus reducing the incentives for engaging in violent conflict. However, intensification of agriculture and other changes in the productive system are often only implemented reluctantly, as they require changes in social relationships and perhaps in consumption patterns, which many societies have difficulty accepting.

It should be recognised that, in an insecure environment—like Darfur during most of the current decade—options for adapting livelihood mechanisms are further curtailed. Investment and planning are virtually excluded, thus providing inducements for groups to opt for quick returns. Nevertheless, cultural norms and traditional mechanisms to deal with conflict continue to offer guidance even in such circumstances, though with reduced choices.

Human societies and patterns of behaviour are very complex, and underestimating this reality is perilous. Nevertheless, human nature and intellectual laziness often seem to make ready-made and single-factor explanations appealing. Back in the 1930s, journalist and popular philosopher H. L. Mencken, also known as “the sage of Baltimore”, coined the phrase “For every complex problem, there is a solution that is simple, neat, and wrong”. How true this still is. Yet, claims of direct links between environmental factors and conflict pop up regularly. There appears to be a coalition among those who might have their role enhanced by the expectation that the frequency of conflicts will increase through exogenous elements.

Researchers cannot join such a chorus. While climate change and the environmental stresses resulting from it are unmistakable, it behoves scientists to maintain a healthy dose of scepticism, both about the extent of the changes, and about their impact. Rising global temperatures have been well documented. Weather extremes may

become more frequent. Yet to assume a linear continuation of present trends is unlikely to be a good basis for forecasting.

While there has been clear evidence of the advance of the Sahara from the 1960s to the 1980s, trends since then are more ambiguous. The ‘greening’ effect that has been observed through remote sensing since 1990 is rather widespread. It needs to be further investigated in order to clarify whether the increases in rainfall that have been observed can be harnessed to increase the supply of fodder for livestock, and to support reforestation. Any opportunities that climate change offers, such as the expected increase in rainfall in some parts of Africa, need to be seized. The Africa-European Union Strategic Partnership, for example, has identified the “Green Wall for the Sahara Initiative” as a priority action (Council of the European Union, 2008). This decision has great potential, through making available funding and scientific back-up for addressing land degradation and aridity in the Sahel, and to improve living conditions.

Science and ideology

There is another aspect of the human response to social and physical events that requires attention. Whenever a trend has been well documented, and some authoritative statements have been made, a bandwagon effect is often created. In those conditions, it becomes difficult to be seen as questioning the dominant thinking. This phenomenon is well known in the media and in politics: it becomes almost heretical to question the basic assumptions around which debates are being conducted, thus limiting the scope of what is debatable. The pressures to maintain orthodoxy tend to become a form of propaganda, frequently turning into censorship, as was eloquently expressed by Herman and Chomsky (1988).

We should avoid locking the debate around environmental change—and the response that may be given to it—into a straightjacket. There is too much repetition of the basic tenets of current environmental thinking, and not enough critical analysis (Butera and Leroy, 2008). Of course, increases in carbon dioxide levels should be measured and their impacts examined. However, a full range of responses should be looked at, and the effects of other trends—such as sunspot activity, which in early 2009 was at its lowest level for several centuries—should also be considered.

Thirty years ago, I looked at another development that seemed to constrain the limits of research and scientific debate. Rapid population increases had, in the 1960s, given rise to a body of doomsday literature that ascribed all ills of the world to population growth. Books such as *Famine – 1975! America’s Decision: Who will survive* (Paddock and Paddock, 1967) and *The Population Bomb* (Ehrlich, 1968) were widely read and quoted. In the early 1970s, the Zero Population Growth movement was attracting a large following, also among the highly educated.

While academic research was not quite that alarmist, this mode of thinking appeared to be setting limits to what demographers could research and conclude. For example, in a survey of over 1200 members of the Population Association of America conducted in 1975-76, seventy-eight percent agreed that “many of today’s serious problems are caused by overpopulation” (for a full discussion, see Leroy, 1981). The concern with ‘overpopulation’ likewise set limits to policy options with respect to foreign aid (Leroy, 1976b).

The fears about population growth were often based on ideological assumptions and value systems inherent in Western societies at that time. Geographer David Harvey, one of my mentors at Johns Hopkins, expressed it quite clearly, though for some perhaps a bit painfully, by translating the phrase: “Overpopulation arises because of the scarcity of resources available for meeting the subsistence needs of the mass of the population” into “There are too many people in the world because the particular ends we have in view (together with the form of social organisation we have) and the materials available in nature, that we have the will and the way to use, are not sufficient to provide us with those things to which we are accustomed” (Harvey, 1974).

Conference on environment and conflict in Africa

It is with an open spirit that we approached our research project, as well as the organisation of the ‘Conference on environment and conflict in Africa, with special emphasis on Darfur’, which took place in Addis Ababa from 20 to 23 July 2009. This meeting was designed to bring together physical and social scientists, researchers, practitioners and academics. The first goal of the conference was to examine the links between climate change and conflict in Africa on the basis of a critical scientific debate. The second goal was to better understand the existing situation in Darfur, looking beyond the political discussions at the broader picture of conflict and livelihoods.

Beyond the scientific discussion, the presence of senior staff from UN agencies, UNAMID, the DDDC and the Joint AU-UN Mediation Team was intended to keep the discussions focused on concrete issues. The outcome was meant to draw conclusions on how to improve Darfur’s physical environment, and the livelihoods of the various population groups. It was intended that the conclusions be used in the initiatives these bodies are preparing to build consensus regarding access to resources and arrangements between local groups.

In preparing this volume, we have divided the contributions into seven themes. This means that the papers presented at the July conference, which included twelve sessions, have been reorganised. The report on the discussions which took place at the July meeting has also been restructured so that the discussion part of each theme covers the remarks made on the papers included in it. The introductory notes for each

of the seven themes are based on research carried out in-house at UPEACE by project staff.

Work done in organising the conference and in preparing this volume is meant as a contribution to the quest for peace, especially in Darfur. This was also the spirit in which the participants to our meeting, as well as the contributors and editors of this volume, have freely provided their efforts.

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Theme 1

Climate and Environmental Changes in Africa

Introductory Notes

According to the Inter-governmental Panel on Climate Change (IPCC) report issued in 2001, mean global temperatures are predicted to increase by 1.4 - 5.8°C over the coming century which will, in turn, cause changes in the distribution of rainfall, the frequency and intensity of extreme weather events, and a rise in sea-levels. Many human systems – particularly agriculture, water sources, industry and human health – will be affected by these changes (Orindi & Murray, 2005, p. 3).

Africa will be affected by the change in climate quite severely, owing to the impact of dramatic swings between drought and floods (ISS, 2009). The people of the Sahel have suffered long periods of drought during the last century: in 1903-1905, 1911-1914, 1966-1974 and 1979-1987 (Sjöström, 2004). These years of drought had far-reaching consequences on the ecosystem of region.

Rainfall is unreliable in the Sahel and the region is well known for its dual environmental problems of drought and desertification (Agnew & Chappell, 1999). Fifty percent of the perceived periods of drought in the Sudan were meteorologically confirmed with rainfall well below average (Teklu, Braun & Zaki, 1991, p.25). Periods of drought, in most cases, have been followed by famines and outbreaks of diseases. It was also pointed out that the relationship between drought and hunger is not a constant and necessary one. Failure of rains had nothing to do with the remembered food shortages in 1929, 1945, 1950, and 1959 in the Sudan, which consistently show up in household-level surveys but do not coincide with actual rainfall information from the same locations (Teklu, Braun & Zaki 1991, p. 26-27).

It is probable that these food-shortage situations happened for social, administrative, or political reasons. Some argue that these food-shortage situations were due to “insects, locusts, rodents, or plant diseases, or that local people were subjected to some kind of grain scarcity for social, administrative, or political reasons.” (ibid.)

Climate change models differ in their prediction of the general trend of rainfall in the Sahel but agree that variability is set to increase and that the duration of rainy periods is set to shorten.

Trends in rainfall are ambiguous. Most argue that there has been a persistent decline in most parts of the Sudan, while others argue that there has been a structural break around 1972, and that pre- and post-1972 rainfall readings oscillate around their respective means. A study of the three Darfur states confirmed that rainfall has decreased over the period for which records exist (Tearfund, 2007, p. 17). However, Kevane & Gray (2008) argue that longer-term trends in rainfall are less apparent in Darfur. They further reject the belief that rainfall has been declining rapidly. The characterisation of rainfall in Darfur as ‘declining’, with the implication of continuing

reductions in rainfall, fluctuating around a declining mean, is misleading. The rainfall evidence suggests, instead, a break around 1972.

Attention was given to climatic and desertification studies in the Sahel after the African Sahel, between the early 1970s and 1990, experienced one of the most dramatic long-term changes in climate observed anywhere in the world in the twentieth century, with rainfall declining on average by more than twenty percent (Hulme, 2001).

The continuous aridity, which was marked by a decline in the water table and low vegetation cover, intensified the process of desertification. The process was further exacerbated by human responses to the changing environment as farmers continued expansion of cultivation into marginal and fragile areas to make up for declines in yields and resorted to generating income from the sale of tree crops to support their falling income (Teklu, Braun & Zaki, 1991).

Contrary to assertions of widespread irreversible 'desertification' in the Sahel, recent findings, with the use of remote sensing tools, report an increase in greenness over large areas of the Sahel, including Darfur.

Although widespread greening is seen, what that means is not well established yet. Improved rainfall in recent decades largely takes the credit for the increased vegetation cover. However, many other factors, including species composition, animal grazing, and human factors like migration, also play a significant role (Seaquist et al., 2008). Altogether, these findings suggest continued caution in interpreting the greening phenomenon, particularly with respect to how it might influence policy or actions that might be taken in the near future.

Total rainfall amount has not been a good indicator of climatic trends and impacts, given the unpredictability and high spatial and temporal variability in rainfall patterns. Increase in the amount of rainfall in Darfur since the late 1980s alone did not restore the vegetation cover. Other factors such as increased herd size, policy failures in managing water resources, and absence of strong institutions to manage natural resources, have contributed to this scenario.

Climate change models differ in their prediction of the general trend of rainfall in the Sahel, but agree that variability is set to increase and that the duration of rainy periods is set to shorten. The longer term prospects are unclear, but climatic change modelling indicates that rainfall is likely to become even more variable with shorter rainy seasons in the future. This is likely to lead to an increase in frequency of failed harvests (Tearfund, 2007).

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Climate and Vegetation Changes in the Sahel

Fana Gebresenbet

Abstract

Climate change and desertification are among the contributing factors to the current crisis in Darfur. Some even put environmental factors at the heart of causes of the conflict. This paper questions the extent of climate change and highlights the pattern of change. This piece also details the extent of vegetation cover change in the wider Sahel context. The findings show that annual rainfall has decreased in Darfur, as well as the Sahel as a whole. Explanations on how this change came about differ: shortening of the rainy season, gradual decline and structural break. The structural break thesis, which argues that rainfall was/is not declining but experienced a break in late 1960's or early 1970's, seems more statistically plausible. In the case of vegetation cover, analysis of satellite data point towards widespread greening in the Sahel, Darfur included, since the late 1980's.

1. Introduction

The fact that the global climate is changing is now indisputable. There is ample evidence of increases in global average air and ocean temperatures. However, precipitation showed an increase in some areas (like eastern parts of North and South America, northern Europe and northern and central Asia) and declined in the Sahel, the Mediterranean, southern Africa and parts of southern Asia. These trends were established for rainfall data of more than a century (1900-2005). Furthermore, the area affected by “drought has likely increased since the 1970s.” (Intergovernmental Panel on Climate Change [IPCC], 2007).

However, when one comes to the issue of the impact of climate change, controversy is rife. When are we going to experience the impacts? Which aspects of human activity are going to be affected most? How best can we adapt? The list goes on

Among the vehemently debated impacts of climate change is its causal link with conflict: as is the case with all resource based conflicts. Analyzing the Darfur crisis, some went to the extent of stating that the real culprit is climate change (Moon, 2007). Some other influential figures thinking in this line include Stephan Faris, Mohammed Suliman and United Nations Environment Program (UNEP) (Faris 2007; Suliman, 2005; UNEP 2007). All of these base their arguments on the presumption that the climate changed to such an extent that the adaptive capacity of Darfurians was overwhelmed. Others argue that climate change is not to blame (Kevane & Gray, 2008), especially considering the fact that the Sahelian populations are highly adaptive to harsh environmental conditions.

This paper won't be delving into this debate. However, it deals with the presumption the arguments are based on, namely that the climate and environment have changed significantly in the Sahel for the worse. The paper tries to do this in two parts. The first part deals with the observed climate change in the Sahel and predictions, while the second attempts to show the changes in vegetation cover in the region and what brought about those changes.

2. Why is the Sahel very vulnerable?

The African Sahel (Arabic for 'shore') is a semi-arid grass and shrub-land region bordering the Sahara desert to the south. It is a transition zone between the arid Sahara in the north and the (sub-) humid tropical savannas in the south, and is marked by a steep north-south gradient in mean annual rainfall, in response to which a continuum of change in vegetation type and density is seen (Sjöström, 2004).

The region is considered the most vulnerable to climate change, according to a recent report by Global Humanitarian Forum (2009), due to its overall vulnerability to drought. Another factor which increases the region's vulnerability is the strong dependence of its population on pastoralism and dryland agriculture, which is poorly developed. This primary sector employs more than 60 percent of the active population and contributes 40 percent of the GDP of the region. Rainfall variability, land degradation and desertification further put the sector in a precarious condition (Serigne et al., 2006). Other factors which decrease the region's adaptive capacity include the poor market linkage and the low level of technological advancement of the sector (a low level of inputs and almost complete dependence on agriculture).

The succession of dry and wet years is a typical feature of the Sahelian climate. Variability analysis for the period between 1961 and 1990 shows that it could get as high as 65 percent, as in the northern parts of Northern Kordofan (Republic of Sudan [RoS], 2003), while a review by Serigne et al. (2006) found that the coefficient of variation of rainfall ranges between 15 to 30 percent in the region. The fact that the climate is highly variable and that extreme years are very frequent led some analysts to argue whether the notion of 'normal rainfall' is relevant in the context of the Sahel (Hulme, 2001). Climate variability is therefore one of the biggest factors increasing the vulnerability of the region to climate change.

Documents detailing the impacts of climate change attest that the poorest nations are the first to be hit by its impacts and are also likely to be most severely affected, due to a low adaptive capacity (for instance, IPCC, 2007). This is notwithstanding the fact that these countries contributed the least to change the global atmospheric composition, unless clearing forests and related agricultural practices are blamed. Therefore, poverty in the Sahel will also be a contributing factor which increases the vulnerability of the region.

3. Observed changes in the Sahel climate

The Sahel has had its fair share of changes (Serigne et al., 2006). Climate change studies based on temperature appear to be rare for the Sahel in climate change related literature, as is the case in the Sudan (Elagib & Mansell, 2000). Most studies focus on changes in annual rainfall amount and pattern, although temperature is equally important in such endeavours. The fourth assessment report of the IPCC stipulated that there had been a 0.2 to 1°C increase in the Sahel from 1970 to 2004 (IPCC, 2007), and projections by RoS (2003) indicate that temperature will increase by between 0.5°C and 2 °C by 2030 and 1 to 3 °C by 2060 in the Sudan.

It is worth noting, however, that although the entire region was affected by the drying, the way that this was manifested varied from one area to another (Serigne et al., 2006).

3.1 Reduction in the length of rainy season

A change in the onset and cessation dates of rainfall is one form through which the drying was expressed. Camberlin and Diop (2003) found a significant trend towards earlier cessation dates of the summer rains between 1950 and 1992, with an abrupt shift occurring around 1970 in Senegal. A small trend towards delayed onset has also been observed in recent years, resulting in shorter growing seasons. A review by Serigne et al. (2006) concluded that the same trend of reduction in the duration of the rainy season was also observed in Northern Benin.

Not all Sahelian countries, however, went through a reduction of the length of the rainy season. A decrease in mean annual rainfall without a reduction in the length of the growing season was observed in Niger and Mali (Serigne et al., 2006).

3.2 Consistent gradual decline in mean rainfall

A review by Serigne et al. (2006) established that the second half of the 20th century has witnessed a dramatic reduction in mean annual rainfall throughout the region. Furthermore, the third assessment report of the IPCC stipulates that a rainfall decrease of 29 to 49 percent was observed in the 1968 to 1997 period compared to the 1931 to 1960 baseline period within the Sahel region (IPCC, 2001). The fourth assessment report of the IPCC also indicates that from 1900 to 2005 precipitation declined in the Sahel region (IPCC, 2007), although the decrease is not quantified.

This downward trend of annual rainfall ended in 1988, after which recovery started. However, it is not yet clear whether this recovery marks an end to the drying of the Sahel, as there is high rainfall fluctuation in the area (Serigne et al., 2006).

3.3 Structural break

Kevane and Gray (2008) are the only, as far as my literature review goes, proponents of this view. Their argument doesn't contradict the view that the Sahel exhibited a reduction in rainfall, but argues that rainfall in the region has been fluctuating around a stable mean before and after the break year, the mean annual rainfall after the break being lower. Additionally, they contend that the assumption that rainfall has been showing a declining pattern in the past four or five decades and/or is declining in the Sahel is misleading.

All Sahelian African countries, as can be seen on Figure 1 for four countries, saw structural breaks between 1967 and 1974, except Ethiopia which had its break in 1977 (Kevane and Gray, 2008).

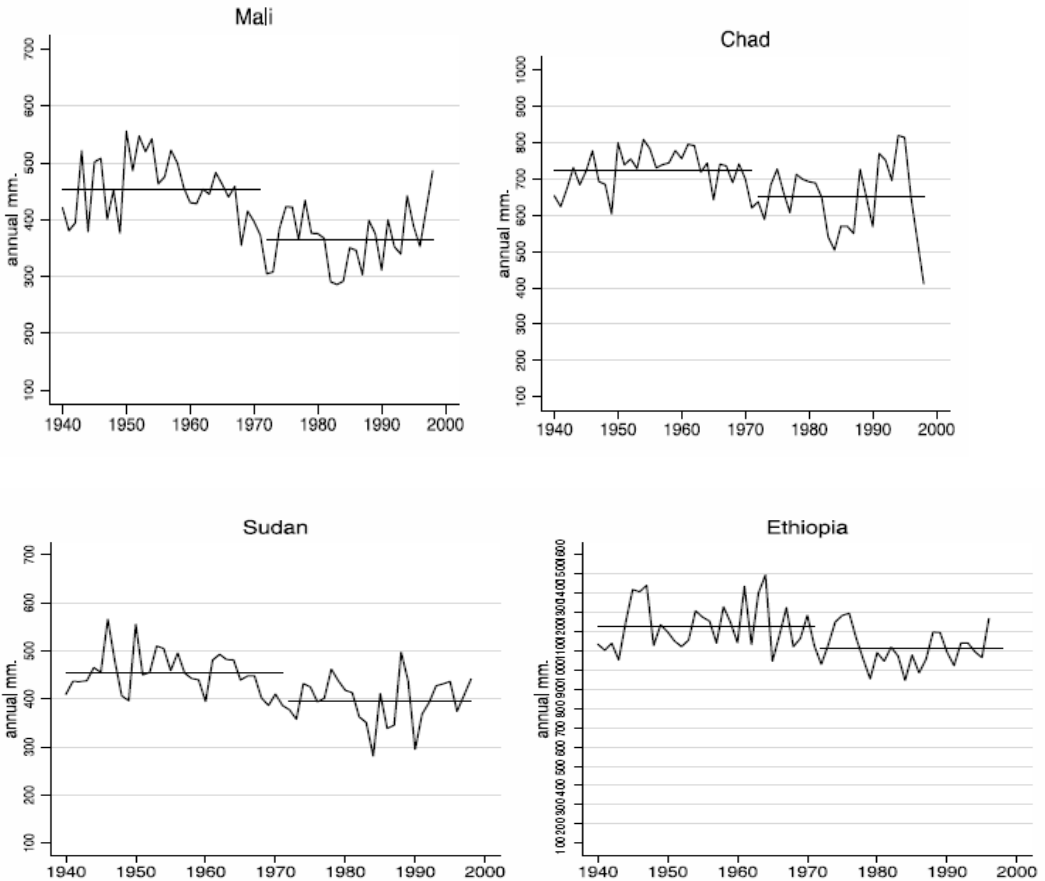


Figure 1: Rainfall in four Sahelian countries, 1940–1998 (dashed lines indicate means levels for 1940–1971 and 1972–1998). Source: Kevane and Gray, (2008)

4. Observed climate change in Darfur

According to the first communication of the Republic of Sudan to the UNFCCC, there is mounting evidence of long-term regional climate change in several parts of the country. This, it was noted, is witnessed by a very irregular but marked decline in rainfall, for which the clearest indications are found in Kordofan and Darfur states (RoS, 2003).

Records confirm that annual rainfall in Darfur is very variable from year to year. The localized nature of rainfall in the region is revealed by the weak correlation existing between the annual rainfalls at the three state capitals of Darfur (Tearfund, 2007b).

A study focusing on the three Darfur states has concluded that rainfall has decreased over the period for which records exist. A significant drop in rainfall occurred around the time of the Sahelian drought of the late 1960s and early 1970s, which has never recovered to the level before this period. Another, more severe, drought occurred in the 1980s but recovery has taken place since then, with a strong upward trend into the 1990s (Tearfund, 2007a).

UNEP (2007) found that there is a major and long-term drop in precipitation in Northern Darfur (30% over 80 years), which has led to reduced productivity. However, Kevane and Gray (2008) argue that longer-term trends in rainfall are less apparent in Darfur. They go further and repudiate the belief that rainfall has been declining rapidly. Their findings rather show that declining trends can be found only if years of above average rainfall, in the 1950s and 1960s, are used as starting years. In Nyala, for instance, no trend at all was exhibited for the six decades between 1942 and 2002. Indications from the northern meteorological stations are mixed. For El Geneina, a negative trend is estimated if the starting year chosen is in the 1940s or early 1950s, as these were periods of above average rainfall in that town. Similarly in El Fasher if the 1960s are selected as starting years for the analysis, a strong negative trend will be found. This is because the 1960s were years of high rainfall for the region (Kevane and Gray, 2008).

This finding led the authors to conclude that the notion of taking gradual decline in rainfall in Darfur is highly misleading. Instead, what seems to have happened to rainfall in Darfur is a break in 1972 (see Figure 2, left for the gradual decline argument and right for structural break). This is certainly true for El Fasher and El Geneina, but less clear for Nyala, where rainfall is basically stationary over the pre- and post-1972 sub-periods. The variance of rainfall was the same for both time periods for El Geneina and Nyala, but not for El Fasher (as one can easily see from Figure 2a, right, the later period has lower variance) (Kevane & Gray, 2008).

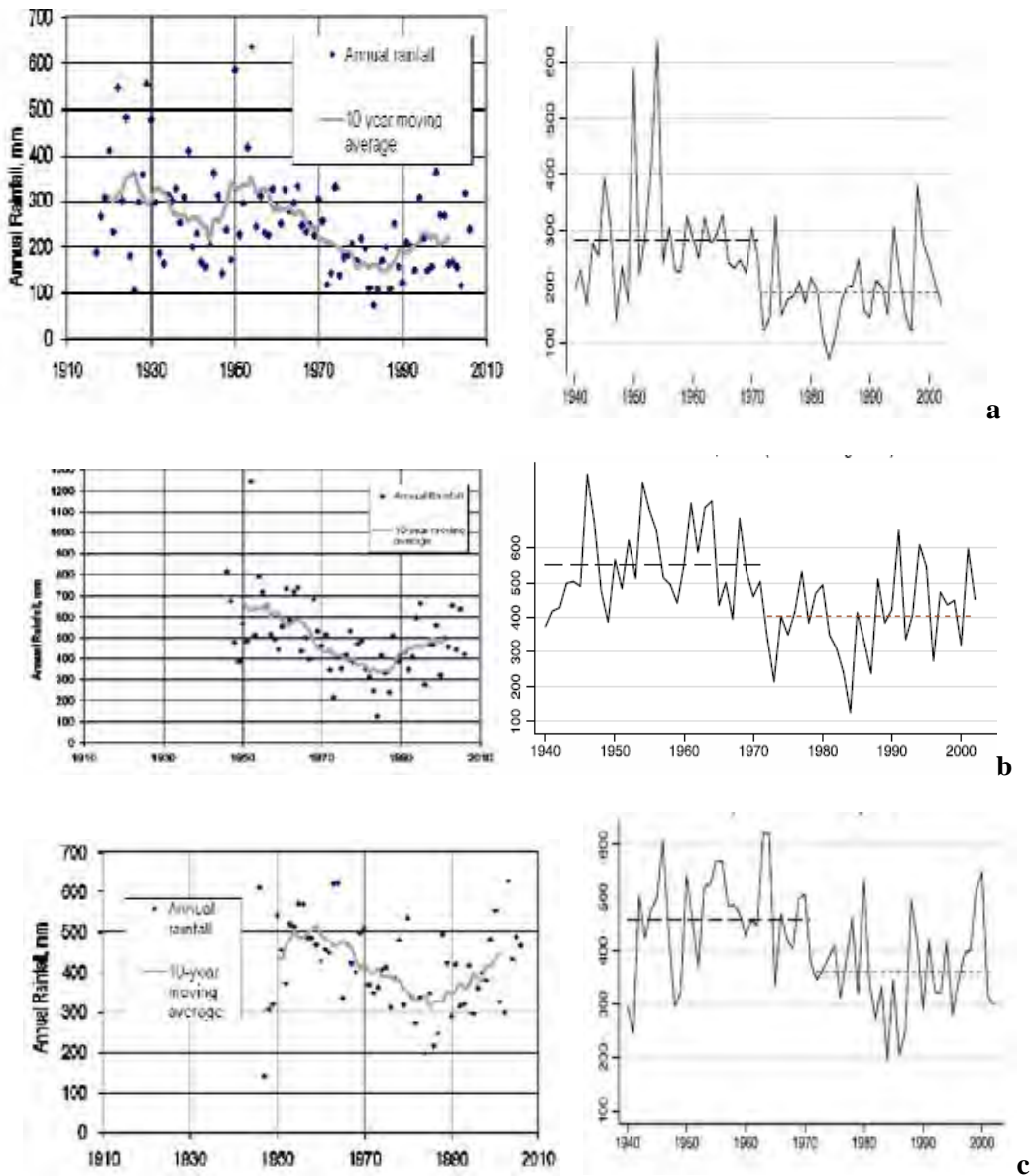


Figure 2: Rainfall in the three Darfurian states: El Fasher (a), El Genina (b) and Nyala (c). The figures on the left show the gradual decline argument, while those on the right show the structural break argument. Source: Tearfund (2007b) for the three on the left and Kevane and Gray (2008) for the ones on the right.

5. Predicting the Sahel climate

While much is known about the climatic past and present of the Sahel, predicting what its future climate will be appears to be a more complicated task (Serigne et al., 2006).

The few predictions available also show different patterns, especially for predictions in rainfall.

Temperature is expected to rise by between 0.2 °C (low warming scenario) and 0.5 °C (high warming scenario) in Africa (IPCC, 2001). Hulme et al. (2001), as cited in Serigne et al. (2006), attested that warming is expected to be greatest in the interior of the Sahel and in central southern Africa.

Historical data, anecdotal field reports and modelling all point to the same general trend: increased variability and climate extremes (UNEP, 2007). Two reports by Tearfund (2007a and 2007b) also reported that climate change models differ in their prediction of the general trend of rainfall in the Sahel but agree that variability is set to increase. This is in line with farmers' analysis of worsening climate in North Darfur; they observed that the pattern of good and bad years is changing and that good years are becoming scarcer (Tearfund, 2007a). The duration of the rainy season is also set to decrease (Tearfund, 2007a; 2007b). This will lead to further cuts in productivity in Sudan's Sahel belt, as well as the entire Sahel region (UNEP, 2007). Rainfall increases could also be expected in the Sahel, but only with the most rapid global change scenario. None of the models used by Hulme et al. (2001) (cited in Serigne et al., 2006) showed a clear outcome for the Sahel region. Therefore, many uncertainties still exist concerning its future climate.

6. Changes in the vegetation cover of the Sahel

Belief of widespread irreversible desertification of the Sahel was the norm in the 1970s and 1980s. Recent findings however, show that the Sahel is getting greener. Time series examination of greenness by Olsson (2008) principally reveals two major periods: the 1982 to 1993 and 1994 to 2003 periods. The first was marked by below average vegetation and persistence of drought, while the second tended towards "greener" conditions, with region-wide above-normal vegetation conditions starting in 1994. Anyamba and Tucker (2005) found a similar trend: vegetation was severely affected between 1982 and 1987, the most severe being between 1983 and 1985. Evidence of easing of the severe drought and desiccation was first seen in Central Sahel (5°E to 35°E), following good rains in 1988. From 1990 onwards, above normal vegetation cover was seen in most parts of the region.

This greening trend is not a localized phenomenon; it is a global one. For the northern mid latitudes and high latitudes, studies suggest that multiple mechanisms (e.g., nitrogen deposition, CO₂ fertilization, forest re-growth, and climatic changes) have promoted increases in net primary production, whereas increases in the tropics have been primarily attributed to CO₂ fertilization (Ramakrishna et al., 2003).

Results of time-series analysis of satellite data show a geographically-consistent pattern of increasing Normalized Difference Vegetation Index (NDVI¹) across the Sahel zone (Olsson, Eklundh & Ardo, 2005). Although average increases are not very meaningful in an environment as dynamic as the Sahel, for the period of 1982 to 2003, up to a 50% increase in average NDVI was recorded in parts of Mali, Mauritania and Chad (Herrmann et al., 2005).

According to Olsson et al. (2005), most of the observed greening is in the northern fringes of cultivation where rangeland, rather than cropland, dominates. This is also the area most affected by the drought of the 1980s, which thus experienced a more severe impact on its vegetation. Sjöström (2004) also noted the North-South difference in vegetation recovery in parts of the region (in Central African Republic, Niger, Mauritania and Sudan's South Kordofan state), and attributed the better regeneration of vegetation in the North to its severe desiccation during the 1984 drought. The devastating effect of the 1984 drought was also recorded by Tucker et al. (1991). Higher mean values of NDVI for the region were found between 1985 and 1990 than for 1984.

6.1 What caused the greening?

The observed greening is attributed to different causes. The most notable one is rainfall, but as rainfall alone cannot fully explain the phenomenon, anthropogenic factors also come into play.

- Rainfall: An increase in rainfall is the dominant causative factor at a coarse scale of observation, as there is a good correlation between the observed greening and recovery in annual rainfall in the Sahel (Anyamba & Tucker, 2005; Herrmann et al., 2005). There is a lagged response of vegetation to rainfall, as was found to be the case in Mali and Niger. The fact that high NDVI values persist towards the end of the year, in November and December, also indicates the lagged response of vegetation to rainfall. This lays the foundation to argue that NDVI is not correlated with rainfall *per se*, but with soil moisture, as it is best correlated with rainfall in the concurrent month and the two previous ones (Nicholson et al., 1990).

¹ NDVI is the most widely used vegetation index (Sjöström, 2004) and is calculated from Advanced Very High Resolution Radiometer (AVHRR) data (Tucker et al., 1991). It is the ratio of the near infra-red and red radiances and is calculated from atmospherically corrected reflectance from the red and NIR channels as:

$$NDVI = \frac{NIR - RED}{NIR + RED}$$

A number of authors suggested that factors other than rainfall also play a significant role in causing the greening (Herrmann et al., 2005; Olsson et al., 2005; Olsson, 2008; Sjöström, 2004). Sjöström (2004) came to this conclusion as five of the six areas studied showed a significant, but not strong, relationship between NDVI and rainfall. However, Olsson (2008) reasoned that while extensive, the greening is not uniform, suggesting that factors other than rainfall may be contributing to greening of some areas and not others. Another point raised by the same author is the coarse resolution of the satellite data, which might obscure some other causes and which makes a direct comparison of rainfall in one discrete location difficult particularly considering the erratic nature of rainfall in arid regions (Olsson et al., 2005). Herrmann et al. (2005) added that the greening trend is not uniform and that the prevalence of greener areas that are spatially coherent and observed over long time-periods without a significant causation link with rainfall, suggest the presence of factors other than rainfall.

- Anthropogenic factors: Sahel's vegetation cover change is not exclusively driven by climatic factors; there is also a human "footprint". This is evidenced by the fact that the removal of the influence of rainfall from the NDVI data results in spatially coherent, statistically significant residual trends. Rainfall-independent deviations of the NDVI are more likely to be induced by human factors, such as changes in land use, exploitation of natural resources, production strategies and conservation efforts (Herrmann et al., 2005).

For instance, increased rural-to-urban migration would tend to reduce the total land area under cultivation, thus increasing fallow land. The resulting increased reliance on remittances following the emigration of a family member can also help the families in the villages intensify their agriculture by increasing inputs on cropland (Olsson et al., 2005). Both the increase in fallow land (due to decreased human pressure) and intensification of agriculture (because of use of inputs, mainly fertilizers) tend to reveal a greener condition.

Therefore, close attention should be paid to possible factors affecting migration patterns, such as political unrest and armed conflicts. The vast belt of significantly increasing vegetation across central Sudan corresponds, to a large extent, to provinces with large numbers of internally displaced people. The eviction of residents to IDP camps leads to the widespread presence of abandoned fields and reduced grazing pressure, resulting in vegetation recovery (Olsson et al., 2005). This trend was confirmed in Darfur after the start of the full-blown violence in 2003 (Schimmer, 2008).

Other anthropogenic factors leading to greening could be a change in livestock density grazing or browsing in a particular area, land improvement activities and the increased CO₂ in the atmosphere. An increase in animal density would

put more pressure on the land and degrade it, while a decrease would mean less pressure and pronounced greening. No records show increased productivity of crops in the Sahel, therefore it is not plausible to assume that better land management led to the observed greening. Plants absorb CO₂ and photosynthesize to produce sugars, which are their building blocks. Therefore, increased CO₂ can lead to more growth of vegetative plant parts. This is partly the case in the Sahel (Brooks, 2006). Moreover, another study cited by the same author reported that a potential increase of vegetation cover of up to 10% of the Saharan land area per decade could be expected as a result of increased CO₂ concentrations. A simplistic reading of these results suggests that the Sahel might actually benefit from anthropogenic climate change.

- Change in vegetation type: Increased greenness could be a result of a change in vegetation type. This is worth considering as the Sahel is characterized by a high inter-annual species fluctuation (Wezel & Schlecht, 2004). In southern and central Niger, for example, most farmers mentioned that the proportion of cultivated fields to fallow fields had increased from the mid 1980s to the present time (Wezel & Haigis, 2002). Therefore, it is plausible to assume that this shift has brought the change in NDVI if the cultivated species are more productive or have higher light absorbance than the fallow species.

7. Conclusions and recommendations

The Sahel has experienced periods of severe drought during the past decades. Currently, annual rainfall is recovering, but is still lower than the 1950's and 60's. Not only has the amount decreased, the length of the rainy season has also shrunk, due to the delayed onset and early cessation trend of rainfall. Predictions of the Sahel's climate tell different scenarios. Some lead us to expect better rains, while many predict decrease in total rainfall amount. The image gets further complicated when one considers the high rainfall variability in the region and its localized nature.

The observed greening in the region is mainly caused by the recovery in annual rainfall, which started in 1988. Anthropogenic factors are also believed to be part of the causative process, but this does not necessarily mean that people and livestock are having a respite after the long years of drought. Change in the dominant species composition to an unpalatable one could severely harm the livestock and an introduction of invasive plant species could also seriously hamper livelihood activities.

Having timely and accurate data of the climate is an indispensable part of decreasing human suffering in the Sahel. Therefore, increasing climate data acquisition mechanisms and having better forecasting models are of crucial importance. This could also be translated into knowing the climate history of the area better, thus allowing more solid grounds for predicting future climate.

Livelihood strategies of people in the Sahel are well adapted to the harsh conditions they live in. However, they are coming under pressure from the severe effects of climate change. This entails changing livelihood activities, ranging from changing the livestock species one is rearing to changing the timing of transhumance/nomadic movements and from changing the staple food crop in production to selecting plant species which better adapt to the climate.

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Global Climate Changes: Impacts on Water Resources and Human Security in Africa

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Abstract

This paper is an attempt to provide how climate variability was evidenced in Africa and to assess the likelihood of more people facing water stress or water scarcity. Climate change has been manifested in the form of erratic rainfall and frequent drought. The paper discusses that the famous Sahelian droughts of the 1980s and 1990s had crucial economic and societal impacts, while mentioning the general decline in rainfall over the last 100 years in other African regions. It also explains the economy of the region, which relies heavily on natural resources, and includes three major agricultural systems: sedentary rainfed agriculture, sedentary irrigated agriculture, and nomadic pastoralism. The paper further explains that the ecological balance which once existed between sedentary agriculture and nomadic pastoralism suffered as repeated periods of drought led to desertification and environmental degradation. Predicted changes in the climate are also expected to intensify competition, while compromising the provision of potable water. Likewise, agriculture, the major water consumer in the region, would suffer most from water shortage. Human security will also be threatened as a result of impacts of climate change. Consequently, a complex set of factors (social, economic, institutional and political) could then interact and produce insecurity and civil unrest. The paper concludes that since climate change is a multidimensional problem, it cannot be solved without implementing a multi-dimensional solution.

1. Introduction

Water resources are among the most vulnerable sectors to climate variability and change. Water resources are closely linked with climatic elements and so the issue of climate change has crucial implications for water resources and their management. With half of its land classified as arid and semi-arid, water remains one of the major issues of concern for Africa. Water supplies from rainfall, rivers, lakes and groundwater are characterised by an unequal natural geographical distribution. In East Africa, inter-annual lake level fluctuations have been observed, with low values from 1993-1997 and higher levels (for example, lakes Tanganyika, Victoria and Turkana) between 1997 and 1998. The higher levels were linked to an excess in rainfall in late 1997, coupled with the large scale perturbations in the Indian Ocean (Mercier et al., 2002).

Climate change has the potential to impose additional pressures on water availability and accessibility. The African continent is the most vulnerable in the world, according to the fourth assessment report of the Intergovernmental Panel on Climate Change

(IPCC, 2007b). The predicted effects of climate change over the coming decades, according to the IPCC, include extreme weather events, drought, flooding, sea level rise, retreating glaciers, habitat shifts and the increased spread of life-threatening disease. Africa has already experienced all of these events and will most likely experience each in greater intensity in the future. Reductions in soil moisture, and consequently fertility, may be the most significant of the projected impacts of climate change in Africa. Other impacts, including changes in temperature and sea levels, are all expected to have severe consequences in a continent that is already experiencing water stresses in many parts and scarcity in others². An increase in frequency and severity of droughts has been observed over the past 30 years. Figure 1 below shows which African nations are expected to experience water stress and which are expected to face water scarcity by the year 2025 (UNEP, 2002).

Emerging evidence from the IPCC (2007a), based on observational records and projections for the future, indicated the high vulnerability of water resources to the impacts of climate change, particularly in Africa. According to UNEP (1999), around 300 million people in Africa have no access to potable water or adequate sanitation. This figure is expected to increase by 2025 – as a result of increased water demand – to 480 million facing either water scarcity or stress, with a potential subsequent increase in water conflicts.

Water scarcity is predicted to impact upon water quality, which will result in sanitation problems and deteriorated health conditions. The high rainfall variability experienced across many African countries during the last decades of the twentieth century, has increased the number of people depending on groundwater as the primary source for fresh water. Groundwater supplies 15 percent of Africa's water resource and is used by more than 75 percent of the population, mainly in the North African countries. The projected decrease in precipitation under climate change is expected to adversely impact water recharge, bearing in mind that many of the major aquifers are located in arid zones of the northern Sahara, Nubia, Sahel, Chad Basins and Kalahari (Datius, 2008).

A number of water-related issues have been identified in the third and fourth assessment reports of the IPCC (2001 & 2007b) as key regional vulnerabilities, with the reports noting that climate change is likely associated with increased water stress in much of Africa. Projected climatic changes in temperature and reduced precipitation will put many wetlands, rivers and lake floodplains at risk of desiccation and will affect many species.

Precipitation models for the southern Sahel and Guinea coast gave mixed results, with some models projecting sharp drying and others projecting progressive wetting, with likely re-vegetation of the Sahel. A recent study, using four general circulation models (GCMs) for the African Sahel region, showed that the number of extreme dry and wet

² An area experiences water stress when the annual water supply drops below 1700 m³ per person, and experiences water scarcity when the annual water supply drops below 1000 m³ per person.

years will certainly increase during the current century (2001-2099) (See annex 2 a and b on Sahel projections) (Held et al., 2005). Many semi-arid and arid areas are particularly exposed to the impacts of climate change on freshwater and will suffer a decrease of water resources due to climate change. The effects include a significant decrease in runoff and water flow in major basins particularly in the North and South of Africa (Brooks, 2004). A study on the impact of climate change on the Nile system presented much drier scenarios of water flows, with the impacts projected by nine climate scenarios ranging from no change to a roughly 40 percent reduction in flows by 2025. Moreover, the study noted with a high confidence, that climate models projected consistently warmer temperatures throughout the whole basin. This is expected to lead to greater losses from evaporation and to result in decreasing flows (Conway, 2005).

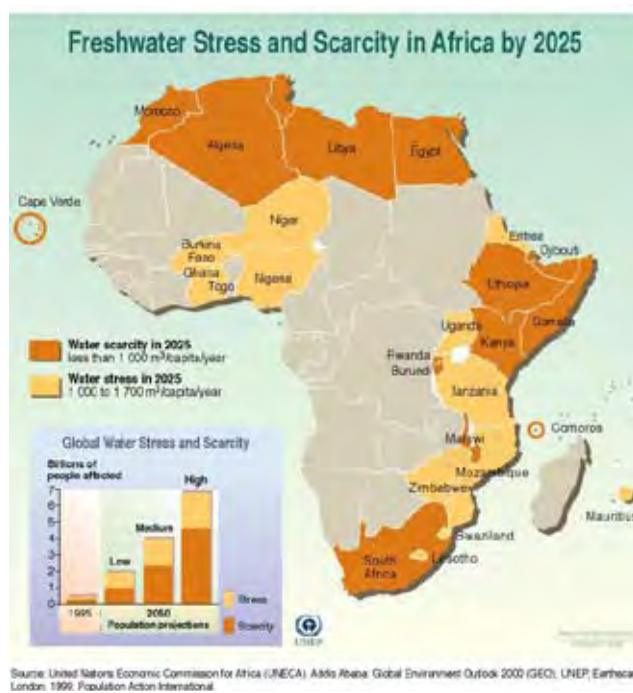


Figure 1: Projected freshwater stress and scarcity by 2025 in Africa. Source: UNEP (1999)

The IPCC (2001 & 2007b) pointed out the striking disappearance of glaciers on Mount Kilimanjaro as a result of global warming. Taking into consideration that snow and glaciers represent the water tank for many of the African river systems, one can imagine the impacts on people's livelihoods and human security. According to the projections, if this decline continues at the current rate, most of Africa's glaciers could fade away within the next 15 years. Recently, it has been observed that several rivers are drying out in the summer season due to the declining volume of the ice-covered reservoirs, which further emphasises this point. Other glacier reservoirs such as

Ruwenzori in Uganda and Mount Kenya are also exposed to similar impacts (Nicholson and Yin, 2001).

The projected future water stresses and scenarios of scarcity will have serious impacts on the socio-economic development of the countries affected. Existing figures show a gap in water availability in Africa, with the average water availability per person being 5,720m³ per head per year, compared to a global average of 7,600m³ per head per year. The rising demand for increasingly scarce water resources is causing a huge concern with regard to the future availability and access to water, and the potential for increasing competition and tensions specifically where two or more countries share water resources, which is the case for almost all of the 50 river basins in Africa (United Nations Framework Convention on Climate Change [UNFCCC], 2006).

Climate change is also expected to have impacts on existing water infrastructure and management options (Desanker, 2002). Water has a cross-sectoral nature and so any changes regarding its amount or quality would have impacts on many other sectors including agriculture, health, forestry and energy. Moreover, the impacts of climate on water systems would exacerbate the impacts of other stresses, such as population growth, land use change, economic sectors, human security, settlements and infrastructure. Current water management practices in Africa are likely to be inadequate to cope with the negative impacts of climate change on water availability and distribution. However, improved incorporation of current climate variability into water-related management would make viable the adaptation to future climate change.

Africa needs to focus in the long-term on increasing adaptive capacity to climate variability and climate change. Recent studies under different initiatives in Africa, such as AIACC³, identified a number of adaptation measures in response to water stresses during droughts and high rainfall variability, including improved water exploitation methods (e.g. shallow wells), irrigation, water transfer, water harvesting and storage. In shared river basins, regional cooperation protocols are needed to minimise both adverse impacts and the potential for conflicts, particularly in arid and semi-arid regions (Conway, 2005).

2. Observed climatic change

Historical records indicated a warming trend in temperature over Africa of approximately 0.7°C during the 20th century. This has also been reported in the fourth assessment report of the IPCC (2007a). Observational records showed that this warming occurred at a rate of about 0.05°C per decade with slightly larger warming in the June-November seasons than in December-May. An average of a 25 percent

³ Assessment of Impacts and Adaptation to Climate Change in Multiple Regions and Sectors (AIACC), a global initiative funded by GEF/UNEP – WWW.AIACCPROJECT.ORG

decrease in rainfall has occurred over the African Sahel during the past 30 years, which was characterised by a decrease in the number of rainfall events. Moreover, IPCC (2007a) reported a decrease in precipitation occurring over the 20th century, particularly after the 1960s, over the subtropics and the tropics. This is further emphasised by Hulme et al. (2001) who pointed out a decline in precipitation by about $2.4 \pm 1.3\%$ per decade in tropical rainforest Africa since the mid-1970s. A stronger rate of decline has been observed in West Africa (4.2 ± 1.2 percent per decade) (for details see Figure 2).

In terms of water-related disasters it has been observed that both droughts and floods have increased in frequency and severity over the past 30 years. The geographical distribution indicated that Africa is severely affected by epidemics, suffering from a total of 334 water-borne epidemics between 1980 and 2006 (Public Works Research Institute [PWRI], 2008).

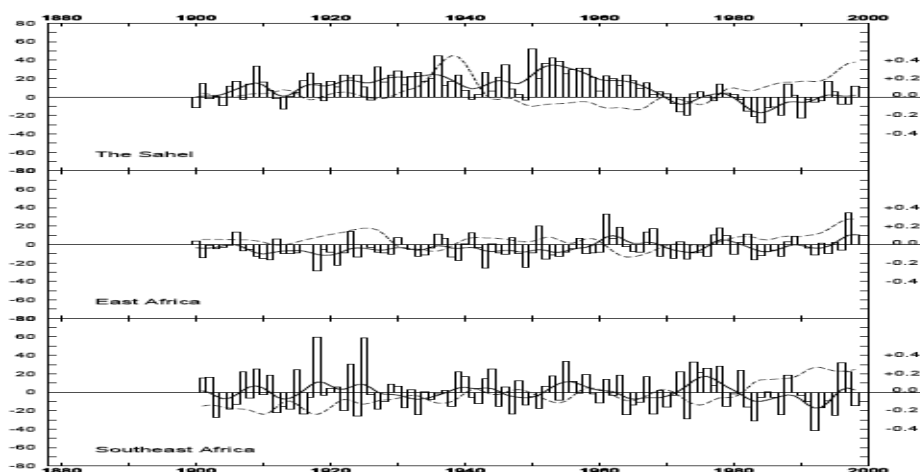


Figure 2: Annual rainfall (1900-98; histograms and bold line; percent anomaly) and mean temperature anomalies (1901-98; dashed line; °C anomaly) for three African regions, expressed with respect to the 1961-90 average: Sahel, East Africa and southeastern. Source: Hulme et al. (2001).

3. Projected changes in Africa's climate

Climate change scenarios which are based on General Circulation Models (GCM) show a general agreement in predicting temperature rise across Africa, but show considerable uncertainty about both the magnitude and direction of changes in precipitation. Rainfall in Africa shows high levels of inter-annual and inter-decadal variability. According to Hulme et al. (2001), understanding and predicting the inter-annual, inter-decadal and multi-decadal variations in Africa's climate represent a major challenge facing African climatologists in recent years. Furthermore, Hulme et al. highlight the changes to African climate resulting from increased greenhouse gas

concentrations, as simulated by GCMs. The authors point out two potentially important drivers of African climate variability: namely El Niño/Southern Oscillation and land cover change. However, they further emphasise the fact that both drivers are not well represented in the models.

Additionally, some studies have projected a drier condition over the Sahel, consistent with the long-term drought that prevailed over the last century. Hulme et al. (2001) pointed out that projected future drying will be consistent with past droughts, the magnitude and intensity of which has been on the increase over the last century. Other studies presented contrasting results that projected an increase in precipitation over the Sahel, which will lead to the greening of the desert. For example, Brooks (2004) pointed out that the models of future climate change suggested warming that may ultimately lead to a more humid regime in the Sahel and parts of the Sahara, prompting speculation that the region is experiencing a shift to a wetter climate. Claussen et al. (2003) reported a potential increase of vegetation cover of up to 10 percent of the Saharan land area per decade as a result of increased CO₂ concentrations, which will trigger an increase in rainfall that can be sustained further through vegetation-atmosphere feedbacks.

A number of studies highlighted the regional and sub-regional differences of projected rainfall. While East Africa has presented a more or less stable rainfall regime, considerable multi-decadal variability and recent drying has been experienced over the Sahel with an up to 20% expected decrease of rainfall. Other regional variations projected over the coming 30 years (2010-2039) included a decrease in rainfall of 10-25% over the northern parts of Africa in the months of June-July-August and 10-60% in March-April-May, with a decrease of 15-62% in southern latitudes for the June-July-August and 8-36% for September-October-November. The same authors have also projected an increase in rainfall of 10 percent and 35 percent in the western parts of the continent for the December-January-February and September-October-November periods, respectively (Hulme et al., 2001).

4. Impacts of climate variability and change on water resources

Rainfall over most parts of Africa is subjected to frequent variability and shifts. Various studies found that average annual rainfall is decreasing in different parts of the continent. Coupled with warming, this implies net drying with negative consequences on water supplies and agriculture. Climate change affects the function and operation of existing water infrastructure (including dams, flood protection walls, drainage networks and irrigation canals and systems) leaving more people across Africa to face potential water shortages in the future.

Boko et al. (2007) indicated that between 75 and 250 million people in Africa are projected to be exposed to increased water stress due to climate change by 2020. Furthermore, they indicated that some countries would witness a declined productivity in agriculture that could reach up to 50 percent during the same period of time. A

range of climatic scenarios projected that; Africa will suffer from both severe water stress and expansion of arid and semi-arid lands by the end of the 21st century (Boko et al., 2007). Harrison and Whittington (2002) predicted a potential negative impact on hydropower production in the River Nile, resulting from increased temperature and subsequent declining river flows: which in turn will have an impact on the financial viability of hydropower schemes.

Lake Chad is reported to have receded to 8% of its original size (see annex 3 on disappearance of Lake Chad) during the period of 1963-2001. Lake Turkana has shrunk from within the Sudanese borders, and since late 2003 Lake Victoria's water level has dropped by over 1.1m from its 10-year average. As of December 27, 2005, it was approximately 10.69m and had reached the lowest level since 1951 (United States Department of Agriculture [USDA], 2005).

5. Interactions of climatic, environmental and socio-economic factors: multiple stresses

Africa is currently facing a number of socio-economic pressures. At the regional and country level, certain countries in Sub-Saharan Africa exhibit poverty, declining food security and decline in overall wealth. Moreover, economic stagnation, the slow progress in education, migration and the spread of HIV/AIDS, is characteristic to the region. This is coupled with the rapid population growth at the rate of 2.4% (almost twice the world average as can be seen in Figure 3). The growing population in Africa will exert continued pressure on the provision of potable water and other essential services, as well as threatening food security. Multifaceted migration patterns, mainly for economic reasons and in response to stress-induced movements, are a common practice in the continent. The stressors resulting in migration are usually linked to conflict and/or resource constraints which can trigger more expansion into marginal lands. This may also trigger 'additional' conflicts over resource use (Elasha Osman, 2008).

Africa is already facing numerous challenges. Many non-climatic factors contribute to its vulnerability, including poverty, hunger, poor health, a low level of education/literacy, gender inequality, lack of access to resources and services, limited technological means and a lack of good governance. The water sector - as one of the major areas of concern - has been addressed in all African vulnerability and adaptation studies (V&A), conducted under their first National Communications to the UNFCCC. This is mainly due to its potential impact on other livelihood sectors such as food, security, agriculture and the distribution and prevalence of human diseases (UNFCCC, 2006).

Water shortage resulting from climate change is expected to impact major economic activities in Africa, leading to, for example, a reduction in the productivity of rainfed agriculture. Agriculture is by far the largest user of water in Africa. Water management in agriculture includes a range of practices including: and irrigated

agriculture, sustainable land and wetland use, freshwater fisheries and aquaculture and the management of water-related diseases including water pollution (from sediments, nutrients, dissolved organic carbon, pathogens, pesticides and salt, as well as thermal pollution). These aspects could have possible negative impacts on ecosystems, human health, the water system reliability and increment in operating costs (Food and Agriculture Organization [FAO], 2002). It is projected that agricultural production, including access to food in many African countries, will become severely compromised. The observed climatic change in Eastern Africa (i.e. increased temperature and decreased precipitation) from 1996-2003 has been accompanied by a decline in the yield of long-cycle crops, therefore impacting the available food supply (Funk et al., 2005). Adversely, this would further affect food security and exacerbate malnutrition (Boko et al, 2007).

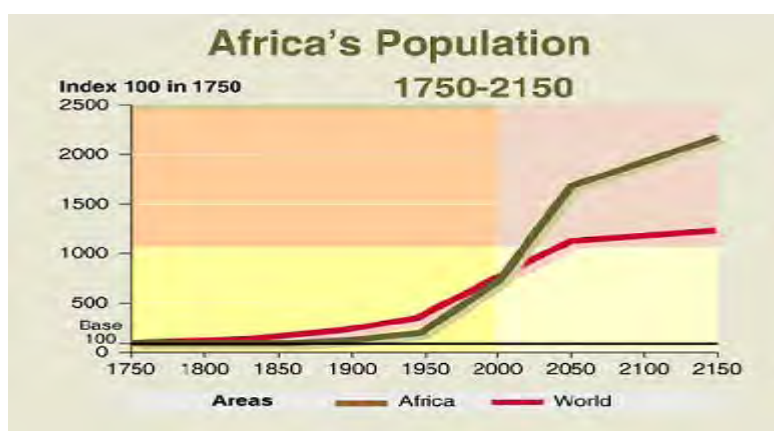


Figure 3: Comparison of rate of growth of Africa's population and that of the whole world. Source: World Bank (2002)

Climate change is expected to impact both water supply and demand, imposing more pressure on the livelihoods of the African people. Under climate change, it is expected that more and more people will suffer from food insecurity, resulting from multiple factors associated with food production and distribution.

Livestock population in the arid and semi-arid lands (ASAL) of Africa is increasing at a high rate. People living in these areas are already exposed to many water shortage related risks. Some of these risks originate from the pastoral production systems that comprise the main economic activities in these areas. The ASAL have rainfall patterns that are highly variable, both temporally and spatially, making pasture and water availability for livestock unpredictable. These risks translate into risks of human food shortages. Other water-related vulnerabilities include the impact of severe drought, subsequent food security problems and the resultant poor nutritional status of the population.

Most of the fresh surface water resources in Africa are found in a number of major trans-boundary river/lake basins, with some shared by as many as ten countries. Water

supplies from rivers and lakes are affected by the unequal natural geographical distribution of water, unsustainable water usage and accessibility. The Congo River basin alone holds almost thirty percent of Africa's total fresh surface water reserves. Seventy four percent of the fresh water resources of the continent are concentrated in eight major river basins, i.e. the Congo, the Niger, the Ogadugne (Gabon), the Zambezi, the Nile, the Sanga, the Chari-Lagone and the Volta.

Some studies have recently attempted to evaluate the impacts of climate change on runoff of major water rivers in Africa. For example, Conway (2005) stated that the projected increase in temperature would lead to greater water loss in the Nile basin through evaporation, placing additional stress on water resources regardless of changes in rainfall. Conway further indicated that the absence of institutional management of water resources might be the reason behind many current disagreements over the negotiations between African countries, which are expected to escalate into conflicts under future climate change. Hulme et al. (2001) highlighted the presence of large disparities between models of rainfall predictions over both the Blue Nile and White Nile and further indicated that various mathematical and hydrological models produced inconsistent results, ranging from a 50% reduction in runoff in the Blue Nile Sub-basin due to a 20% decrease in precipitation, to an increase in water runoff up to the year 2025. If the negative projections prove accurate, the basin is likely to experience profound environmental change with serious security implications.

Climate change could further impact the availability and quality of drinking water through the contamination of rivers and reservoirs during high floods and the overflowing of effluents from sewage and industrial discharges. This could deteriorate the water quality and increase the spread of water borne diseases. Major health problems associated with water scarcity and deteriorating quality include spreading of diarrhea, cholera amongst others (Mong et al., 2001).

6. Climate change and human security

Human security is defined as the "safety from chronic threats such as hunger, disease, and repression as well as protection from sudden and harmful disruptions in the patterns of daily life – whether in homes, in jobs or in communities." (United Nations Development Programme [UNDP], 2007). This definition identifies the close link between livelihood security, human security and well-being, which is expected to become threatened by the advent of climate variability and change.

Currently, small-scale farmers and pastoralists in the Greater Horn of Africa (GHA) region are experiencing continuous resource-based confrontations which could lead to the loss of their livelihood means. The IPCC (2007b) projected a decline in agricultural productivity over most of Sub-Saharan Africa, including the loss of some agricultural crops such as rice, millet and sorghum, which support more than 75% of Africa's population. This will further exacerbate food insecurity, leading to more

displacements, cross-border movements and potential conflicts. By the 2080's climate change is estimated to place an additional 80-120 million people at risk of hunger worldwide and 70-80% of these will be in Africa. On the other hand, conflict could bring about profound impacts to the environment and natural resources, a situation that has already been observed in many African countries, overwhelmed for long periods by a state of conflict and environmental deterioration. The more resource deterioration resulting from conflicts, the more people will be forced to migrate to neighbouring areas, hence more friction, more pressure and the continuation of the vicious cycle (Elasha-Osman, 2008).

6.1 The Darfur conflict: a focus on the environmental dimension

The conflict in Darfur can be considered as made up of complex problems having many dimensions and layers. In order to identify regions most vulnerable to conflict, diverse forms of knowledge are required, from an understanding of the history and contemporary social organisation, to sound empirical data and seasoned judgment (Foundation for Environmental Security and Sustainability [FESS], 2009).

Livelihoods in Darfur are closely linked with natural resources. Rural production systems are predominantly based on sedentary cultivation (farming) and transhumant and nomadic pastoralism). Historically, during past drought episodes, local people in Darfur managed to adapt their living systems through different strategies, for example, by diversifying their livelihood strategies, or by moving with livestock to fodder and water-rich areas, i.e. nomadic pastoralist migration from within the region to more distant areas and urban centres (Elasha-Osman, 2008; Elasha-Osman & Sanjak, 2007). Household mobility has also enabled adaptation to climate variability when core activities became under ecological pressure from drought.

Trends in migration increased during the early 1970s and mid-1980s, because livelihood systems were devastated by extreme drought and famine. During this time, the majority of households in the region migrated southwards and others opted to live in refugee camps. A major change in the region following these drought years was the increase in population in wetter parts of south Darfur, where people came from other parts of the region, as well as from neighbouring countries, to settle in order to make a living. Migration across regional and national boundaries could therefore be considered as an adaptation strategy that was well integrated into their livelihoods. The declining resources and the prevailing weak institutions and administrative power further exacerbated the situation.

The conflict on the other hand, has largely impacted the migration and nomadic seasonal mobility, which further restricted the movement of people and livestock, with awful consequences for livelihoods. The forced displacement and restriction/blocking of physical mobility directly contributed to the loss of livelihood strategies, assets and properties and sometimes brought death of livestock.

Other factors that contributed to the escalation of the conflict in Darfur include the late response due to the fact that conflicts over resources always start at the very local level, and, as a result, may not be given due consideration at the right time. By the time attention is given, it might be too late to contain it, due to loss of traditional wisdom and the collapse of a traditional administration system, proliferation of small arms smuggled across the region and heightened internal and cross-border tensions caused by large-scale migrations.

Additionally, policies employed in the past to address climate-related disasters were characterised by a primary focus on short term solutions (emergency relief). Addressing the symptoms rather than the causes has further aggravated vulnerability and undermined traditional coping capacities. The ill informed regional and international interferences further complicated the situation.

6.1.1 How to address the problem

Since competition over natural resources could be considered as one of the main causes of the Darfur conflict, a resource-based solution should always be seen as an integral part of any effort aimed at solving the problem and maintaining a lasting peace in the region. These include:

- Implementing a peace building process with the objective of incorporating climate change concerns in the development of national policies and plans, and to create an enabling environment for the success of the peace building initiative.
- Working towards the wider involvement and consultation of different stakeholders using bottom-up approaches.
- Efforts in strengthening national and regional integration and collaboration in solving resource-related trans-boundary issues and disputes.
- Understanding the livelihood dynamics of stakeholders, their various needs and interests, and tailoring development programs accordingly.
- Restoring local institutions and traditional systems, for example, revisiting the Native Administration System, coordinating lessons and building on its strengths.

7. Conclusion

- Conflicts present an additional risk that threatens the sustainability of the people's livelihoods in many parts of Africa.
- There is an urgent need for more scientific knowledge to understand the link between vulnerability to climate change and conflicts.
- So far, few studies have been conducted to explore these links and there is still a need for a more integrated approach in researching the different dimensions that contribute to conflict, i.e. the social, economic and political dimensions and their interaction with climate change.

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Annexes

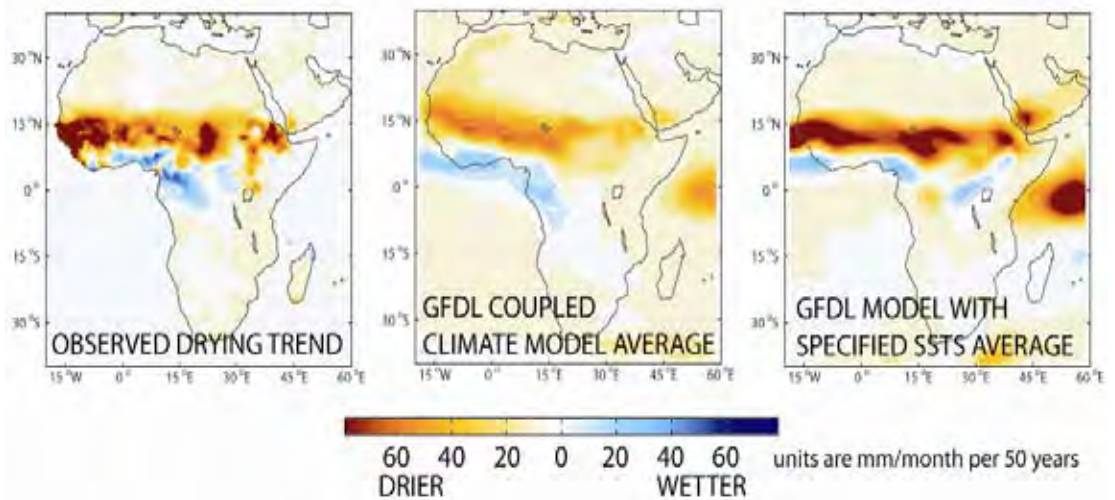
Annex 1: River and lake basins in Africa



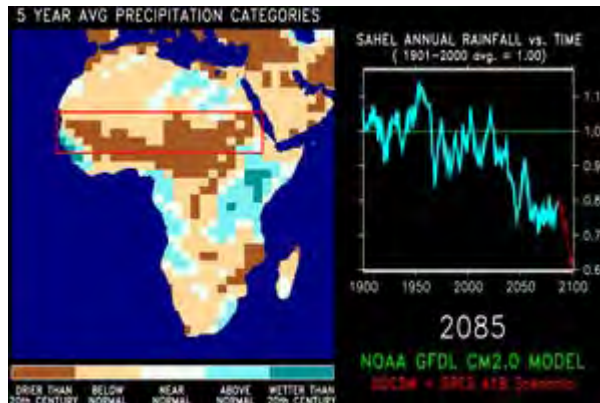
UNECA/DISD/GEOINFO. 2001/Source : ECA & World Bank

Annex 2: Sahel drought: past problems, an uncertain future

Annex 2a

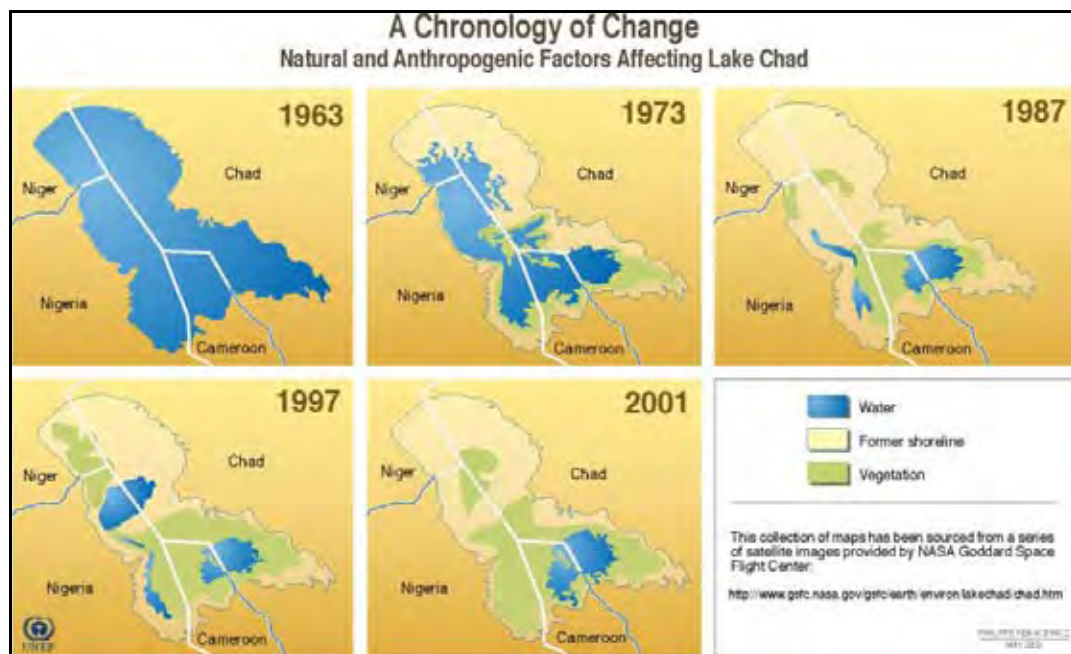


Annex 2b



Annex 3: Gradual disappearance of lake Chad

Average max flooded area of Lake Chad decreased from 37,000 Km² from 1950 to 25,000 in 1960 and then to 2000 Km² today. Source : PNUE <http://www.unep.org/vitalwater/27.htm>



Vegetation Composition Changes in the Darfur Region

Abduljabbar Abdalla Fadul

*Summary*⁴

All communities, including the nomads, pastoralists and sedentary communities in Darfur depend on vegetation and pasture for their livelihoods. The declining rainfall in recent times has led to the change of species composition. For instance, after 1986 the number of species in a particular area declined first from twelve to six and, presently, to one species. This is due to the depletion of the seed bank and the overuse of land, since the land system is communal—whereby everyone has the right to graze. Moreover, the increasing livestock population further exacerbated overgrazing. This leads to the depletion of certain palatable plant species, and if grazed before seed sets, the stock of seeds in the soil will also get depleted.

Even though there are many more farmers in the eastern part of Darfur, the north eastern part has witnessed more resource-based conflicts. In the north-western part, similar conflicts occurred as a result of competition over resources between the nomadic people, who moved down to the wetland due to a lack of vegetation.

Following to the 1970s drought in the Northern part of the region, conflicts have increased among communities. Local resource-based conflicts had previously been addressed through the local traditional system until its demise in 1987 and, following the failure of the system, the conflicts have escalated.

In a nutshell, it can be said that competition between pastoralists and farmers has led to the degradation of vegetation and grasses. However, the question of resolving the problem of the degradation at local, national or regional level still remains unanswered.

⁴ This is a summary of the presentation by Abduljabbar Abdalla Fadul on change of species composition at the conference on 21 July 2009.

The Tale of Al Matorat: A Documentary Film on Desertification⁵

Asim I. El Moghraby

The film tells the story of desertification in the Sudan according to the people that are actually affected by the phenomenon. It must be stressed that desertification is the dominant and most salient and far reaching environmental problem in the Sudan and indeed in many other parts of Africa, South of the Sahara. This is the first documentary film produced by Sudanese Environment Conservation Society (SECS) and is essentially a “docudrama”, incorporating a number of difficult choices given that the drama and scientific schools spoke different languages.

Al Matorat is a village south of Al Deaain in southern Darfur. It is in the *dar* of the Rizaygat, a major *baggara* tribe, and was thought to be representative of the area.

The film begins with scenes of people going to the weekly village market on donkeys, camels or on foot, taking their goods or arriving as buyers and bystanders. The story is narrated by several key people: the water vender, a village elder, the tailor, the horse cart owner and the film’s central character, Asha, with scenes of everyday activities in the water yard and in the market shown between interviews.

The strength of the film lies in the fact that it depicts the foundations of the present conflict in Darfur from the time when it was brewing and building up steam. It also highlights the fact that nobody imagined that the seemingly small and containable frictions could culminate into a conflict of such horrendous proportions. For example, in the film a fire was started by herdsmen to allow the new grass to sprout, whilst in another part of the country fire was started by the farmers to deny the nomads any fodder for their animals.

The first report is given by the borehole attendant/mechanic (the water vender). He reiterates that the water point was opened in the early 1970’s and that the output was originally plentiful whilst the pressures were few. Gradually the water table became lower however, and as a result, the yield less.

The second and third reports were given by a village elder and the tailor, who spoke of similar backgrounds. They had both moved to Al Matorat from northern Darfur after the Sahelian Drought of the early 1970’s and had found the place rich in plant and animal biodiversity. They stated that they had ‘burnt and slashed’ their way to the present denuded situation, confirming that there were eight different tribal groups in

⁵ The film was produced in 1997 by the Sudanese Environment Conservation Society (SECS) with funding from the Ford Foundation. It was directed by Al Tayeb Mahdi and the scientific director was Asim El Moghraby. This narration of the film was prepared by Asim El Moghraby.

the village. They talked of hardships and the repeated attempts to migrate to either cities or Libya.

The next report was by the horse cart owner. He was the only means of transport in the village and talked of the suffering of the old and sick and of women in labour. Finally Asha, the main character, was interviewed. She and her ten children had moved in from Um Saaona in the north, but soon her husband left and a son had died. Her eldest son had then gone to Libya, leaving his wife in the hands of his mother, and she reiterated that “it is only us, the women, ugly and miserable that are left behind”. She described how they had nothing to eat and had to work for others during the season, with even her young children having to work for others before being able to do their school homework. She had tried living in Al Deaain and Nyala and depending on food aid but felt that nothing worked. She was given a donkey and a goat by a well-to-do relative and used the donkey to fetch the water with whilst keeping the goat to be slaughtered as ‘*karama*’ at the time of her death.

She described the sand dunes covering everything, saying “look, look”. The climax was when she said “look at my hands; look at my slippers”, showing her shredded flip-flops in two different colours. She also reiterated that they could not go anywhere saying, “If we try to move out [of the safety of the village], they will kill us”.

We never asked ourselves who “they” were, and why they would kill Asha and her family. We never heard the message!!

Al Matorat village no longer exists. It was burnt down and abandoned some time ago!

Discussion

During the discussion, participants thought that it was important to look at the implications of climate change, including the changes in plant species composition on grazing lands. They also noted that when the issue of climate change is raised, there is a need to consider the management of water resources, aside from rainfall changes.

Some participants stated that there are nearly thirty meteorological stations to monitor the climate in Darfur, out of which only the three stationed in the capitals of the Darfurian states have been used in climate change studies because continuous measurements have been recorded only in these stations for a long time. One participant further noted that studies could also be undertaken by employing the freely available rainfall data from the NASA Satellite launched in 1998.

Participants highlighted the fact that after the recovery of rainfall at the end of the 1980s, there has been evidence of vegetation regeneration, though not in all areas. Therefore, it was commented that it is important to address all the factors affecting regeneration of plants before attributing it all to the decrease in rainfall. In addition, it was pointed out that the traditional adaptation system has failed due to various factors besides the decreased rainfall. Hence, it was stressed that there is a need to see other factors than climate change when the issue of breakdown of the traditional adaptation system is raised.

Regarding climate change and its consequences for the people of Darfur, it was argued that the situation has been aggravated due to the fact that grazing practices have not yet properly adapted. As a result, low quality fodder, including invasive species, has begun to dominate. This has, in turn, led to the intensification of the competition. Participants also discussed the importance of integrating climate issues into the conflict resolution analysis. The direction of change of rainfall is, however, uncertain in the region, due to its high variability; hence, it remains important to formulate various strategies and plans.

Participants also underscored that mitigation of overgrazing has been obstructed because of people's unwillingness to change. They noted that people sometimes prefer to migrate, rather than going through the process of improving their local situations by, for example, incorporating other crop species into the life and work cycle.

Responding to the questions raised by participants regarding the movement of pastoralists and the emergence of conflicts, Prof. Abduljabbar Abdalla Fadul explained that most of the time, movement of pastoralists is to the southern part of Darfur. He added that the pastoralists in the eastern part practice transhumance, whereas those in the north eastern part are camel nomads; hence, he noted that the movement is southwards, especially during the dry season. He also mentioned that the

livestock population has increased, for the camel owners have now started to raise sheep along with camels.

Regarding a question on owning camels as an economic means, Prof. Fadul replied that camels as a livestock species can serve as a source of foreign income to the country. He noted that camels have served not only as an economic means but also as a means of transportation. However, camels have now been replaced by trucks, and are used less as an economic means. According to him, the reason why pastoralists are still clinging to rearing camels is because no alternatives are available.

Another question posed was concerning the cattle grazing trends of the local communities. Prof. Fadul responded by highlighting the fact that anyone has the right to take their cattle to grazing lands since they are communal properties based on the traditional system of pastoral communities. He also commented that such a trend should be regulated by local authorities before leading to further overgrazing.

Dr. Balgis Osman-Elasha gave a brief response on the issue of consultation with the CSOs and the DDDC in relation to the peace process, stating that the process should be participatory. She further noted that rehabilitation and management of environment are key issues for the peace process.

Theme 2

Natural Resource Scarcity as a Cause of Conflict in the Horn of Africa

Introductory Notes

It is difficult to develop a clear-cut typology or classification of conflicts in Africa, not least because of the multi-causal, multi-dimensional and inter-connected nature of most conflicts. Analysis of causes and catalysts, many recent studies and leading schools of thought have highlighted these conflicts, giving them varied significance pertaining to the area of focus they want to address.

In the last decades, the exploitation of natural resources and related environmental stresses has become a significant driver of violence in Africa. Civil wars such as those in Liberia, Angola and the Democratic Republic of Congo (DRC) have been centred around “high value” resources like timber, diamonds, gold, minerals and oil. Other conflicts, such as the one in Darfur, have revolved around the control of scarce resources, such as fertile land and water (UNEP, 2009, p. 8).

The exploitation of natural resources and related environmental stresses can be implicated in all phases of a conflict cycle, from contributing to the outbreak of violence to undermining prospects for peace. Therefore, natural resources can be inspected for their causal role in the onset of conflict, as well as for their role in prolonging and sustaining violence (Ibid, p. 11).

Resource based conflicts can emanate from structural and systemic factors such as state policies. The underlying causes of resource conflict can be poverty, the policy choices that states have pursued over the years, and the failure of institutional frameworks for conflict resolution or prevention. Resource-based conflicts should be seen and analyzed within a policy and governance context. Looking into most of the pastoralists conflict in the Horn of Africa, for instance, the notion of marginalization both in the political and material sense. Pasture land depletion and water scarcity are also important in explaining conflicts in the region.

The root causes of conflict in Africa have been the subject of much debate. In contrast to the stereotypes of “ethnic” conflict in Africa, evidence appears to show that Africa’s great ethnic diversity actually reduces, rather than increases, the chances of conflict erupting. Nevertheless, in particular cases, it seems that where one ethnic group is numerically dominant, this may increase the risk for conflict. However, even in these cases, the manipulation of ethnic identity by elites is a major driving force.

According to the Commission on Human Security (2003), causes of internal conflict include:

- Competition over land and resources;
- Sudden and deep political or economic transitions;
- Growing inequity among people and communities;
- Increasing crime, corruption and illegal activities;
- Weak and unstable political regimes and institutions; and

- Identity politics and historical legacies, such as colonialism.

Malthusian philosophy emphasises the impact of population increase on conflict. The underlying assumption of Malthusian population policy pessimists is that there is a direct link between population pressure and chaos and disaster – be it political, environmental, or social (GeoJournal, 1995, p. 208).

In his 1798 work, *An Essay on the Principles of Population*, Malthus proposes that populations are largely limited by the availability of resources, but also recognises that populations will grow as production of resources grows. However, populations can increase exponentially and can “out-pace” the increase in production of resources; and when this happens, the outcome is a shortage of resources (Elgin, et al., 1996). This can result in forced population decline (a “population crash”), or negative social outcomes, including famine, poverty, and even violent conflict (Yanagizawa, 2008, p. 2).

Resource-based conflicts take place as a means to secure entitlements to land and its resources, to control state power or address other identity and grievance issues. In cases where capturing of resources is the main objective of the conflict, two distinct explanations may be offered to understand such a phenomenon: conflict breaks out purely as a survival mechanism to ensure life-sustaining resources; or out of pure greed for economic gain. It is important to note that conflict, in both cases, may involve lootable (non-replenishable) and non-lootable (replenishable) resources.

Land scarcity, exacerbated by inequitable distribution of land and high population increase, has also been described as one of the proximate causes of violence in countries such as Burundi and the Democratic Republic of Congo. Access to land has been key in changing patterns of economic domination and exclusion that created deprivation and social tension, and influenced the power relations between communities.

Environmental scarcity was one of the numerous aggravating factors which had a role in the recent conflict in Rwanda. The massacres, war and refugee movements were tied to political aspirations and elite insecurity. Environmental scarcity was used as a political tool to mobilise the rural population for political ends (Mitchel, 1997). Resource scarcity, particularly land scarcity, one of the factors in the Rwandan conflict, also brings a challenge to ongoing peace-building efforts in Rwanda.

Research conducted by African Centre for Technology Studies (ACTS) and the Institute of Security Studies (ISS) concluded that,

“Land was not the root cause of the Rwandan conflict...the role of land, however, is crucial to understanding conflict dynamics in Rwanda. Control of the state by elites in Rwanda has facilitated their domination of land ownership... land was an important factor underlying the formation of violent conflict between the ruling elite and armed

opposition. The land issue continues to complicate peace-building and national reconciliation in the post-genocide period.” (Huggins et al., 2005, p. 13)

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Conflict in the Horn of Africa

John Markakis

Abstract

This paper discusses issues concerning the causation of conflict in the Horn of Africa and how conflict itself is managed. There are many different strands of opinion on what causes conflict, which tend to cluster into two contrasting categories, namely ethnicity and resource competition. Indeed, conflict in Africa is perceived in 'ethnic' terms as this carries a ready-made causal explanation that does not require further analysis. The findings of this paper demonstrate that the perceived conceptual antithesis between 'ethnicity' and 'resource competition' in conflict causation is more apparent than real, and appears only when the two are presented as mutually exclusive. Hence, a distinction between form and substance of conflict, which can only be made in context, would help illuminate the role that each of these factors play in any given instance. As it stands, it has now become obvious that the Horn of Africa is a veritable laboratory where this approach can be tested because of several reasons, which include the abundance of ethnic groups and cultures, turbulent history, and the abuse of power to capture and monopolise resources. The paper also attempts to explain the bones of contention for conflicts among pastoralists in the Horn, and the implications of such conflicts for political stability and development in the region.

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The main theme of this paper is conflict; what causes it and how to manage it? As is well known, there is great diversity of opinion with regard to the ongoing debate on both sides of this question. What I want to do is to highlight salient features of the debate in order to give focus to our discussion.

While there are many different strands of opinion on what causes conflict, they tend to cluster into two contrasting categories: *ethnicity* and *resource competition*. 'Ethnicity' is the label for what used to be called 'tribalism'. Like tribalism, ethnicity is an unpopular, politically incorrect concept among scholars and politicians alike. Striving for political correctness, scholars now refer instead to 'identity', 'values', 'attitudes' and other dimensions of ethnicity that may figure as ingredients of group conflict.

Even so, all too often conflict in Africa is perceived in 'ethnic' terms. The label is popular with the mass media because it carries a readymade causal explanation that does not require further analysis. The implication is that the causes of conflict are inherent in ethnic differences, and since ethnicity is commonly defined in terms of culture, 'ethnic conflict' is, in essence, a clash of cultures. Ethnicity, thus, is given the status of an analytical concept.

If ethnicity is inherently conflictual, and cultural differences are the essence of conflict, where does that leave the management of conflict? Theoretically nowhere it seems, since cultural differences cannot be eliminated or negotiated. The most peacemakers can do is to strive to dispel suspicion and mistrust that arise from cultural differences through 'dialogue'. 'Dialogue' then becomes a conflict management tool; the idea being to get the rival parties to 'know each other' when, usually, they know each other only too well.

Undeniably, more often than not, parties to conflict in Africa identify themselves in ethnic terms, and to that extent, the label fits. Two problems remain, however. First, ethnicity cannot be inherently conflictual since symbiosis is the rule, not the exception, among the myriad of ethnic groups in Africa. Second, how does 'ethnicity' explain conflict among sections of groups that are recognized as ethnically homogeneous? The 'ethnic' factor is simply not relevant where the rival groups identify themselves, and are recognized by outsiders, as belonging to the same ethnos. Somali clan conflict is a notorious example that has defied analysis based on the 'ethnic' factor.

In analyzing conflict, it is important to distinguish between form and substance in any given instance. The question that has to be asked, and is begged by resorting to the 'ethnic' label, is what causes the assertion of ethnic identities, values, attitudes, etc., that leads to conflict?

The first step towards an answer is to define the context – historical, material, social, political – within which a conflict is generated, and the second is to identify the factors in the context that have contributed to the outbreak of the conflict. These are factors that determine peoples' welfare and quality of life; resources worth fighting for. Central to people's welfare and quality of life is security: a manifold concept that includes physical and material needs such as food, shelter and health; social needs such as culture, language, religion and appropriate education for their preservation; and political needs such as inclusion and participation on equal terms in governance.

These basic human needs are manifested through membership in social groups and secured collectively through group mobilization. The relevant group may be variously identified; it could be class, caste, religion, region, language, or ethnic unit. The context determines which of these is most relevant and can serve as the basis of group mobilization in defence of its security. As it happens, in Africa 'ethnicity' is often the relevant identity marker and basis for group political mobilisation. Ethnicity then, is the form conflict frequently takes in this continent.

The substance, more often than not, is political power, because it is the most effective means of ensuring peoples' welfare and quality of life as defined here. Political power is trebly useful in this sense. First, since the state in Africa controls both the production and distribution of resources, political power is the shortest and surest path to resource accumulation. Second, in a continent where institutional and legal

safeguards are inadequate, political power offers the best protection for accumulated wealth. Third, political power is needed to ensure recognition, respect and preservation of indigenous cultures and identities that are threatened with extinction in the drive for homogeneity, national integration and globalization. When cultural integrity is threatened, ethnicity becomes an ingredient in the generation of conflict.

The perceived conceptual antithesis between ethnicity and resource competition in conflict causation is more apparent than real, and appears only when these are presented, as often they are, as mutually exclusive. A distinction between form and substance of conflict, and a focus on the issue of security broadly defined, while keeping in mind the primacy of political power in any situation, will help illuminate the role each of these two factors play in any given instance.

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The Horn of Africa is a veritable laboratory where this approach can be tested. An abundance of ethnic groups and cultures, its turbulent history, the perennial monopolization of state power by dominant groups, the historical abuse of it to capture and monopolize resources, the gross failure to develop new and additional resources to accommodate high rates of population growth, the resort to forced cultural assimilation in the name of national integration, and the ruthless resort to force against political opposition, obviously have a lot to do with the record incidence of conflict in this corner of Africa.

An area that has experienced endemic conflict for many decades and demands special attention are the Horn lowlands, home of the largest remaining concentration of traditional mobile livestock producers in the world. Four states in the region – Sudan, Somalia, Ethiopia and Kenya – rank first, third, fifth and sixth respectively in the world in terms of pastoralist population size. Though never accurately counted, the estimated size of this population ranges from 6 percent in Kenya to 60 percent in Somalia. Vast expanses of land in the arid zone comprising major portions of each state's territory – 52 percent in Ethiopia, 66 percent in Sudan, 70 percent in Eritrea, 72 percent in Kenya, 75 percent in Somalia and 100 percent in Djibouti – are pastoralist habitats.

The pastoralist zone forms a great arc stretching from the Sudan-Egypt border in the northeast to the middle of the Sudan-Ethiopian border in the southwest. It straddles the borders of all six states in the region. Nearly all the borderlines in the Horn are drawn through this zone, and most of the groups that inhabit it are split by them into two or more fragments. In the worst cases, the Somali are split into five and the Afar into three. Drawn during the colonial scramble for territory, the fragments were not put together afterwards and the wounds have not healed. Borders cut off people from their kinsmen, leaders, markets and places of worship. Borders also limit herd mobility, an imperative aspect of pastoralist production.

The pastoralist habitat is mostly arid lowland, the greater part of which receives a mean annual rainfall of less than 500mm. Unsuitable for cultivation, parts of the zone are also becoming ill-suited for grazing due to adverse climatic trends and unsustainable utilization. Drought is a familiar visitor here – whose visitations are remembered for they are usually accompanied by famine – and is threatening to turn parts of the lowlands into desert.

Poorly endowed by nature, the lowlands of the Horn have also been utterly neglected by the states that rule them. Agriculture has been the economic mainstay of all the states in the Horn, Somalia included. Pastoralism did not produce for the market, did not make profit and did not provide tax revenue. Neither capital nor modern technologies were brought to the lowlands, save for irrigated cultivation which left few signs of, and fewer prospects for, development there. Relative deprivation is the hallmark of the lowlands throughout the Horn, and that is part of the problem.

The pastoralist zone in the Horn is wracked by manifold conflict. It was never a peaceful place. Pastureland, water and access routes are perennial bones of contention in the arid lowlands. Control of caravan trade routes is another. Livestock looting is a traditional practice whereby depleted herds are replenished; young men acquire animals and attain manhood. Such conflict took place between, as well as within, ethnic communities. It followed rules designed to limit damage to life and property, and was resolved in a manner that provided for mediation and compensation, rather than punishment.

In the second half of the twentieth century, conflict in this zone increased in frequency and scale, and also changed form. Conflict among pastoralists for pastureland, water, access routes and control of contraband trade became more frequent. The conventional explanation is that these resources are becoming scarcer due to several reasons, which include higher incidence of drought, intrusion of commercial agriculture, increased involvement of pastoralists in trade and changing consumption patterns that make them dependent on market exchange. New resources such as contraband trade, which represents the bulk of intra-regional commerce in the Horn, commercialisation of animal looting, transport links that cross the lowlands, and the discovery of minerals, have become additional bones of contention. The scale of violence increased due to the introduction of automatic weapons and experience in warfare gained by pastoralists enlisted in larger conflicts in the region. Formerly spared, women and children have become fair game.

Pastoralists become involved also in larger conflicts in the region. Such conflicts have different origins and leadership, as well as different goals, unrelated to the immediate concerns of pastoralists. They are fought under national, regional, religious and ethnic flags, and aspire to create new states, merge with existing ones, or wrest a share of state power. The post-colonial history of the region is a tale of many such conflicts. Pastoralists proved enthusiastic recruits in the guerrilla armies that sprouted throughout the Horn in the second half of the twentieth century. In many cases they

joined opportunistically to get weapons for use in their own parochial confrontations. Elsewhere, they responded to the call of ethnic kinship, as in the Somali region of Ethiopia.

Given the fragmentation of communities by state borders, conflict in the lowlands often spills across borders. The larger conflicts in which pastoralists are likely to become involved invariably invite intervention from neighbouring states, thereby immensely complicating inter-state relations in the Horn. Perennial conflict and attendant insecurity rule out meaningful development intervention in the pastoralist zone, and thus perpetuate the impoverishment and marginalisation that are, themselves, the most potent sources of conflict. Caught in this vicious cycle, the pastoralist domain is an arc of crisis with a baneful impact in the Horn of Africa.

The negative impact of such conflict for political stability and development in the Horn is a matter of great concern. Until recently, the states in the region showed little interest in areas without readily exploitable resources or taxable income; the lowlands offer little of the former, and pastoralists are infamously tax resistant. By and large, they have been left to settle disputes among themselves in the traditional manner, without resorting to state law enforcement agencies, or even state law itself. It was only when conflicts spilled across borders or had an impact outside the zone – for instance, by threatening state security or severing transport links – that the state intervened. The usual form of intervention was to threaten or use force, and to attempt to disarm the belligerents.

Recently, the states in the Horn have showed greater awareness of the nature of the problem, as well as greater interest in conflict mediation. A step has been taken to create an institutional framework for this purpose. State efforts in this field need to overcome two obstacles. One is a lack of knowledge of the pastoralist mode of production and understanding of the predicaments it currently faces. Such knowledge and understanding is essential to comprehend conflict causation, the very first step to prevention and lasting resolution of conflict. The second is the short span of government attention, and the tendency to treat symptoms, without identifying and eliminating root causes.

To the extent that attention has turned to the existential pastoralist problem, the states in the Horn are attracted to the idea of ‘settling’ the nomads on land to supplement their food through cultivation, and where they can be provided with facilities and services like their sedentary fellow citizens. Sedentarisation of nomads is occurring with increasing frequency in the Horn. Mostly, it has been forced on impoverished pastoralists who end up in refugee camps, or congregate around food distribution stations and peri-urban slums. Others have turned to cultivation spontaneously where cultivable land is available. Still others have taken up trade in rural towns. State sponsored settlement projects are relatively rare, and the known results are disappointing.

For detailed discussions on the state of pastoralists in the Horn of Africa and their often conflictual relations see Markakis (1987; 1993; 2004).

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Politicising Scarce Resources: Thoughts on Violence in Darfur Since 1987

Victor Tanner

*Summary*¹

The paper focuses on the following areas:

- Competition over natural resources, violence and politics over the last two decades in Darfur, which has witnessed growing communal tensions and violence as a result of environmental degradation;
- Merely focusing on the communal violence or on technical issues such as the environment is often dangerous, as it puts politics aside;
- An overview of conflicts in Darfur in the last two decades, which can be summarised into the following five instances of conflict:

1) **The Arab-Fur war of 1987-1989:** The environmental causes of the Arab-Fur war include the droughts of 1984-1985 and of the early 1970s, and the large scale migration of populations from North Darfur to other parts of the region, which put pressure on the farming communities. In addition, developments in farming at the local level led to an increase in number of farms and increased the use of land in the areas south of Jebel Marra. This impeded the transit of pastoralists and their livestock. It was also in this conflict that large numbers of Arab groups, both the *abbala* and *baggara*, coalesced against other Arab groups.

2) **The Arab-Masaleet conflict of the mid 1990s:** The main problem in this conflict was a very aggressive assertion of claims over land. The disturbing factor to the non-Arab groups, in this case the Masaleet, was that the government seemed to endorse these claims under new *nazirs*—who directly challenged the Sultanate of the Masaleet and his traditional claim to the land. This conflict was different from the others in that there was a high degree of violence, killing of people, incidents of rape, stripping of assets, and systematic destruction of agricultural assets. Moreover, deliberate attempts to instil terror through forcing people to flee and restricting their movements, or blocking them from accessing their homes and their land, were among the contributing factors in this conflict. This conflict was different in scale, but similar in nature, to the conflicts which have occurred since 2003.

¹ This is a summary of the presentation by Victor Tanner on 22 July 2009.

3) **The Zaghawa and Aulad Zeid dispute (2001):** The Aulad Zeid groups are a branch of the Mohamid. These groups come from *abbala* and have their traditional areas in North Darfur, but go back and forth between the areas south and north of the Jebel Marra. The Aulad Zeid groups came under great pressure from the Zaghawa because of the scarcity of water and resources, caused as a result of their encroachment. The conflict left several Zaghawa dead.

4) **The rebellion of 2003:** The Government of Sudan reacted to this rebellion in a different way. The violence that the government unleashed was a classic counter-insurgency, for it was brutal and relentless including the looting of assets, undermining of the popular base of the insurgency and displacing people. The pattern of the conflict was that those who were involved in the violence would attack a particular area, and then stay from one to three days before leaving. Such a pattern of conflict could indicate that the aim was to loot but not to occupy the land. This conflict was very different because in the areas of Western Darfur, which are well watered and fertile, there were no intense rebel activities. Instead, these places were relatively calm and less destructed *vis-à-vis* agricultural assets.

5) **Rebel tactics since 2006:** It is believed that the government and, to a certain extent the rebels, have encouraged local conflict by creating competition over resources. At the government level, the approach has been to manipulate local conflicts as a means of arming groups supporting the Government of Sudan; whereas, for the rebels, it has been essential to block camel herding groups and other pastoralists, from accessing pasture.

Concluding Remarks:

- Competition over resources has been exacerbated by poor governance;
- Violence and fear play a significant role in causing conflicts. Conflicts in this case have come about as a result of a sense of fear among both groups that their identities and livelihoods are being threatened by the other group;
- Since rearing camels is no longer economical, and since trans-humance routes are increasingly blocked, camel herders tend to be desperate. Such despair plays a huge role in aggravating conflict;
- While the competition over natural resources is a problem, politics remains the main driver of the conflicts. The Arab-Fur and Arab-Masaleet wars, and the Zaghawa-Aulad Zeid conflict, can be cited as examples of political conflict, since they were addressed through improved governance;
- Likewise, the current conflicts have also been instigated as a result of the nature of the government's brutal response to the rebellion and the CPA itself, thus entailing political decisions;

- It is hazardous to focus exclusively on issues such as livelihoods, the environment and the climate at the expense of politics;
- As long as the government of Darfur is not committed to the rights and stability of all Darfurians, there will not be lasting peace in Darfur no matter how much livelihoods are improved or how much better coping mechanisms are in place, and no matter how much more rain falls.

New Directions in Climate Change-Conflict Literature

Clionadh Raleigh

Abstract

This paper presents a framework to assess theoretically and quantitatively how political marginalization and exclusion influence an ethnic group's vulnerability to climate change and, in turn, how that vulnerability can lead to conflict. At present, two separate clusters of literature assess climate change vulnerability and conflict. Environmental security literature assigns primacy to physical change and vulnerability in initiating or exacerbating conflict. Political ecology literature details the importance of political marginalization in creating local level instability. In combining insights from both, the components of 'political vulnerability' are investigated and a framework for conflict risk is devised. From an initial examination of communal conflicts in Sub-Saharan Africa, the risk of conflict depends largely on the size and political importance of ethnic groups. Environmental issues can be catalysts for low-level conflict in marginalized communities, but the critical factor is the extent of political and economic marginalization. Small, politically insignificant ethnic groups experience most conflicts related to environmental pressures. This framework and findings form a basis for possible forecasts concerning high levels of politically induced vulnerability and resultant intra and inter-communal conflicts.

1. Introduction

Climate change is expected to disproportionately affect developing states. In addition to major physical exposure, it is posited that the change in climate will alter the political stability of poor and underdeveloped states, making environmentally related violence more likely (Baechler, 1999; Homer-Dixon, 1994; 1999). Many point to the frequency and intensity of wars related to resource scarcity and distribution, arguing that current conflicts in Darfur, Somalia or Mali are evidence of this trend (Byers and Dragojlovic, 2004; Schwartz and Randall, 2003). Others contend that although climate change is an insufficient cause of conflict, it may exacerbate current tensions and inequalities (Barnett, 2001; Brauch, 2002; Pervis and Busby, 2004).

After more than two decades of research on resources, degradation and conflict, we have few concrete conclusions. Many scholars now agree that long-term environmental degradation (e.g. soil erosion, etc.) has a limited or insignificant role in generating civil or international wars (Raleigh and Urdal, 2007; see reviews by Homer-Dixon, 1991; Salehyan, 2008; Theisen, 2008). The risk and propensity for increases in communal conflict is speculative. Meier, Bond and Bond (2007, p. 733) found that, "Environmental factors do appear to influence pastoral conflict if only in the constraints they pose on those making the tactical decision to engage in communal raids." In short, studies of civil war and environmental factors consistently reiterate that the "political and economic characteristics" of countries are the strongest

indicators of conflict risk (see Raleigh and Urdal, 2007 for a review). This broad conclusion is parallel to the findings within climate change research that posit that the risk of adverse consequences due to climate change is related to the pre-existing political, economic and physical vulnerability of communities (Cutter, 1996; Eriksen, Brown and Kelly, 2005; McGregor, 1994; Pelling and Dill, 2006; Wisner, Blaikie and Cannon, 2004). However, the environmental security literature has not offered a serious investigation into the process of governing and the structural creation of vulnerability.

This research note means to expand on a number of new avenues to explain how climate changes occur in arid and semi-arid land (ASAL) areas. In particular, the effects of climate change on communal conflict patterns are interesting. From an initial brief analysis, it would appear that small ethnic communities are often engaged in communal conflict. Such small communities are typically excluded from national politics, and hence are here designated 'politically irrelevant'. In contrast, being 'politically relevant' means that you belong to a group that is part of the national political calculus². Homelands of 'politically irrelevant' groups (i.e. nomadic or pastoral areas) tend to be underserved by government services. These homelands are also likely to experience ecological stress, and groups residing there will be more affected by such stress because of their dependence on the environment for a sustainable livelihood. However, it would appear that the main contributor to conflict risk in these environs is the political marginalisation of the groups which, in effect, is the root cause of any communal violence that may be correlated to short or long term climatic shifts.

2. Environmental security

The 'environmental security' literature has three main characteristics. It privileges the physical environment in determining conflict risk within and across states, and it increasingly incorporates both 'distribution' issues and marginalisation into models of conflict. Both are regarded as functions of the physical proximity and access to scarce resources, and both are considered mediated by rising populations and their pressures on non-renewable resources (Baechler, 1999; Homer-Dixon, 1999; Kahl, 2006). In environmental-security scenarios, the determinants of crisis are likely to be rapid population growth, the degradation and misdistribution of renewable resources and regime instability. These are generally regarded as policy failures, which allow for physical changes to act as major agents in inciting violence. In short, poorer states are likely to both experience resource scarcity and, due to regime weakness, suffer more from it.

² However, a relevant group's position in the 'national calculus' may not be positive. Such groups can be hostile to a sitting government and thereby marginalised. In national level policy decisions on the other hand, the reaction of significant and large ethnic communities are considered, even if such policies are disadvantageous to such groups.

Barnett (2000, p. 279) succulently criticises this type of literature for engaging in ‘negative argumentation’, in which relationships between the environment and conflict are assumed, and blanket assertions about how highly complex political contexts (i.e. ‘state failure’ or ‘bad governance’) are the link between the two. In addition, such studies purport to consider the politics of developing countries, yet none consider the powerful effects of political marginalisation and exclusion borne as a result of patronage politics or checkered capacity and access across state territory. The dynamics of marginalisation and political exclusion are important components of conflict literature, but receive little critical attention in the environmental security discourse.

3. African governance patterns

African political relations reveal jarring evidence of uneven political representation and interests across space. In many African states, ethnic groups are not represented in accordance with their population (Enloe, 1980; Horowitz, 1985). Over time, this imbalance has become increasingly apparent. Sixty-five percent of African ethnopolitical minorities encounter disadvantages in gaining access to top political, civil service, and military positions, as well as rights to organise or obtain legal protection (Scarritt and McMillan, 1995, p. 328-329). State-based policies and practices shape the nature of political discrimination, and, “political and economic differentials are essentially the products of discrimination” (Scarritt and McMillan, 1995, p. 328-329). Ethnic contests for power serve mainly to perpetuate disproportional government representation.

Many authors have specifically noted the disadvantaged position and low political weight of those living in marginal lands, or with nomadic/pastoral livelihoods. These groups can largely be designated as ‘politically irrelevant’. As ethnicity is strongly linked to access to resources in African states, particularly access to land rights (Homewood, Coast and Thompson, 2004; Klopp, 2001; Unruh, 2005), a government’s recognition and support of local authority structures and customary institutions can depend on the degree to which it perceives such arrangements to be to its advantage. This is particularly important with respect to negotiating who gets access to land. Groups that are not considered part of the political base are effectively not considered stewards (Thébaud and Battersbury, 2001). For example, many Sahelian states do not acknowledge the specific nature of pastoral land use. Thébaud and Battersbury (2001) note the inconsistent role of the state in assisting or constraining pastoral livelihoods and the negative discourse about pastoralism that circulates in government and development agencies. Others note that pastoralists have been severely affected by economic and institutional changes that take place outside the realm of pastoral influence (Blaikie et al., 1994). In short, livelihood type is linked to policy formulation processes, with pastoral production systems frequently neglected (Homewood et al., 2004; Malley, Taeb, Matsumoto and Takeya, 2008).

Political exclusion creates economic inequalities. The economic viability of communities practicing sustainable agriculture is constructed around access to markets and the ability to collect assets in order to withstand short and long term ecological change. Severe variation in government-client networks and capacity is supported by evidence that general social services, physical infrastructure, and political representation are routinely well below national averages in remote and low population density pastoral areas (Watts and Peet, 1996, p. 10). As noted in Smith, Barrett and Box (2000, p. 1949), “pastoralists represent a relatively powerless political minority viewed as powerless by their governments. There has been little state or colonial impact outside of administration in the pastoral areas. Much of the public services, famine relief...have been provided by ... NGOs, especially in Kenya. In general, physical and institutional infrastructure is weaker in pastoral areas than in cropping zones and urban areas.”

The Masai of Kenya provide an appropriate example of the interaction between physical and social vulnerabilities. They are considered marginalised, as access to social services, physical infrastructure, and political representation are routinely well below national averages in remote and low population density pastoral areas (Coast, 2002). If drought struck large swaths of Masai and non-Masai territory, Masai would be most vulnerable to severe and crippling economic effects because their margin for disaster is so narrowly constructed by forces beyond their control.

People in marginal regions have developed a variety of mechanisms to strengthen their ability to cope with both slow climatic changes and extreme climatic events (Findley, 1994; Maxwell, 1999, p. 301; Meze-Hausken, 2000; Mula, 1999, p. 318). How a household reacts to environmental hazards depends on the severity of the change, their particular vulnerabilities, and available assets and strategies (Meze-Hausken, 2000; Mortimore, 1989). Multiple factors unrelated to environmental change influence resilience most. The availability of markets, access to infrastructure, and the promise and delivery of aid affect the ability of families to prepare for and withstand environmental hazards or changes (Eriksen et al., 2005). A severe stress situation, such as drought, brings into stark focus the ways in which income diversity and dynamic coping strategies form the basis of rural livelihoods. During lean times, coping strategies tend to become more specialised and directed towards surviving and insulating families against distress migration (Eriksen et al., 2005; McGregor, 1994).

4. Conflict patterns

African conflict literature presents a compelling case that political exclusion alone may lead to increased conflict, but with many caveats (see Horowitz, 1985; Gurr, 1993). It has become increasingly clear that marginalisation, inequality and exclusion are motivations for conflict, but do not entirely explain its occurrence; “It is a profound and repeated finding that the mere facts of poverty and inequality or even increases in these conditions do not lead to political and ethnic violence” (Goldstone, 2002, p. 8).

At the very least, opportunities to create and sustain a violent political movement must be present for a group to succeed in armed rebellion against even a weak state. Political stability or instability is based on reciprocal relationships – between states; between state and elite; and between state, elite, and popular groups (Goldstone, 2002). Especially in African cases, local or regional groups may engage in communal violence to solve local issues. The state may or may not be actively involved.

From an initial examination of communal conflicts in Sub-Saharan Africa, the risk of conflict depends largely on the size and political importance of ethnic groups. Environmental issues can be catalysts to low-level conflict in marginalised communities, but the critical factor is the extent of political and economic marginalisation. Small, politically insignificant ethnic groups experience most conflicts related to environmental pressures. Although groups are motivated to justify a campaign against the government, they lack the opportunity to level a significant threat. These opportunities are available to particular groups, or alternatively, only certain groups within society are capable of creating and sustaining a violent campaign. Small, marginalised groups are not considered threats to regimes because their grievances will not attract sufficient support from larger, more powerful groups in society. Findings in the quantitative literature related to ethnic fractionalisation and polarisation mean to capture this dynamic (Azam, 2001; Montalvo and Reynal-Querol, 2005). In order for popular discontent to create large-scale conflicts, there must be elite leadership to mobilise popular groups and creating links between them. In contrast, communal conflict tends to be structured in the form of ‘ethnic militias’.

Uppsala Conflict Data has recently begun to collect information on communal/ethnic violence in Africa from 2002-2008 (UCDP, 2009). Disputes in the Sahel and Horn countries comprise most of the list. The participants in the communal conflicts are overwhelmingly ‘politically irrelevant’ in that they belong to a language or clan³. Of the fifty-four cases (one hundred and eight conflict dyads) reviewed, twenty two involved access to “land/water rights”, five were over “territory”, five were over cattle rustling and crime, nine were over local or national politics and fourteen were classified under “unknown” cause (UCDP, 2009). Seventeen cases (or twenty-six conflict dyad actors) were ‘politically relevant’. Of the ‘politically irrelevant’ groups who engaged in conflict, all are traditionally regarded as pastoralist communities (e.g. Afar in Ethiopia and Fulani in Nigeria) and are politically and economically

³ Each group can be assigned a ‘political weight’ based on the concept of ‘ethno political groups’, which according to Scarritt and Mozaffer (1999) are cleavages evident in contests for political power. Scarritt and Mozaffer (1999) go further by specifying groups by their relevance based on level, and aggregate into cleavages across four possible categories within a country. The categories include groups of no known political relevance (Language/Clan), Lower Level groups which are politically relevant and allied but ethnically dissimilar (Low), Middle level cleavages of groups that are allied, but ethnically distinct (Middle), and possible National Level dichotomies (National). Groups can be politically relevant in one state and not in the neighboring state (i.e. Zaghawa in Chad and Sudan). Although group coalitions are dynamic, Scarritt and Mozaffer (1999) note that these groups are those that have been politically salient since Independence.

marginalised by the sitting regimes. Although this is a basic assessment, it is clear that a focus on environmental resources as sources for conflicts misses the broader issue of how marginalisation shapes ethnic group interactions and reactions to scarcity or issues over distribution.

5. Patterns and correlates to violence in areas of political marginalisation

Communal conflict in the Sahel is frequently regarded as a 'chronic' condition by researchers in this area. Violence between ethnic or livelihood groups (eg. pastoralists, agriculturalists) is a normal process and does not signify a direct relationship between scarcity and conflict or abundance and conflict. It is typically presented as part of a strategy by those living in areas of minimal government intervention to regulate access to critical livelihood components such as water and land, and to acquire wealth to sustain groups through uncertain ecological conditions. In recent years, the proliferation of guns has made typically low-level exchanges more intense and frequent.

Conflict in east African rangelands has been variously presented as resource competition between minority and majority ethnic groups, part of a direct response of marginalised people to systematic dispossession, or orchestrated events stage-managed by elites seeking to retain monopoly on power and resources (Klopp, 2001). Here, an example of Kenyan violence is particularly illustrative: privatised land use and migration of non-Masai to traditional Masai areas served to intensify a sense of land pressure and insecurity on the pastoral group (Homewood et al., 2004; Klopp, 2001). Disputes over land repeatedly erupted, and many people died or were displaced. There is overwhelming evidence that the violence was orchestrated to undermine multiparty elections and allow politicians to retain a monopoly on power (Klopp, 2001). Violence was targeted at multiethnic communities of small landholders, and benefited large landowners and supporters of the current regime. In short, Kenyan politicians used disorder as a political instrument, deflecting discontent onto the vulnerable to manipulate elections (Homewood et al., 2004).

The few case studies that have addressed armed and organised violence conclude that these struggles reflect tensions within and between social groups. For example, Turner (2004) found that conflict is related to local issues surrounding access to cropland and pasture encroachment, or to changes in federal policy and weak local leadership in the resource poor Sahel region. Conflict is therefore based on relational instead of absolute scarcity, and is designed to control access to key resources over the long term (Turner, 2004, p. 877). Bassett (1988) notes that communal conflicts between groups in relatively abundant areas in northern Ivory Coast and central Cameroon were caused by national food security policies, interacting with local land-tenure rights and use agreements. Thébaud and Batterbury (2001, p. 76) conclude that pastoral conflict in eastern Niger is based on the increased isolation of these communities, limited access to basic services and difficulties herding cattle outside of confined areas.

In short, the type of conflict we can expect is dictated by the size and relative importance of groups. Civil wars may be fought in areas of political relevance and occur in areas of national importance (such as large towns, garrison towns or border areas). However, communal violence occurs in areas outside of 'relevant' group homelands. Ecological stress in these areas is believed to increase livelihood stress and may lead to an increase in frequency or intensity of typical communal violence (raids or ethnic militias clashing). Cross case inquiries have yet to be done.

6. Conclusion

From past evidence of persistent climatic uncertainty, conflict is a possibility across many ethnic communities within ASAL and peripheral areas. In addition, studies confirm that increasing levels of conflict in areas affected by famine or drought lead to "complex emergencies" (Keen, 1994).

In short, we have yet to ascertain any broad patterns in communal conflict, we are only able to note that 1) it is presented as a chronic, yet normal, condition in ASAL areas; 2) violence is strategic and used to increase wealth or acquire control of resources unregulated by another authority; and 3) not all groups participate in violence. Groups involved in the communal violence noted by the Uppsala Peace and Conflict Dataset do not appear in the 'politically relevant' ethnic communities. This reiterates that communal violence occurs between groups who are not part of the national political discourse; instead such groups operate and fight on the local level. Finally, areas of scarcity see persistent conflict, but no definitive relationship between seasonal or yearly scarcity and conflict is presently evident.

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Methodological Issues in Climate Change and Conflict Research

Tony Karbo

Abstract

The discourse on the nexus between climate change and violent conflict started long before climate change became a household concept. Since the early eighties, numerous scholars have tried to examine the relationship between various environmental factors (climate change being one of them) and their relationship to violent conflict. Some scholars (Homer-Dixon, Gleditsch, Westing) have made attempts to locate this relationship in environmental degradation which in turn leads to environmental scarcities, with the resultant shifts in population and competition over scarce environmental resources. This competition, they claim, leads to violence. In Darfur, much of the violence that has occurred since 2003 has been attributed to climate change and the scramble for land and water to sustain various traditional practices. The complex nature of interactions between environmental factors (climate change) and other socio-political factors made it extremely difficult to interrogate this relationship. Understanding the difficulty in researching the complex nature of ecological factors and how they interact with other factors requires a systematic methodological approach. This paper seeks to lay out the various conceptual and methodological debates in researching complex environmental problems and how they relate to conflict.

1. Introduction

Recent researches focus on the effect of environmental scarcity on political stability and violence. For example, a review by research by Homer-Dixon, (1996) suggests that rapid population growth and “environmental scarcities” – scarcities of renewable resources such as cropland, forests and freshwater – can contribute to widespread violence and social conflict, especially in developing countries. The study of complex ecological systems is deemed problematic, in the sense that it is difficult to pinpoint causal relationships directly linking environmental scarcity and violence.⁴ This is partly because such complex ecological systems are characterised by a large number of physical, political and social variables linked to a number of non-linear and causal relations (Homer-Dixon, 1996, p. 132).

⁴ For the purposes of this paper, I will thus distinguish ‘environmental degradation’ (including ‘natural disasters’) from issues related to the scarcity and distribution of ‘natural resources.’ Such scarcities may, however, themselves be caused at least partially by environmental degradation. To refer to the aspects mentioned *in toto* I will use the term ‘environmental climate’.

Numerous examples, including rural-urban migration and urban unrest in developing countries (Homer-Dixon, 1996), which are caused by scarcities of land and water in the countryside, have been put forth as reasons for such complexity. In addition, the penetration of Third World regimes by powerful coalitions of rent seekers, who profit from the overexploitation of natural resources, and the evolution of international institutions that address climate change (Homer-Dixon, 1996, p. 132), have also been cited as causing difficulties in conducting such research. In order to understand the convoluted and difficult nature of researching complex ecological systems and how the resultant factors of violence interact, one needs to take a critical look at the literature that contributes to this fast growing field of inquiry. A natural starting point in my view is to look at the philosophical debates surrounding the use of qualitative research methodology. The focus of this chapter, however, is to outline what the research problem of climate change and its relationship to conflict is, and how such research should be carried out using qualitative methods of inquiry.

There is some evidence that potential outcomes, such as a reduction in resources, a decline in livelihoods, an increase in poverty levels, a diminished state revenue, and an increase in inequality across space and class, may create opportunities for some elites to harness resentment and mobilise people to fight. This is more likely to occur in states where regimes are weakened by decreasing revenues from resource-based rents or taxes. If climate change causes migration, this too may be a cause of violent conflict in certain circumstances.

Many studies recognise that there are multiple options for reducing the risk of conflict arising from climate change. It is also important to recognise that conflicts resulting from climate change might not necessarily be violent, but can instead lead to changes in the distribution of power and resources and the protection of valuable assets.

2. Methodological debates on environment and conflict

Qualitative research – as a set of interpretive practices – favours no single methodology over any other (Denzin and Lincoln, 1994), but is inherently a multi-method focus (Brewer and Hunter, 1989 as cited in Denzin and Lincoln, 1994). The use of triangulation is employed in an attempt to ensure a greater understanding of the phenomenon in question. Similarly, qualitative research is also able to draw from, and utilise, multiple approaches and techniques of various disciplines including ethnology, phenomenology, hermeneutics and cultural studies, among others. Qualitative research is multi-paradigmatic in focus crosscutting the humanities and the social and physical sciences.

The choice of empirical data is of great importance. The data must provide for some variation of both the hypothesised independent and dependent variables, whilst allowing for control of all other potentially confounding variables (Homer-Dixon, 1996). This form of research, however, seeks to explain the climate change and violence linkages. It moves away from hypothesis testing, and instead uses a set of

questions that seek to interrogate the linkages between political factors, climate change and conflict.

On a methodological level, issues that relate to the appropriate and useful analysis of climate change are extensively debated. In a conventional situation, the unit of social analysis is the nation or society. For example, environmental sociology employs society and the societal environment as units of analysis. Environmental quality is both multi-dimensional and multi-faceted; environmental change, therefore, must not be seen as a unilateral construct of quality in the biophysical sense. Blaikie (1995), for example, argues that social implications from environmental changes are of significance in dealing with such environmental issues. He posits that the way in which changes in the tangible and “real” physical environment impinge upon people’s lives, have to be interpreted by the people. Firstly, people have different experiences because of these changes. These experiences become objects of thought which are ultimately articulated by them.

Buttel (1997) attempts to create the link between climate change, conflict and the role of economic, political and socio-cultural institutions in shaping climate change and environmental change. Institutions have, “Specific or special clusters of norms and relationships that channel behaviour so, as to meet some physical, psychological and social needs, such as consumption, governance and protection, primordial bonding and human meaning, human faith and socialisation and learning” (Buttel, 1997).

Explicit selection of cases in which climate change and conflict both occur aid the research on the links between political factors, climate change and social conflict (Karbo, 2008). In other situations, the link between environmental scarcity and violent conflict is selected when one case experiences violence and the other does not.

Another element of climate change conflict research (see Homer-Dixon, 1999) that warrants consideration is the notion that the determination of the range of factors, which explain the current value of the dependent variable (incidence of violent conflict), seek to determine that a specific independent variable (climate change) could be an important cause of change in the dependent variable. The question still remains: Why does violence occur in some parts of Sudan and not in others; or, why is violence more intense in some parts of Darfur and not in others?

The interest of researchers who study climate change and conflict is not in understanding a whole range of factors that cause changes in the value of violence as a dependent variable. Rather, they seek to find out whether, and how, an independent variable (climate change) can cause conflict. The fundamental question is therefore: Does climate change contribute to, or lead to, violence? If it does, what types of change (emphasis added, Karbo, 2008) in climatic conditions and violence can we identify?

Homer-Dixon (1994), like Dessler (1994), reminds us that in researching complex ecological systems and their relationship to violence, the emphasis shifts from explaining the incidence of violence, to understanding the current and potential causal role of a specific variable and the nature and causal relationship between these two variables.⁵ In this sense, it is reasonable for researchers to explore three basic questions:

- 1) Can climate change contribute to violent conflict?
- 2) If yes, how can it contribute to conflict?
- 3) Is this contribution of much significance?

Identifying how climate change can contribute to conflict – that is, answering the second question – means identifying the possible causal role of climate change. Identifying the causal roles help to answer the third question. For example, climate change, and its contribution to a given conflict, is interesting if it is identified as a powerful independent cause. This approach may appear confusing and even outright unnecessary. What is not clear is how such identification is carried out or how this determination might be achieved. In addition, there is a lack of clarity regarding how many environmental change factors have to be investigated in order to establish a relationship between climate change and conflict. Alternatively, can each climate change variable be interrogated individually to achieve results even if those results are not desirable? Can climate change contribute to violent conflict?

Social scientists centre their debates on how climate change contributes to conflict in the specific, causal role of climate change itself. Two useful ways of thinking about this critical issue include paying attention to the way that climate change influences various actors in the conflict space (national, regional and international) and the nature of the relationship between the cause (climate change) and its effects (violence or conflict).

One approach to analyse the causal role of climate change focuses on the nature of the relationship between the cause and its effect. The following seven variables can be used to characterise this causal relationship: necessity, strength, proximity, exogeneity, multi-causality, interactivity and non-linearity (Homer-Dixon, 1994).

Climate change is not a necessary cause of violent conflict – violence also occurs in situations of resource abundance and solid environmental integrity. Unlike necessity, the strength of a cause can vary along a continuum or scale, from weak to sufficient (Most and Starr, 1989 as quoted in Homer-Dixon, 1994). Causal proximity can similarly vary along a scale from distant to proximate. Proximity must be seen as a function of the number of intervening causal steps or variables between the cause and its effect (Homer Dixon, 1994); the larger the number of intervening variables, the

⁵ Dessler distinguishes between a focus on outcomes and a focus on causal factors.

lower the causal proximity (Goetz, 1994 as quoted in Homer-Dixon, 1994).⁶

The degree of multi-causality of the processes that produce social conflict can vary. If climate change contributes to conflict causation, it will usually operate alongside other political, economic and cultural causes (Homer Dixon, 1994). Interactivity is a dichotomous variable; it is the relationship between two causes of an event, which can either be interactive or additive. Interaction is a common feature of environmental social systems. A system with highly nonlinear functions can exhibit unanticipated 'threshold effects' and chaotic behaviour in response to small perturbations. This is a key characteristic of many environmental systems (Homer-Dixon, 1994).

3. Research design

If research focuses on single-data collection methods, the basic questions about the relationship between climate change and violence cannot be answered. Therefore, a research design that seeks to establish the relationship between climate change and violent conflict must include multiple methods that have been extensively described and employed by well established authors, such as Myers, Homer-Dixon, Gleditsch, Gleick, Colin Kahl and others.

Understanding whether climate change could cause conditions – when other factors are present individually or in combinations – that are likely to lead to violent conflict, is a crucial starting point. It could be that climate change does not lead to violence alone. Extensive case study research will illuminate the question of potential links between political factors, climate change and violent conflict, and also the potential links between climate change and other variables.

1. What is the nature of the change in climatic conditions?
2. What are the sources of these changes?
3. What is the level and nature of violence?
4. Is there a link between climatic changes and violence?

In addition, what type and level of violence occurred in the cases studied? There is a need to establish the nature of the violence and the parties involved (whether the violence is between specific ethnic groups, intra-ethnic, inter-family or inter-party). The matrix below represents the missing pieces that need to be put together if comprehensive answers on the basic questions regarding the relationship between climate change and violent conflict are to be obtained.

⁶ Goetz (1994) notes that proximity is influenced by theoretical concerns, because it is usually possible to specify the variables and links in the causal process with greater and greater detail and thereby reduce proximity, especially by dropping down to lower levels of analysis, as quoted in Homer-Dixon, 1994.

Table 1: Establishing the links

	Political Factors	Climate Change	Violence
Northern Darfur	?	?	Low-level, inter-family violence/ anti-government?
Central Darfur	?	?	Extensive, inter-ethnic, sporadic/pro-government?
Southern Darfur	?	?	Extensive/inter-ethnic or inter-group?

Source: Heavily adapted from Karbo (2008).

5. Conclusion

An examination of the literature on the issue of climate change and violent conflict reveals a number of commonalities in the methods used to explore the relationship between these two phenomena. First, we have studies that explore different aspects of the relationship between climate change, environmental change and violent conflict. Such studies explore both extreme weather events and their effects, which look at processes including sea-level rise and land degradation.

The other approach to such studies is progressive, 'practical' models, which are undertaken with varying degrees of scientific rigor. Such works include the predictions of an increase in flooding due to sea-level rise, the general analyses of future 'environmental refugee' populations and the resultant violent conflicts that could occur as a result of population movements.

Another major aspect that separates these approaches is between the qualitative and quantitative focus. Different approaches address different aspects of the 'climate change and conflict' debate and both appear important. What is not clear, however, is strong empirical evidence to support the claim of an existing relationship between climate change and violent conflict. Understanding the methodological approaches to research in this field is an important step in understanding climate change and its relationship with violent conflict. This article has aimed to provide a basis for the current studies in Darfur in a quest to establish a link or nexus between climate change and violent conflict.

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Discussion

Throughout the discussion, it was underscored that the issues of politics and of livelihoods are both essential and inseparable. It was added that the issue of livelihoods of farmers and pastoralists should also be addressed in parallel. Asked whether to prioritize livelihood or politics, Mr. Tanner noted that both are important, hence, should go hand in hand.

Participants discussed the fact that various tribes have their own internal ways of resolving resource-use conflicts. They underlined the need for other peace-building techniques or interventions to build on these traditional ways of resolving conflicts. At the same time, participants noted that policy improvements at the government level can also contribute to the peace-building process.

The issues of politicization and ethnicisation of conflicts were also raised. Participants cautioned that categorization of ethnic groups has always existed but that emphasising ethnicity could be a source of conflict. It was also highlighted that the government instigates tribal fighting among Arab groups. Some participants exemplified this by stating that the government has recently privatized some of the water services and allocated some of the water yard management on a tribal basis, whereby the tribes of the area own and manage the resources. This, according to the participants, has created new tribal conflict and mis-usage of the resources.

Mr. Tanner was also asked to share his thoughts on the possibility of either keeping the status quo or creating a new paradigm for sustainable peace in Darfur. He replied that it is not easy to maintain the status quo, stressing that *hakura* is one of the elements of discourse that can be used to move forward, for it brings together the politically relevant groups in Darfur.

Explaining the difference between politically relevant and irrelevant groups in the Darfur context, Dr. Raleigh elaborated that the politically relevant groups are those with a strong political role and those that are important in the national decision-making context. She further noted that groups are relevant largely because they carry arms, whereas groups that don't carry Kalashnikovs are irrelevant to the government. Additionally, Dr. Raleigh noted that, in most cases, communal conflicts are not intense because groups *per se* are not conflictual; hence political relevance is important for conflict to escalate. However, another participant argued that some marginalized groups in Darfur have become politically relevant.

Similarly, Dr. Karbo was asked to offer his views on whether conflicts are linked with environmental degradation or not. He noted that in order to examine the relationship between the two, one also needs to look at other variables. He mentioned that political variables such as democracy, regime type, corruption and weakened legitimacy should not be overlooked in this regard.

Apart from this, participants discussed the causes of conflict in Darfur and the role of ethnicity in this regard. It was argued that ethnicity in itself cannot be considered as the major factor in the crisis. It has only been used by the incumbent government to mobilize certain groups in Darfur as “Arabs” to fight against others seen as “Africans”.

A question was addressed to Prof. Markakis on how ethnicity became a source of conflict in Darfur. He replied by affirming that ethnicity is a valid cause for conflict and can be used as a basis for group mobilization. He also added that suppressing religious and cultural values may result in provoking communities, thus encouraging rebellions. Prof. Markakis, in addition, stated that ethnicity is a basic need, as it gives individuals an identity. If this need is not properly met and satisfied, then it becomes a factor in setting off conflicts.

In line with this, some participants asserted that whilst talking about ethnicity in Darfur, the norm in the region has been to possess multiple identities. Multiple identities result from people having various cultural backgrounds through marriage and other social activities. However, the government encourages mono identity, thereby creating tensions which may lead to conflict.

It was also argued that ethnicity as a source of conflict results from bad governance. The government is too weak to provide good governance and strong leadership in the region, making government unpredictable. Participants further stated that bad governance, starting in the 1980s, has exacerbated the situation in Darfur, meaning that the conflict is not as natural-resource driven as many seem to believe.

Overall, participants conceded that ethnicity has become one of the factors of the crisis, although it has a long, complex and largely peaceful history in the region. Borders of Darfur with Libya and Chad encompass a diversified ethnicity, creating further complications. As many different groups have settled in Darfur in recent centuries, the region is historically a homeland for multi-ethnic people, including some that have come from Western Africa.

As a final remark, it was suggested that dialogue and local peace-building should play an important role in rebuilding life at the local level, as it reminds people of the things they share. Hence, passive traditional methods of resolving crises have an important role to play in the peace-building process.

Theme 3

Scarce Resources, Governance and Conflict in Western Sudan

Introductory Notes

As land and water become scarce, competition over these vital resources intensifies within societies, particularly between the haves and those who are poor and dispossessed. The shrinkage of life-supporting resources per person, a bi-product of population growth, is threatening to drop the living standards of millions of people below the survival level, leading to potentially unmanageable social tensions (Brown, 2009). According to Hermann (2008, p. 22), the ongoing crisis in Darfur can be partially attributed to resource shortages, and this conforms to the ideas first proposed by Malthus,

Land is central to the livelihood processes of any society and has, thus, often figured as an object of conflict. There is a complex relationship between land and conflict. Seldom is a violent conflict uniquely about land, but access to land and disputes over land rights have appeared large in almost every episode of prolonged violence and war (Park, 2007).

Access to land is a major source of social tension. As the world population growth by 70 million each year, the grain land available per person has been cut in half, from 0.23 hectares in 1950 to 0.10 hectares in 2007. The shrinkage in cropland per person not only threatens livelihoods, but in largely subsistence societies, it also threatens survival itself. Tensions within communities begin to build as landholdings shrink below that needed for survival (Brown, 2009).

Conflict between pastoralists and herders over scarce resources is common in areas such as Darfur, and is accelerated whenever populations grow faster than the available resources. Since the early 1970s, due to the drastic environmental changes, the Darfur society underwent equally drastic changes. The most important of these changes was that, due to prolonged droughts, large groups of humans and animals migrated from the north to other areas that are relatively rich in resources. Examples of these areas are the rich savannah *baggara* lands in the south, where pastoralism is the main occupation, and the Jebel Marra ranges that are the heartland of Fur cultivators (Taha, 2007).

Land scarcity, exacerbated by inequitable distribution of land and rapid population increase, has also been described as one of the proximate causes of the violence in Rwanda, Burundi and DRC. Limited access to land has been key in changing patterns of economic domination and exclusion that create deprivation and social tension. Grievances were expressed through ethnic cleavages which had evolved mostly out of colonial past. Years of unequal resource distribution resulted in the eventual collapse of the regimes in Rwanda, Burundi, and Zaire.

The link between ethnic identity and land access was clear in the political structures of the states during the pre-colonial and colonial period. The group that assumes control of vital resources strengthens its claim or access to power over the other. Control of the state by elites in Rwanda has facilitated their domination of land ownership (Huggins, et al., 2005, p. 13). The expansion of the power of the Mwami in Rwanda during pre-colonial and colonial times led to most of the land being controlled by the Tutsi by the 1950s. The Hema's economic dominance in Eastern DRC was also increased by the unequal distribution of administrative power (Lobho, 2002, p. 75).

The colonial period has also been associated with the destruction of traditional institutions that resulted in change in the relationships between major 'ethnic' communities. Revision of traditional land tenure rights and access used to favour the ruling group over the other.

The replacement of one political 'ethnic' elite with another tends to introduce a new dimension of political and social instability in relation to land. In Rwanda, resentment towards the Tutsi after independence resulted in social upheavals that led many Tutsi leaving the country and widespread redistribution of land. Tutsi grazing lands were gradually turned into Hutu farming lands. Mobutu's policy in the late 1960's Zaire favored the Hema elite especially over land concessions. His 1979 land law also despoiled Lendu communities to make way for plantations and cattle ranches of the rich Hema (Pottier, 2003, p. 4).

Water has a special role in arid and semi-arid nations like Sudan. Rainfall, which provides much of the available surface water, and supports most of the country's agricultural activity, varies significantly from the northern to southern ranges of Sudan. Both shortage and surplus of water are realities in different parts of Darfur (IRIN, 2007).

Water shortage in Darfur is caused by numerous factors. Since 2003, the concentration of people in camps around villages has forced boreholes to support many more people than in the past. Furthermore, the prevailing geology is unfavourable for storage of groundwater (Tearfund, 2007). A study by UNEP in 2008 confirms that the principal risk associated with groundwater depletion in Darfur pertains to camps and communities that are vulnerable to the impact of low rainfall.

Attention has recently been drawn to the possible existence of an aquifer beneath the site of an "ancient lake" in the desert region in the far north of Darfur. This lake, known as 'Lake Ptolemy', existed several thousand years ago when Darfur's climate was much wetter than at present. The underground resource has not been proven as yet, but even if reserves are plentiful, it will have little relevance for the humanitarian program due to its very remote location in the unpopulated desert area in the far north

of North Darfur (Tearfund, 2007). Researchers claim that the Darfur lake discovery is indisputable evidence that the Sahara was once a wet, green region (Brahic, 2007).

Alex de Waal argues that shortage of water has not actually been the biggest problem in the Darfur region. Rather, he says it is the resources to extract existing water that are lacking (National Geographic Newsletter, 2007).

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Climate Change as a Crucial Factor in the Darfur Crisis.¹

Abdel Ghaffar M. Ahmed

Abstract

Climate change is a crucial factor in the Darfur crisis, though it is arguably one of several factors causing the present crisis. Climate change has aggravated the severe competition between farmers and pastoralists over the scarce resources in the region since the mid-1970s. Recently, however, it has been over-shadowed by ethnic and political factors. This paper aims to highlight the impact of climate change with special emphasis on the role of cyclical droughts and desertification in the intensification of the crisis in Darfur. It attempts to explain how the symbiotic relations and the occasional small scale local conflicts between farmers and pastoralists in Darfur have been transformed into violent regional and national conflicts as a result of the escalation of competition over land and other natural resources. In conclusion, it is evident that lasting peace and security in the region depends, among other issues, on the natural rehabilitation of the region through combating the impact of climate change.

1. Introduction

During the last three years Darfur became well known throughout the world. The international media displays the conflict in Darfur as the most engaging item on the International Community agenda, ranking next to Afghanistan, Iraq, Somalia and international terrorism. Since mid-2003 government forces, militias (known as *Janjaweid*) and rebel groups have, according to different reports, committed crimes against humanity and war crimes on a massive scale in the region. The latest peace agreement, signed in May 2006 and heavily backed by the United State of America (USA), but approved by only one rebel faction and the Sudan Government, is in disarray. Though inter and intra-group conflicts among the different ethnic groups in the Sahelian region are not an unfamiliar phenomenon, especially when this concerns natural resources in this arid region, the conflict in Darfur has exceeded most known proportions. The strategic position of the Darfur region within the Sahelian one is shown in Figure 1.

The recent escalation of this conflict in Darfur has attracted the attention of the international community. This attention is due to the fact that the conflict unleashed a humanitarian disaster that led to the displacement of over two million people,

¹ An early short draft of this paper was presented to the workshop on “How do global discourses affect natural resource governance in the South?” organized by Chr. Michelsen Institute (CMI), University of Bergen (UiB) and the Nile Basin Research Programme (NBRP), 26-27 March 2009, Bergen, Norway.

internally, and into neighbouring Chad and the Central African Republic, as well as the death of almost 200,000 people. Such a situation led to the allegation, mainly by the USA, that it amounted to an act of genocide and eventually led to the dispatch of the United Nation (UN), the African Union (AU) observers, and the passing of UN Security Council Resolution 1706, calling for international intervention (Ahmed, 2007, p. 219).

Under such circumstances, the simplified way of depicting the Darfur crisis in the media relegates the role of climate change to a blurry background that is rarely noticed. It seems that as far as the media and the international humanitarian organisations are concerned, Darfur has only emerged on their maps in the year 2003. Ethnicity and politics are the driving forces behind their reports with astonishing negligence of the ecological factors and the developing catastrophic situation in the entire Sahelian belt.

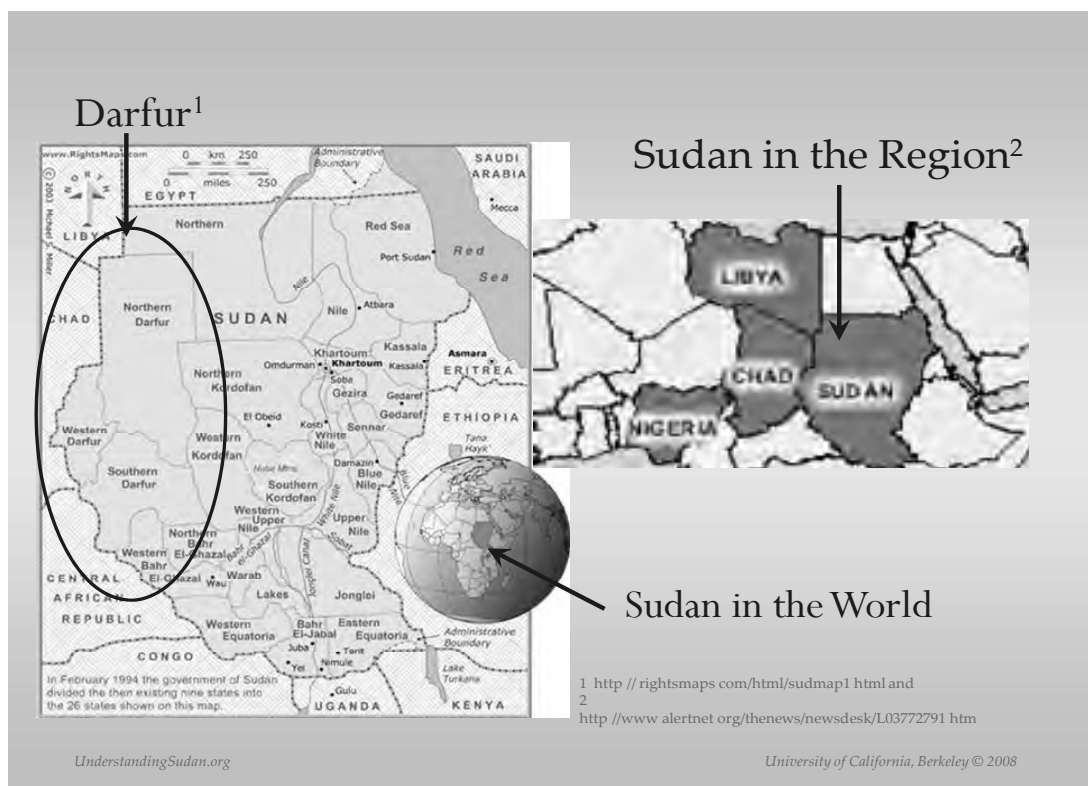


Figure 1: Geographical location of Darfur. Source: Understandingsudan.org.

Climate change is arguably one of several causes of the interminable Darfur crisis. However, since it is not the single root cause, it still should be viewed in relation to other factors, rather than considered as an afterthought. It is the earliest indicator of

the severe competition over natural resources that are becoming scarce, primarily due to cyclical droughts that triggered conflicts in the whole area of western Sudan and beyond. The complexity of the different factors driving Darfur's crisis needs to be borne in mind in order to avoid over-simplification of the situation. It is noted that "recent years have shown that shifts in rainfall can bring down governments and even set off wars. The African Sahel, just south of the Sahara provides a dramatic and poignant demonstration" (Sachs, 2007). It is recognised that the deadly carnage in Darfur is almost always discussed in political and military terms and little or no attention addresses the fact that it has its roots in an ecological crisis directly arising from climate shocks.

Only recently has it been acknowledged, amid the diverse social and political causes, that the Darfur crisis began as an ecological one arising at least in part from climate change. "Fighting in Darfur has occurred intermittently for at least thirty years. Until 2003, it was mostly confined to a series of partly connected tribal and local conflicts. In early 2003, these hostilities escalated into a full-scale military confrontation in all three Darfur states, which also frequently spills into neighbouring Chad and the Central African Republic." (United Nations Environment Programme [UNEP], 2007). A multiplicity of factors with varying degrees of significance such as poverty, marginalisation and ethnic politics or "re-tribalisation" are involved (Takana, 2008). "There can be no simple reading of the issues that have led to the situation at hand and the difficulty in adequately defining the problems people are facing as well as mapping the root causes of such problems. No single explanation has the power to elucidate the causes that underlie the persistence of the conflicts over such a long period of the history of the country." (Ahmed and Manger, 2007, p. 10).

This paper aims to highlight the contribution of one of these factors - namely climate change - that is seemingly overshadowed in the process of addressing the roots of the on-going Darfur crisis. It explores its impact with reference to the role of drought and desertification in influencing the direction of human and animal mobility in the region. It also looks into land degradation and the resulting competition over areas endowed with rich natural resources and the ways in which the conflicts started in the region as well as the new realities regarding the relations between different ethnic groups. It concludes with the emphasis that the way out of the present state of affairs, among others, must consider environmental rehabilitation.

2. Drought and desertification in Darfur

The scale of historical climate change, as recorded in Northern Darfur, is almost unprecedented: the reduction in rainfall has turned significant areas of already marginal semi-desert grazing land into desert. The impact of climate change is considered to be directly related to the conflict in the region, as desertification has added significantly to the stress in the livelihoods of pastoralist societies, forcing them

to move south to find pasture. This is clearly exemplified by the correlation between rainfall and water-related ethnic conflicts between 1960 and 2003 (Figure 2). Sheer survival in the face of an ecological crisis created an unprecedented human and animal movement south in response to a desert creep which is estimated at 100 kilometres in 40 years or 5-6 kilometres per year (Adger et al., 2001; Mamdani, 2008; UNEP, 2007).

Two discourses in the debate over the impact of desertification are relevant in the Darfur case. Firstly, the neo-Malthusian discourse that depicts over-population in drylands is the main problem and secondly, the populist one that explains land degradation by marginalization of smallholders and pastoralists caused by colonial and subsequent neo-colonial exploitation (Adger et al., 2001). Both approaches can find supporting evidence in the Darfur situation. This has to be seen in relation to the fact that the Northern part of Darfur has over the past decades witnessed a significant rate of increase in human and animal population which, combined with environmental stress resulting from rainfall decline, creates conditions for triggering and sustaining conflicts especially when political and ethnic differences are invoked. Such developments have led to the social breakdown resulting from the evident ecological collapse. The two major parties to the escalating crisis have each chosen to use one approach rather than the other. While the government propagates the neo-Malthusian approach, the rebel groups give emphasis to the populist one. Both are unable to see the complexity of the situation and the need to apply both approaches simultaneously.

For understanding the crisis in Darfur, it is essential to look back to the early droughts of 1974-75, 1984-85 and 1990 which represent a major factor in what happens today (Suliman, 2000). Darfur occupies a vast, sparsely populated territory in western Sudan. The ecology of the region “reflects diverse features ranging from typical desert environment in the north to rich savannah marshland in the south. The ecological zones represent physical attributes of the area and natural resources that created conditions for particular land use patterns and livelihood options.” (Abdul-Jalil, 2008, p. 4). Seasonal weather patterns govern the livelihood options. Agriculture and livestock, the main productive sectors, are often hit by drought. Such drought, which is frequently occurring in the region, is in itself a crippling, life threatening force. It also brings with it a series of events and reactions that together create a devastating cycle of environmental collapse, civil strife, displacement and rapidly increasing number of destitute.

Reported droughts have contributed to the depletion of natural resources and impoverishment of people in Darfur. As early as 1977 it was observed that overstocking and the lack of significant off-take of the increasing number of animals have escalated these processes of depletion and impoverishment (Ibrahim, 1984). Throughout the region, during drought years, livestock in North Darfur perished or their owners were forced to sell them at rock-bottom prices. Groups which were

principally pastoralists in South Darfur, such as the southern Rizaygat, saw their wealth evaporate as their livestock died.

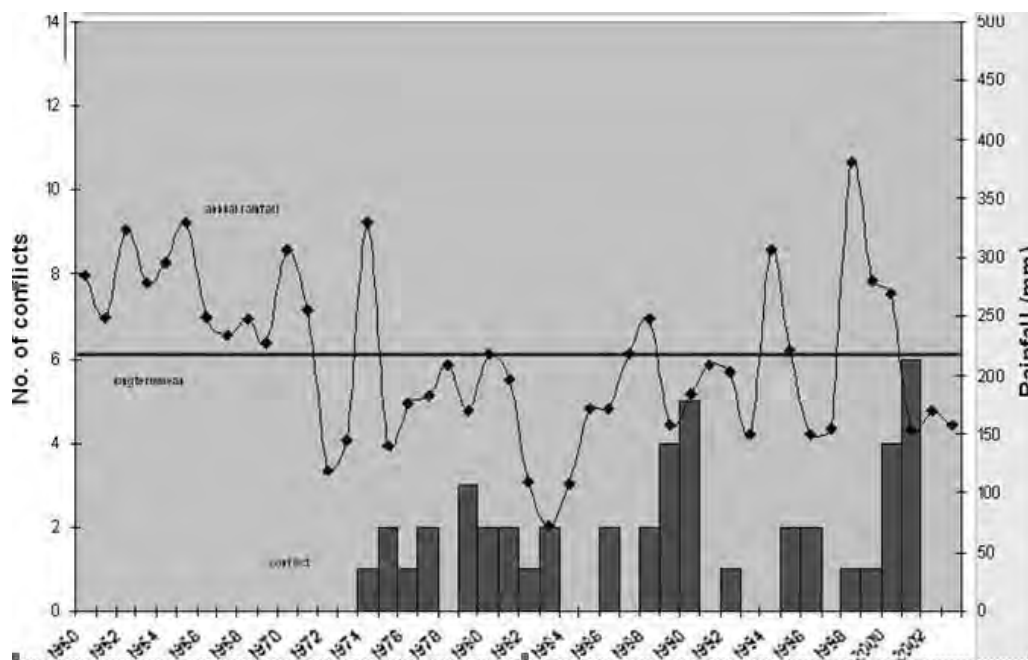


Figure 2: Correlation between rainfall and water-related tribal conflict in Darfur (1960-2003)
 Source: Ali, (2007)

Depletion of the natural resource base has also occurred as a result of drought and desertification. Rainfall statistics show that, overall, rainfall in the region has declined, and its pattern has changed to a shorter and more unreliable wet season (Suliman, 2000; Understandingsudan.org, 2008). As long ago as 1986, both farmers and herders recognised that ecological deterioration was occurring as a result of declining rainfall, which forced them to apply land use practices that were not sustainable. These included cutting down trees for firewood and feeding animals; as well as over-cultivating fragile soils, leading to deforestation; and desertification when stabilized *goz* degenerates into wind-blown sand and a declining yield. Over-grazing has contributed to the degradation of pasture (Ibrahim, 1998).

Desertification caused sand to blow onto fertile lands and the rare rainfall washed away alluvial soil. Farmers in the southern part of Darfur who had once hosted the camel herders of northern Darfur are now blocking their migration since having seen that land is no longer able to support herders and farmers. “Until the rains began to fail, (the pastoralists) lived amicably with the settled farmers. Pastoralists were welcomed passers-through, grazing their camels on the rocky hillsides that separated the fertile plots. The farmers would share their wells, and the herders would feed their

stock on the leavings from the harvest. But with the drought, the farmers began to fence off their land—even fallow land—for fear it would be ruined by passing herds. A few tribes drifted elsewhere or took up farming, but the Arab herders stuck to their fraying livelihoods—nomadic herding was central to their cultural identity.” (The distinction between “Arab” and “African” in Darfur is defined more by lifestyle than any physical difference: Arabs are generally herders, Africans typically farmers. The two groups are not racially distinct) (Faris, 2007; also see de Waal, 1989).

3. Farmers and herders relations

Under such circumstances, the traditional symbiosis between herders and farmers has been eroded in recent decades as people’s livelihoods have converged, shifting the moral geography of herder and farmer and bringing them into conflict with one another. The possibility of shifting identities and alliance creation that once emerged in the region no longer exists (Háland, 1969; 1972). Declining rainfall and encroaching desertification have contributed to North-South migration which, combined with increasing population pressures, has created more direct competition for access to natural resources. Settled farmers from the northern parts and pastoralists who lost their herds have moved south and settled on plots of lands that are claimed by already settled farmers. While the process of land use sharing went peacefully in its early stages, this situation drastically changed when more people started to settle and refused to recognise the traditional system of land ownership (*hakura*).

Relations between the newcomers and the indigenous population deteriorated further due to cultural perceptions regarding land use. While farmers, for example, are careful about keeping their cultivated fields, fruit gardens and other trees healthy, as they are their capital, pastoralists see them primarily as fodder for their herds. Such cultural differences in perception of resources have led to major conflicts, which have been aggravated by more people and animals moving into farming lands. This was coupled with the government’s abolishment of the traditional mechanisms that governed and facilitated the relations between the different ethnic groups in the region (Ahmed and Assal; forthcoming). The social organization of certain ethnic groups, and the way they collaborate and support their ethnic members, also played a role in creating some jealousy and enmity among the settled owners of the agricultural lands.

4. South and Southwest movements

Drought-induced famine has forced most of the agro-pastoralists of northern Darfur to move out of their traditional settlement places. Such displacement and migration of some of the groups affected by drought started as early as the 1970’s. People were forced to move in different directions looking for places where they can find sustainable livelihood. An illustrative case of this early migration that has influenced and is still influencing the crisis situation in Darfur is that of the Zaghawa ethnic

group of the northern part of the region. This group suffered severely as a result of the drought phase of the last four decades. Movement out of the traditional areas occupied by the groups increased tremendously due to contribution of other relevant factors (see Abdul-Jalil, 1988; Tubiana, 2007). During this, more than half the group, especially those who were settled farmers, migrated southward towards areas endowed with a rich environment, inhabited by the Fur and other smaller ethnic groups of farmers. Once accepted and hosted by the local inhabitants, they started establishing ethnically based networks and became considerably more economically successful than their hosts. Their networks extended beyond Darfur, across the borders into Chad, Libya and the Gulf states (Ibrahim, 1998; Tubiana, 2007). More members of the group were attracted by the movement south and southwest and started to claim land in areas that historically belonged to others under the traditional *hakura* system. The space became contested, contributing significantly to the present crisis.

The land issue in the Zaghawa case above and that of the camel herders such as the Mahariya has not been adequately focused upon during the present crisis. “The Arab camel herders of Northern Darfur have never enjoyed traditional land rights and they aim to gain access to the land they increasingly feel they need because of environmental pressure.” (Tubiana, 2007). Centuries ago, the land tenure system in Darfur recognised a division of land into three categories: the largest and the richest central part of the region around the Jebel Marra massif was occupied by settled farmers and considered as their homeland; semi-settled cattle herders in the south had smaller homelands including their village lands but not the grazing areas; and camel herders in the north had no settled villages and no home lands (*dar*) (cf O’Fahey and Abu Salem, 1983 and Harir, 1994). Given the drought in the northern part, the camel herders are becoming increasingly interested in water holes and pasturelands on the migratory routes of their belt, alongside highly watered lands south and southwest where they would like to settle. In this process of contestation of space, the relations of the pastoralists and the farmers who hosted them in their lands deteriorated as local clashes over natural resources intensified. The traditional symbiotic relations between farmer and pastoralists have given way to disastrous conflicts, leading to a great number of lives lost.

Both the Zaghawa and Arab camel herders have been forced to move south and southwest due to the intense processes of desertification and the continuing series of droughts over the past four decades. While accepted by the traditional inhabitants of these areas as “guest-subjects” they gradually started to assert their ownership on the land they occupied and even invited relatives from across the borders to join them. The present day crisis is mostly fuelled by such action, in addition to the political intervention of the regional and central state authorities which have led to the prevalence of poverty and marginalisation dominant in the region.

5. Concluding remarks

Climate scientists have identified climate change as another cause in the Darfur crisis and found that the roots of the drying Darfur lay in global climate change (Faris, 2007). Recognising climate change as a factor in the conflict means seeking a solution that transcends a mere political treaty between the rebel groups and the government so as to ensure land rehabilitation that transforms existing systems of livelihoods and ensures peace, security and stability. UNEP's report indicates that "there is a very strong link between land degradation, desertification and conflict in Darfur. Northern Darfur – where exponential population growth and related environmental stress have created conditions for conflict to be triggered and sustained by political, tribal or ethnic differences – can be considered a tragic example of the social breakdown that can result from ecological collapse. Long term peace in the region will not be possible unless these underlying and closely linked environmental and livelihood issues are resolved" (UNEP, 2007, p. 95). For this to be achieved, lifestyles and agricultural and grazing practices must be changed to accommodate many ethnic groups on the limited and more fragile land that characterises the region. The states – regional and central – have to initiate widespread investment, create awareness and provide education in order to combat hazardous practise in land use. Understanding of the dynamic situation partly created by climate change and acting accordingly in a positive manner requires the use of approaches that recognise and address its complexity, as well as taking into consideration the changing situation in the entire Sahelian belt.

It must be emphasised that considering climate change as the main or only factor leading to the Darfur crisis leads to oversimplification. Depleted natural resources and livelihood transformation, though they contributed to the present armed conflict, cannot alone account for what is happening. Overpopulation, marginalisation, poverty and inadequate distribution of power and wealth sharing between the centre and periphery have to be taken as part of the multiple factors leading to the crisis. Although this paper placed emphasis on the role of climate change as signified by drought and desertification, it recognised the fact that it is part of a series of the above indicated causes.

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Resource Based Conflicts in Western Sudan Some Reflections on the Role of the State

Leif Manger

Abstract

This paper identifies the various causes of conflict in Western Sudan in relation to natural resources. It reveals that such a relation requires an understanding of the way people deal with access to, and the use and management of, natural resources at the local level; and the social structures in which they are embedded. However, one should not accept at face value that conflicts have such resource management as their 'root causes'. Rather, a broader focus is needed within which wider economic, administrative and political contexts are made relevant. Be that as it may, once conflicts erupt they tend also to be interpreted in tribal and ethnic terms and can be linked to other types of conflicts, leading to their escalation. Hence, the findings of this paper demonstrate that an increase in levels of conflict, such as we have seen in the Western Sudan, cannot automatically be interpreted as another example of the many gloomy accounts of the 'degradation' of African environments, or that all conflicts are environmental in nature, thus requiring resource management solutions. Instead, the way in which conflicts have evolved in the region seems to require a focus on the state and on the concept of 'governance'. In line with this, a possible suggestion is that there is a need to look at people's use of, and control over, resources at many different levels, thus permitting a consideration of processes of power and authority.

In addition, this paper presents a small case study from North Kordofan, where the findings show that there is an intervention from both the state and multi-national corporations, which has not only created chaos in the existing local tenure system but has also led to confrontations with the local communities. Furthermore, as there is no room for legal action to be taken by the local community, there is a tendency for violence to break out as a defence mechanism. Thus, it is suggested that both the state and planners should do well to pay attention to such local groups by providing 'good governance' in general and 'resource management systems' in particular.

1. Introduction

My first fieldwork in Sudan was in the Kheiran area of North Kordofan and lasted throughout 1976. The second substantial fieldwork I did focused on the Liri area in South Kordofan, with stays in the southern parts of the Nuba Mountains, during various periods from 1979 until war broke out in the area in 1985. A major focus of my work at that time was resource management, which was a key theme in the

ongoing research collaboration between the anthropology departments in Bergen and Khartoum.

The general aims of the research were to show that human resource utilisation systems in Western Sudan were (and are) far more complex than anticipated in development circles (see Haaland, 1980), and that local resource management existed in cases where Western onlookers had concluded that it did not. We thought it important that policy-makers and planners alike should have information on various types of problems related to the working of production systems in rural areas of the Sudan, and that the various policy options dealt with by such people should be based on realistic assumptions about the driving forces behind existing patterns of utilisation.

An important part of this work was to define what this “realism” consisted of. Were the linkages between people’s adaptations and available local resources in Kordofan characterised by people’s over-utilisation of a finite set of resources, requiring a focus on *resource management*? And, if that was the case, was such over-utilisation caused by population increase or by the introduction of more intensive technologies in productive life? That is, was it population-driven or investment-driven? Or, were we dealing with situations of conflict that were not necessarily related to any absolute over-use of resources but that had to do with other factors that were rather social, cultural and political in nature, thus requiring a focus on *conflict management*?

A considerable part of my early writing dealt with such issues (Manger, 1981; 1984; 1987; 1994) and I find it appropriate after all these years to revisit Western Sudan and some of the debates. As many causes of conflict in the region of Western Sudan are related to natural resources, both land and water, this requires an understanding of the way people deal with access to, and the use and management of, natural resources at the local level and the social structures in which they are embedded. However, one should not accept at face value that conflicts have such resource management as their ‘root causes’. Rather, we need a broader focus within which wider economic, administrative and political contexts are made relevant. What such a broad presentation shows is that not all resource conflicts are based on a situation of resource scarcity; rather, they are political in nature and have to do with the workings of the political system. Once conflicts erupt however, they tend also to be interpreted in tribal and ethnic terms and to become linked to other types of conflict, leading to their escalation. Hence, an increase in levels of conflict, which we have seen in Western Sudan, cannot automatically be interpreted as another example of the many gloomy accounts of the ‘degradation’ of African environments or the theory that all conflicts are environmental in nature, thus requiring resource management solutions. The way in which conflicts have evolved in Western Sudan also seems to require a focus on the state and on the concept of ‘governance’, in this case ‘bad governance’, i.e. the reproduction of autocratic leadership, corruption and the collapse of states into warring factions. This suggests a need to look at people’s use of, and control over,

resources at many different levels, thus permitting a consideration of processes of power and authority.

2. A small case from North Kordofan

Let us start with some empirical details from North Kordofan. The focus group of our case are the Jawamaa cultivators. The Jawamaa tribal areas extend from Um Ruwaba in the east to the vicinity of El Obeid in the west, an area with some 350 mm annual rainfall. They grow millet, sesame, sorghum and *kerkade*. In the same area, one can also find Bidieriya (the people of El Obeid), who are also cultivators. The picture is further complicated by the presence of the Shenabla transhumant pastoralists (Sebeihat section, some 40 households) who have their base camp close to the Gagrur village (3-4 kilometres) from which they go on their transhumant movements. Their area of origin is in the White Nile area and they rear cattle, sheep, goats and camels. They spend the rainy season along the new highway, and then move to Gumaiza to the north-west where they spend January to March. The hot summer (April to June) is spent in the camp near Gagrur. Being Shenabla, the Sebeihat are considered landless, but they do benefit from the various types of derived rights such as intra-community land loans, heritable use rights and rental and share cropping arrangements. The area is also the northern point of the Hawazma movement into North Kordofan. Before the civil war, the Hawazma used to stay in the area from late July until mid-September, but during the years of fighting along their migration routes in the Nuba Mountains they stayed longer, creating suspicions given that the war also made them carry arms wherever they went.

The general trends in the area are characterised by demographic growth, the introduction of tractors (people from Kosti rent out tractors that are used locally in Kordofan), increasing rainfed agriculture per household (from 3-4 *makhammas* in the 1960 and 1970's to 13-15 *makhammas* at present), the commercialising effect of the highway established in 1990 (which for instance has made it easy for people to travel to El Obeid to buy what they need, a trend that is changing local exchange relations) and increasing investment in livestock by locals as well as urban traders and government employees. All of this has created a process of environmental degradation through the overuse of resources.

A separate factor illustrates the involvement of the Sudanese government and their relationships to foreign commercial interests. The description is based on a case presented by an International Food Policy Research Institute (IFPRI) report discussing resource based conflicts in the larger Kordofan region (International Food Policy Research Institute [IFPRI], 2007). It relates to the traditional collection of gum arabic in Kordofan. Apart from the cultivation of grain and various types of vegetables and fruits, an important source of income in Kordofan has been gum arabic collection. The collection of the gum from the *hashab* trees (*Accacia senegal*) provided people with a

traditional cash crop. The right to tap such trees was given by Sheikhs and Omdas of each tribe if the trees were on virgin land, or the right to trees on fallow land (*gineina*) followed cultivation rights. *Hashab* trees yield after about five years (1-5 pound per tree) and remain productive for 15-20 years. Then, the trees are cut and the land is cultivated for 4-5 years. This system of inter-cropping also provided browse for animals, wood for the house and eventually charcoal incomes when finally cut. Thus, the agricultural cultivation of millet and groundnuts, animal husbandry and gum-tapping constitute the basic aspects of the farmers' strategy of survival in Kordofan. The Sudanese state has always been involved in the marketing of gum arabic, as the product was handled through a para-statal organisation, in this case the Gum Arabic Corporation. However, as the following case shows, this is about to change (IFPRI, 2007, p. 81-82).

In 1997, a concession to plant 38000 *feddans* with acacia trees for export was given by the Government of Sudan (GoS) to a private company called Malaysian-African Agriculture Company (Jandeel) in Shikan, a locality 40 kilometres east of El Obied towards Er Rahad, south of the railway line. The concession was to last for 25 years, and it gave the company access to a vast area, going from Kasgil to Rahad. This affected the tribes of Jawamaa and Bidariya, as well as other small tribes associated with them, whose base is in the area covered by the concession; as well as nomadic tribes periodically entering the area. More specifically, the concession deprived pastoralists from two of their most important wet grazing areas (Mugshasha and Ghanama), blocked some pastoral routes and also encompassed several village farms. The concession was granted through a federal law, namely the Investment Encouragement Act of 1990. Although the State also has a Committee of Land Disposition, which should in theory grant concessions to private investors on state land and work in harmony with federal investment authorities, this particular concession did not pass through the committee. At the local level, whilst the traditional leadership of nomads was not consulted, there were rumours that some village Sheikhs of settled farming groups did not object to the concession because the company had bribed them.

The company tried to placate the population by making token donations for social and community services, but continuous complaints found their way to state authorities from different locations. The company itself resorted to using guards and security personnel to prevent animals from entering the area under concession, whilst farmers as well as pastoralists continued to regard this investment as an infringement upon their customary rights. Most of the resistance, however, came from pastoralists whose routes had been blocked; both State authorities and the company realized, somewhat belatedly, that because the pastoralists were armed, they could stage a serious confrontation. Hence, around the time of interviews, an agreement was concluded between the state of North Kordofan and the company, stating that (i) 1500 *feddans* of land would be deep-ploughed and seeds would be disseminated in this area as grazing

land, so as to make it an alternative stock route for affected nomads, (ii) sheep and cattle would be allowed to graze in the company's plantation, as they would not cause harm to the *hashab* trees and (iii) *hafirs* would be built for settled communities affected by the plantations.

One of the lessons learned in this case is that lack of transparency and consultations can lead to dangerous speculations. In this case, states the IFPRI report, "*Some pointed to a conspiracy and hidden agenda behind the grant, as acacia is not normally planted on, or even suited for clay soil. The natural site for such trees is said to be sandy soil. They thus doubted the developmental objectives of the plantation, and tend to think that it might be a form of land speculation or else to lay claim over an area (known but not yet disclosed that it is) rich in minerals.*" Due to the frequent reoccurrence of complaints, it seems that a partial solution like the one provisionally suggested by the above agreement may not hold beyond the short term, hence the conflict is as yet unresolved.

3. The role of the state – the case of land tenure

What we see here is a case in which the interference by the Sudanese state, on behalf of foreign capital, overrides local concerns and leads to a situation of tension. Moreover, this case is just one among many. Throughout history we find numerous examples of the Sudanese state interfering in various ways in local situations in which land tenure issues and local access to the local populations' own resources have been at stake, with local interests being in opposition to, and hence being overrun by, the interests of the State. It is to the history of this increasingly direct involvement of the State in the land situation in the country that we shall now turn.

The land tenure situation in Sudan is not unlike the general African situation, in which indigenous land tenure systems are specific to particular ethnic groups, and have evolved in the interaction of culture and environment over the centuries. They have been defined by factors such as local climate and ecology, the quality of land resources, population density, level of agricultural technology, crops, markets, kinship organisation, inheritance patterns, settlement patterns, political organisation, the religious significance of land and patterns of ethnic conquest, dominance and rivalry. Tenures are often "communal", but this does not mean that everyone has equal access. Rather, there is a hierarchy of rights, available to members of the group at different levels, from the rights to individual plots at a local level, to rights that may vary with the type of land use (cultivation versus pasture, irrigated land, land with trees etc.), to the rights in a general territory (*dar*) being available at a tribal level. There are also rights within traditional political units, originating in pre-colonial states, such as the *hakura* system in Darfur or *wathiga* in Funj. The different levels are tied together by rules of descent; or ethnicity, defining insiders and outsiders. There are also secondary tenures, so-called derived rights, such as share-cropping arrangements, rights of way

and water and rights of wives in their husbands' land. Many conflicts occur as a result of outsiders' infringement on the insiders' rights, but conflicts may also arise as a result of tension within the group itself. Such internal conflicts of interests are based on the different types of positioning and different types of interests among the units and individual actors themselves. Young men may want to work as hired workers to earn money for bride-wealth rather than work for their fathers, as the fathers obviously would like. Young, unmarried women may want to work selling tea etc. whilst married women may want to allocate time for their own fields, rather than work the joint household fields.

It is unlikely that a farmer or a pastoralist has an academic understanding of this as a system in the way it has been explained above. Rather, the rights are understood as being very concrete and located in time and space, and have to do with a person's chance of survival – hence the heat in many of the conflicts. In this type of situation we can get access to this thinking only through concrete cases, in which we see the specific ways any person acquires rights. Questions such as what is the first farming experience (on parents' land), what is the first land right in the person's own right (at marriage), what is the base of current rights, and what are the plans for the future, are questions that take us into this concrete world of the user. This requires a time dimension that shows how units are established and how rights are acquired over the generations. A likely outcome of this is a situation full of local compromises and situational give and take, rather than strict rule enforcement. This personal basis is also important because land tenure changes often start as individual deviance from the norms, as we see in the early establishment of gardens on communal lands; introducing elements of private ownership rights that can be later developed. Such systems have been dynamic and have changed with use and time, which makes it likely therefore that some of the types of conflicts we see today also have appeared earlier, and that people have been able to deal with them in the past. This, of course, gives cause for some optimism in looking backwards in order to learn from the past whilst also understanding that contemporary conflicts also have their own dynamics and must be related to a wider, contemporary environment. It is at this point that the general context of a national land tenure system comes in.

If we look at the tenure situation in a longer perspective, we see the important role played by the Sudanese state in affecting local outcomes. Both the colonial rulers and the subsequent independent regimes in Sudan have greatly affected the state of affairs. Through colonial rule, a commercial sector was developed with tenure arrangements inspired by Western forms, coexisting with traditional forms that remained under subsistence agriculture. A problem in this development was that the colonial outsiders saw traditional tenure, as it was based in kinship rules, as being 'private', and did not recognise the way the kinship and descent systems were interwoven in larger systems, defining political units. Western inspired systems, on the other hand, were seen as under public law, thus producing a basic inequality in the system within the emerging

nation states. With colonialism and Native Administration, the higher levels of this tribally based system were given status as 'native elites', making tribal leaders part of the public system whilst other, lower level, parts remained 'private' and received little attention. This also created a situation in which Native Administration leaders could acquire more power to interfere in the system than was traditionally available to them.

We see this clearly in the Nile Valley, where the British registered agricultural land and where the traditional elites of the day could acquire estates. In the central rangelands, the British introduced 'grazing lines' to divide pasture land and cultivation, and local orders stipulated how the rules of the game were to be played out. Special *dar* areas were designed with specific rights for those who belonged there, and for those who were passing by. The system was controlled by the Native Administration leaders such as *Nazir*, *Omda* and *Sheikhs*. Water points were also opened and closed to regulate movement, in a period that represents a flourishing of pastoral development in the central rangelands of the Sudan.

The period of independent regimes saw a lot of land tenure legislation, a basic one being the declaration of state ownership of nearly all land through the 1970 Unregistered Land Act, an act which also instituted a leasehold tenure system. In the Sudan case, traditional tenure continued, but the state used its powers to acquire land for development of modern schemes. The choice of models was related to a basic ideological outlook, and the Sudanese law introducing this came in the early, socialist oriented, years of the Nimeyri regime (Nimeyri took power in 1969). The argument was that a leasehold system was more consistent with the traditional situation, in which the state was supposed to operate as a "super-tribe", playing the same role that the tribal leaders had done. However, the state did not develop as a neutral factor, but rather became an operator in its own right, using the laws and the system to establish enterprises that benefited the supporters of the state. The Mechanised Farming Cooperation (which was established in 1968) was one mechanism with which to achieve this, and other para-statal were created to deal with other sectors. In spite of the Islamisation, efforts in the 1980s leasehold remained the norm on which the government makes land available for development projects, both in irrigated and rainfed areas. Rents are nominal, and the lack of both political will to deal with conservation and husbandry requirements, and to stop mechanised cultivation outside scheme areas, has added to the problem in the traditional sector, particularly for the pastoralists using the areas. This has also fuelled conflict. Rather than providing order, the policy has facilitated processes of further land grabbing by the elites. In 1980, still within the Nimeyri period of power, the tribal 'homelands' of various groups were also abolished, making it difficult for people to keep outsiders out. This happened at a time in which the need for movement into certain areas became more important as a result of drought and war.

With the current regime taking power in 1989, with its policies of decentralisation and federalisation (spelled out in the National Comprehensive Strategy, 1992-2002), there is considerable institutional chaos as far as dealing with resource management is concerned. Schemes have blocked pastoralists and taken land from local cultivators. The legal system is not protecting the rights of local people, but rather, has turned against them. Policies of privatisation have led to a situation in which people do not get services that they cannot pay for themselves and the land grabbing goes on through the privatisation policies now dominant. Rich farmers and pastoralists can develop strategies with scheme owners for their own benefit, but the ordinary people are losing out. At the national level, the federalisation of the regional system has further divided the areas into smaller administrative units.

With federalisation, the various states are now the context for institution building and for legal decisions – tasks that before were carried out and supervised at the federal level. One problem is basic finance. The highest authority is the State Governor, followed by a State Council with legislative powers and then state ministries. This level is supposed to get finance from the central government through The National Fund for State Support, but only obtains such funding after submitting applications, based on their plans. Such money may come, or may not come, injecting insecurity into the system, and turning the focus of the leadership away from matters on the ground to the collection of taxes and the tapping of other revenue sources (that are also weak) in order to cover higher level spending. Within the new States, all action relating to the grass-root level is supposed to be carried out on the *mahliya* level, where there is a local council with an executive officer. They are supposed to deal with agricultural development, education, health, pasture management, forest, soil conservation, and water, but in the same manner as at the highest level, these people are busy collecting revenue from crops, livestock and some services in order to cover their own salaries. The collection of *zakat* is also important, as the collectors receive a part of the money collected. Taxes are also levied for crossing *mahaliyat* boundaries, and sometimes outsiders are actually encouraged to cross such boundaries in order to generate taxes which may, in the case of pastoralists, create problems. The important consequence of this lack of basic resources is that only services for which people pay themselves will be provided. Such a reduction in government ‘subsidies’ may be sound in macro-economic terms, but as an offer to people who struggle with staying alive during droughts etc. it might be less advantageous.

Hence, the logic of a local administrator being concerned with his small, administrative unit is not paralleled with the logic of local people, particularly pastoral ones, who derive their thinking from the totality of their adaptive systems. The result is a situation characterised by land tenure and institutional chaos. This insecure tenure situation brings several consequences that negatively affect people’s livelihoods. First, tenure becomes insecure the moment one rents out land, since renters might claim rights for themselves; and can succeed by pledging support to village *sheikhs* who

may use this in political games. Renters do not pay rent, claiming the land is theirs. If land is along water courses and can be used for irrigation, such land may be sold, thus entering into the calculus of private investments by people in the commercial sector.

4. From resource management to conflict management

As indicated in the introduction of this paper, the situations we have reviewed are not characterized by resource based conflicts alone, but by a host of different conflicts that may also change over time. Certainly, an argument about the spreading of conflict can be sustained, and we need a particular focus on the role of the state in these conflicts. The Sudanese people have always regarded the government (*hakuma*) as above the people, as a guarantor of law and order and, hence, a place where one can appeal in times of problems. This has been part of the basis of legitimacy of the state *vis a vis* its people. The Sudanese state, however, as most other African states, has moved through developments after independence that can be characterized by a privatization of the state, a militarisation of the state around such private interests and, consequently, an undermining of the legitimacy of the state.

Also in the types of conflicts we are talking about here, we see how the modern Sudanese state is more and more becoming an independent player in these conflicts. The end result of this is the crisis we see. People are squeezed by drought or by war, whilst there are simultaneously some who benefit from the developments. These are civil servants, military people, politicians and big traders who are in the political game and who can exploit their relations within the privatised state.

So-called development inputs are not based on proper planning procedures but rather on the private interests of individual actors. Political representation is based on elections only to a limited degree; more and more we see that key officers are appointed based on loyalties to the state rather than legitimacy from the people. Although these developments still, to a certain extent, have an ethnic dimension, the general development is towards a group of winners who are close to the state apparatus, and an increasing group of losers who are not. Winners and losers are represented in most groups in the Sudan. This is truly a vicious circle!

Still, however, there are regional differences in the ways that these conflict situations play out. In the case of Western Sudan, the difference between Kordofan and Darfur is telling, and shows the importance of historical relationships to the centre. Unlike in Darfur, the history of Kordofan is one of early commercialisation (Stiansen and Kevane, 1998). Trade routes traversed the areas from west to east, and north to south. There was never any unified political body in the area, unlike in Darfur, where the Sultanate of Darfur provided an overall political system under which tribes were allotted their space. Rather, Kordofan was an area that was controlled by the Darfur and the Funj Sultanates at different times, then came under Egyptian control in 1870,

was central in the Mahdia uprising and was then controlled by the British during the Condominium rule until Independence in 1956. Attempts at state building in the region were short-lived. Throughout these periods the Kordofan 'tribes' were fluid groups that hardly qualified as tribes at all.

The British, however, succeeded in re-settling and amalgamating the scattered tribes in larger, territorial, *nazirates* that had the support of central authorities. As we know, this system was abolished by Nimeyri, but was brought back in the 1980s. As a consequence of this history, and also because of Kordofan's proximity to the Nile Valley, urban based commercial groups came to play central roles and were able to exploit local people, partly through political (often based on marriage) alliances with local tribal leaders and partly through their involvement in the general process of commercialisation, often represented by illegal trading. Their involvement was both in agricultural produce, particularly in cash crops such as gum arabic, and culturally, bringing people living there closer to the lifestyle of the riverain groups in the Nile Valley. Hence, the relationship between traders and local tribes were exploitative and integrative at the same time, as was the relationship between Kordofan and the Nile Valley in general, a fact that help shape local conflicts. Conflicts were, and continue to be there, of course, but they tend to remain local in nature. They did not spread in the way we see in Darfur, nor are they conceived to be linked to the wider national conflict of race, as is increasingly happening in Darfur, and even more so in south Sudan.

Summing up this discussion, we may easily end on a note of despair. Although there are variations in degrees of violence, there is not much hope in the situation in Western Sudan for a process that might facilitate development. Furthermore, there are no short cuts to development, and simple models based on 'popular participation' may seem as far-fetched in solving problems as is government coercion.

Local people like the Jawamaa, to mention some, are at centre stage of these problems. They are victims of large processes and struggles, through which they have become marginalised and neglected. But they are there! Moreover, they represent a basic resource for any effort to overcome the problems. Their indigenous 'development planning', which is embedded in their social organization, must be tapped. Their socio-cultural organisation, which also represents the experience of previous generations, must be utilized; not because it constitutes a perfect management system, but as a starting point. Local agro-pastoralists have broader agendas that do not particularly fit with those of the powerful groups, nor the development planner. However, both states and planners do well in paying attention to such local groups. If this is to be the case, the challenge is as much in the broad direction of providing 'good governance' as it is in the more narrow direction of providing sound 'resource management systems'.

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Analysing Resource Constraints as One Dimension of the Conflict in Darfur

Brendan Bromwich

Abstract

This paper argues that for analysis of environment to provide a useful resource for the peace process in Darfur, the role of environment must be set in the context of the complex concerns of the wider conflict. Whilst issues relating to access and control of natural resources are important at local level, the conflict has an overarching political dimension at national level relating to Darfur's position within Sudan. There is a further regional dimension to the conflict as evidenced by violence reaching N'Djamena in February 2008. Acknowledging the importance of this context both improves analysis of environmental issues, and also provides a more realistic and significant analysis for the peace-building community.

That said, the role of competition over natural resources in Darfur is important and needs to be seen alongside changes in population and rainfall over recent decades. Livelihoods analysis has proven to be a useful tool in understanding the complex links between environment and conflict in Darfur, particularly relating to how environmental governance has declined as a result of the multiple levels of conflict in Darfur. The paper reviews rainfall records in Darfur and draws attention both to rising trends in rainfall since the 1980s, and to the risk of drought during the current crisis which has hitherto coincided with years of above average rainfall. The paper concludes with an appeal for the development of a nuanced analysis of environment in the Darfur crisis that reflects the complexity of both the conflict and environmental conditions. This would provide a sound basis to promote the rebuilding and adaptation of environmental governance that is urgently needed in Darfur.

1. Introduction

The role of the environment in the Darfur conflict has caused considerable international debate. Darfur has become the case study of choice for people who support or refute the links between environmental degradation and conflict. References on Darfur are aimed at particular audiences in the context of a particular conflict, and so reflect one aspect of the crisis or another. For example, where the purpose of the debate is to promote action on climate change, relatively little analysis of the political context is likely to be provided and so the reference will have little contribution towards the informing the peace process. However, in order to fully understand the implications for peace-building in Darfur, the role of the environment must be set alongside other dimensions of the conflict, including the overarching political concerns.

This paper seeks to provide an introduction to the role of the environment in Darfur, by relating it to explanations of the conflict operating at national, local and regional levels. It argues that environmental considerations apply at local rather than national or regional levels, but that the three levels are interlinked. This paper highlights how livelihoods analysis plays an important role in the identification of links between the environment and conflict. The subsequent discussion of rainfall records highlights the complexity of identifying trends in rainfall and ascertaining how such trends fit into the debate on the conflict in Darfur.

The paper concludes by confirming the inadequacy of a simplistic reading of environmental scarcity leading to conflict in Darfur, and emphasises the need for a nuanced analysis that will gain more traction in the wider debate. This will allow the significant environmental challenges in Darfur to receive greater attention in peace-building, and in humanitarian and recovery programming.

2. What is the role of the environment in the Darfur conflict?

The Darfur conflict can be considered as having three levels. Local level fighting between different groups in Darfur, which is generally defined on a tribal basis, is the first level. Secondly, at the national level, a confrontation between Darfur rebel movements and the government constitutes the next level of conflict; and finally, the regional rivalries amongst Sudan, Chad, Central African Republic and Libya, are implicated (Bromwich, 2008; Young, 2005). All three levels of conflict have roots dating back several decades. However, the level of violence and displacement of the current conflict sets it apart from its historical antecedents.

The current conflict is widely acknowledged as commencing with the attack on the El Fasher airport by rebel movements of April 2003. The rising rebel activity provoked a major counter insurgency and a period of intense violence followed during 2003 and 2004 (de Waal, 2004). This came at a time when significant progress was being made in the north-south peace process and the vision of a post conflict Sudan was being forged – a process that highlighted the Darfurian political grievances.

The categories of negotiation in the Darfur Peace Agreement in 2006 focused on issues of wealth-sharing and power-sharing with the government based in Khartoum, supporting an analysis of the conflict as being primarily related to Darfur's marginalisation within Sudan. The national reach of the conflict was further highlighted by the 2008 rebel attack on Omdurman, which was clearly for political, rather than natural resource, objectives.

However, the government counter-insurgency soon mobilised support from groups with more localised concern. The rebel groups were largely drawn from particular

Darfurian tribal groups. As a result, local tribal disputes around access to, and ownership of, natural resources were exploited to undermine the insurgency. The Darfur crisis is therefore often expressed as being between government-backed pastoralists seeking land and pro-rebel farming communities. The reality is more complex, however, particularly since the signing of the Darfur Peace Agreement (DPA) violence occurred between pastoral groups, alliances between the government and pastoralists became stuck and unstuck, and the rebel groups have splintered (Flint, 2009). Between 2005 and 2006, thirty two tribal reconciliation conferences were held in South Darfur alone (Takana, 2008). Notwithstanding this complexity, it is still valid to consider conflict over natural resources and land as an important reality in Darfur. Competition over natural resources and land has been exacerbated in recent decades by the increasing frequency of drought and rapid population growth (Tearfund, 2007; Young et al., 2005). However, it is necessary to disaggregate these local dimensions of conflict from the overarching political conflict at national level in order to understand environmental dynamics in Darfur and identify how these issues interact.

The regional dimension of the conflict was clearly evidenced by Chad's declaration that it was in a state of war with Sudan in December 2005. In February 2008, Chadian rebel groups attacked N'Djamena, reportedly having prepared in both Western Darfur and the Central African Republic. Justice and Equality Movement (JEM's) tribal base is predominantly Zaghawa, a tribe that straddles the border with Chad and from whom Chad's president Idris Deby comes. Sudan accused Chad of supporting JEM, evidencing the linkages right through the strata of conflict: tribal, national and regional. The regional level of conflict also required a long term perspective, particularly with respect to the impacts of the Chadian civil war in the 1980s and the Libyan support to Arab factions within it. The Libyan agenda played out in Darfur in the 1980s in addition to Chad, as many of the groups involved in the Chadian conflict were also present in Darfur (Giroux et al., 2009; Marchal, 2007)

The identification of these three levels of conflict enables us to identify the limits to which environment is a factor in the crisis in Darfur. It is important at the local level, but a solution to the Darfur crisis as a whole must resolve conflict at both national and regional levels also. Ethnicity is acknowledged as an influence at each level, but again, as an issue that defies simplistic analysis or the conflation of these multiple levels of conflict. Banditry is now a significant component of violence at the local level, but not without links to national and regional level, as the vehicles and timber stolen within Darfur find their way to markets outside Darfur either in, or outside of, Sudan.

The table below provides a visualisation of the three layers of conflict with respective evidence that would need to be discounted if Darfur's conflict were to be examined with the focus on one level of conflict alone.

Table 1: Issues and evidence of the three levels of conflict in Darfur

Levels of conflict	Issues	Examples of evidence
Regional conflict	Regional political issues	<ul style="list-style-type: none"> • Violence reaching N'Djamena
National Conflict	National political issues	<ul style="list-style-type: none"> • Violence reaching Omdurman • Categories in the DPA
Local conflict	Local political issues Access to land and other natural resources	<ul style="list-style-type: none"> • Environmental asset stripping • Local violence often taking place between different livelihood groups over access to natural resources

Reductionist analyses over-emphasising the role of environment in the Darfur conflict, paradoxically, make it easy for environmental issues to be discounted *en masse*, when they are set against the competing explanations of the crisis. In order to influence processes relating to peace and recovery in Darfur, environmental analysis must acknowledge these diverse dimensions of the conflict.

3. Livelihoods analysis can be used to identify links between the environment and conflict

Livelihoods analysis has proved to be a useful tool for the analysis of local level conflict in Darfur. Livelihood groupings often coincide with groups of tribes, which allow important issues to be discussed. Such issues relate to groups of livelihoods rather than groups of tribes, thereby disaggregating the complex issue of ethnicity from the local level of conflict. Depersonalising the discussion of environment and livelihoods from the discussion of the conflict like this facilitates the sensitive analysis of conflict at the local level.

The widespread use of the humanitarian livelihoods model in Darfur has developed a shared understanding of livelihoods terminology amongst Darfurian livelihood professionals. From an environmental perspective, the tool is important in allowing the link between the environment and conflict to be analysed and communicated in such a way that handles the complex human dynamics associated with conflict (Young et al., 2005; 2007)

Important features of the humanitarian livelihoods framework (as can be seen in Figure 1) in communicating environmental concerns include:

- The capacity of the model to clearly distinguish between the natural resources (assets), the means through which these resources are managed (policies,

institutions and processes – PIPs) and the activities that people are undertaking (strategies).

- An understanding of how both natural resources and the structures of their management and governance are undermined by conflict, which is one of the most important aspects of this framework.
- The identification of the changes people make in their livelihood strategies in response to conflict, often choosing short-term over long-term strategies.
- The feedback loop, which draws out dynamics by which the environment is a victim of the conflict in addition to a driver of conflict.

The loss of management and governance structures for the environment should be seen as the most significant environmental victim of the conflict. This loss of capacity for equitable and sustainable environmental governance undermines the means by which other forms of environmental degradation may be addressed.

Adaptation is a key concept in support of livelihoods in Darfur, because in many ways the multiple shocks to which Darfurians need to adapt require the same approaches to be taken. Darfurians are adapting to the impact of conflict, to a process of rapid urbanisation and, like the rest of the Sahel, are also faced with the challenge of adapting to the impacts of climate change. Conflict and insecurity undermine these other processes of adaption. In all cases, building assets for livelihoods and the policy and institutional framework to manage them are core to adaption, as they are vital for the recovery and development processes. The livelihoods framework is shown below.

One weakness in the model, however, is that it shows the feedback loop as being internal to the livelihood system, whereas from an environmental and a conflict perspective, it is also important to identify external negative impacts affecting other livelihood groups.

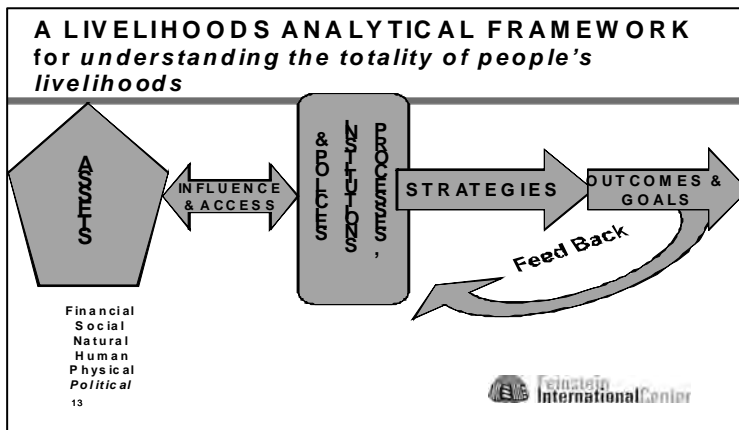


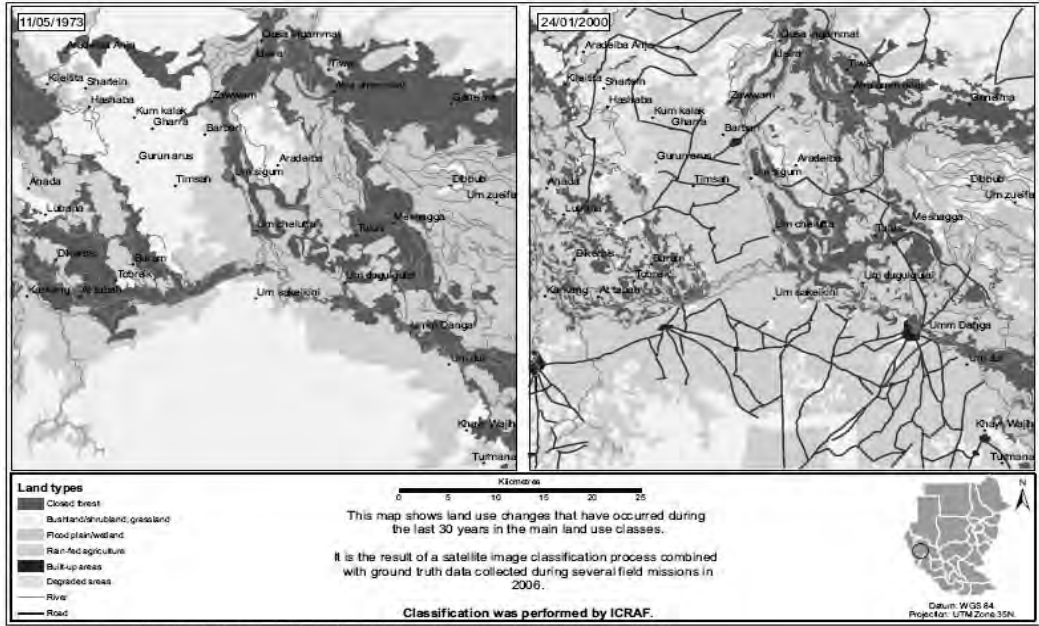
Figure 1: Livelihoods analytical framework. Source: Lautze and Raven-Roberts, (2006)

4. Increasing the pressure on natural resources

Whilst not being the main cause of the conflict in Darfur, the process of increasing pressure on resources in the context of declining governance is an important driver of tension between different groups. An example of the impact of increasing use of natural resources is shown in the changing land use in the Um Chelluta region of South Darfur. This region was analysed by ICRAF for UNEP's Post Conflict Environmental Assessment (UNEP 2007) with the changes in land use depicted between 1973 and 2003. The analysis showed a considerable increase in agriculture, largely at the expense of rangeland. However, it was not just the loss of land for grazing that presented a problem for pastoralists, but the difficulty of reaching the water sources in the *wadis*, and the difficulty in crossing the area with transhumant herds. From the land use maps below, it is possible to imagine the increased difficulty in the negotiation of a route through farmland, from one side of the map to the other in 2003, compared with 1973. Greater social cohesion and effective governance was needed for more complex negotiations in 2003, but by this time the capacity for peaceful governance had declined.

Changes in land use have been accompanied by changes in land management. One example is the increasing practice of enclosing areas of pasture around villages, which used to provide open grazing for pastoralists. This process was a contributing factor in conflicts between the Northern Rizaygat and Bani Halaba, in the early 1980s (Håland, 1991; Young, 2009). This process culminated in the Arab-Fur War between 1987 and 1989. However, as discussed above, these wars had links with both national and regional conflict and should not be seen in terms of resource scarcity alone.

Furthermore, Darfur has experienced a considerable increase in population size in recent decades, from approximately 1.3 million in 1973 to 6.5 million in 2003. This has caused a depletion of natural resources. ICRAF's research indicated that there has been a large loss in forestry during this period. Deforestation rates across Sudan were approximately 0.8% per year, but the three areas assessed in Darfur indicated rates of 1.4% per year. This was borne out by FAO, which examined fuel wood production and population size, indicating that much of Darfur had a fuel wood deficit before 2000 (FAO, 2005). This is shown In Figure 3.



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Figure 2: Land Use Change in Um Chelluta, South Darfur 1973 – 2003. Source: UNEP (2007)

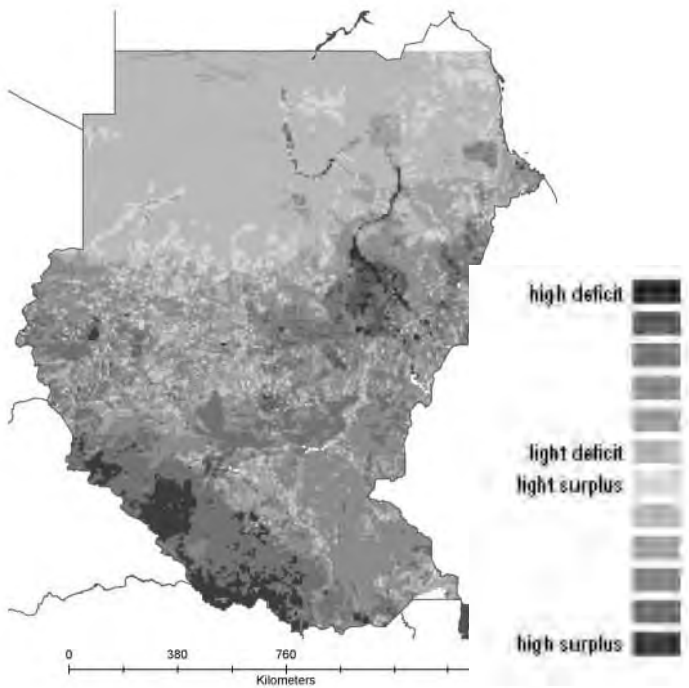


Figure 3: Fuel wood deficit in Sudan (2000), Source: FAO (2005)

5. The complex question of rainfall

Declining rainfall is sometimes cited as a driver of conflict in Darfur. However, this dynamic requires careful investigation. It is important to note that the current crisis, which is by far the most violent conflict in Darfur in terms of mortality and displaced people, has taken place in years of above average rainfall and on a trend of increasing rainfall (Tearfund, 2007b; UNEP 2008).

The longest uninterrupted record of rainfall in Darfur is from El Fasher, where recording began in 1917 (see Figure 4 below). The thirty years from 1971 to 2000 had an average rainfall of 192mm, whereas 1941 to 1970 had an average rainfall of 284mm, indicating a drier period since the Sahelian Drought. However, this does not equate to an ongoing trend of declining rainfall, as there is evidence that rainfall appears to have recovered since the drought of the 1980s. This pattern is consistent with other parts of the Sahel, in which the 1950s and 1960s were above the mean for the century. A decline occurred in the 1970s and 1980s, which was reversed in the 1990s. Rainfall has been monitored in Nyala and El Geneina since 1946, and both of these records show high periods in the 1950s and 1960s, which then declined to a minimum in the 1980s and finally increased thereafter.

The pattern of increasing rainfall since the 1980s is consistent with reports of a pattern of greening in the Sahel as a whole (Herrmann et al., 2005). Some recent climate models that examine the interaction of anthropogenic global warming and vegetation change, suggest that the process of increasing rainfall and greening of the Sahel may continue (Brooks, 2006). However, optimism relating to increasing rainfall is tempered by consideration that this pattern has not been evident for long, by consideration of the variability of rainfall, and a precautionary approach in general.

Variability in rainfall has an arguably more significant impact on livelihoods, particularly in terms of the frequency of drought. The Sahelian band between 11 and 17 degrees north has a particularly variable rainfall. The effect of this is evident in the variability of the vegetation, and is shown in Figure 5. The annual maximum vegetation (measured in NDVI) has a variability of over 30% in parts of the Sahel and less than 10% away from this area (Tearfund, 2007). Records from El Fasher indicate that the frequency of drought has increased since the early 1970s, with 16 of the 20 driest years on record occurring since 1971 (Tearfund, 2007b). This increase in frequency of drought is consistent with general patterns of climate change, in which increasing variability is a leading impact.

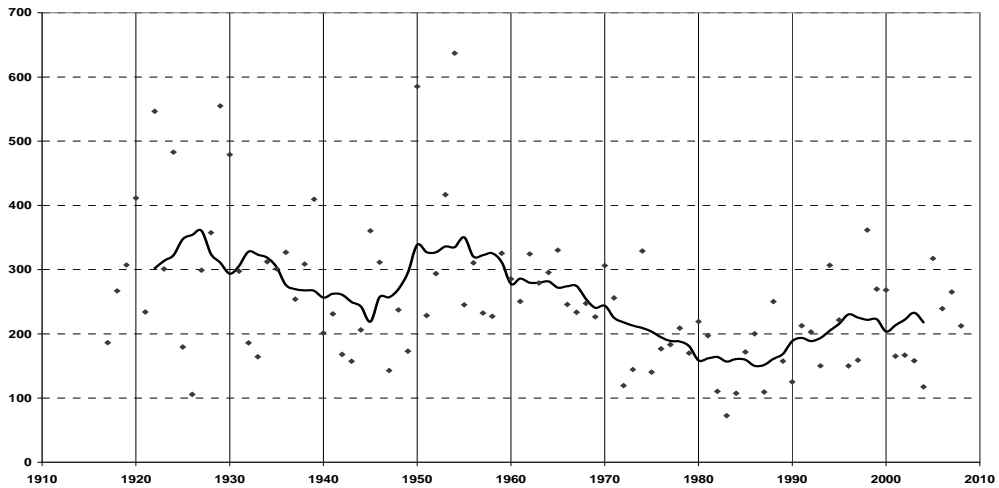


Figure 4: Annual Rainfall in El Fasher, between 1917 and 2008 (mm). Source: UNEP (2008)

The significance of these records is not to discount the role of decreasing rainfall and increasing drought from the analysis of social changes in the 1970s and 1980s, but to ensure that there is a cautious approach to analysing the role of environmental change, particularly rainfall, in the current conflict. Despite this, a review of rainfall during the conflict raises alarming questions about the risks of drought during the current crisis.



Figure 5: Variability of Annual Maximum Vegetation (NDVI). Source: Tearfund, (2007)

Darfur's population has undergone a remarkable process of concentration into IDP camps and contiguous urban areas. During this period, rainfall has generally been above average, or close to it. Many of these large populations (including Nyala and El Fasher) lie on a geology largely dependent on annual recharge. Consequently, the resilience of these aquifers to acute water stress is unknown. Although the impacts of famine would be mitigated by the presence of a large food aid programme, the impacts of water shortages may still produce significant unrest.

The table below shows rainfall in Darfur's capitals during recent years, set against the average over the last 30 years, and the lowest rainfall on record.

Table 2: Average rainfall in the three Darfur capitals for 2004-2008 and the lowest on record, Source: UNEP (2008)

Location	Average rainfall (mm)	Lowest annual rainfall (year)	2004	2005	2006	2007	2008
El Fasher	194	73 (1983)	118²	317	239	265	213
Nyala	384	140 (1947)	432	487	467	457	368
Geneina	428	124 (1984)	442	636	419	508	406

Overall, the absence of consistent trends in rainfall should be a cause for caution when linking patterns of rainfall with conflict, particularly because the current conflict undermines linkages between low rainfall and violence. However the role of drought triggering further violence in the current crisis should be given urgent attention. (At the time of publication, poor rains are reported in Darfur for the 2009 rainy season giving further urgency to conflict mitigation work relating to drought).

6. Conclusions

In order to understand the role of the environment in the conflict in Darfur, it is important to acknowledge it as being part of the conflict between different tribal groups, which is in itself just one level of a system of conflict that also has national and regional components. By avoiding a reductionist environmental narrative to the conflict in Darfur, due weight may be given to the environment without drawing attention away from the need for resolution of the overarching political levels of the Darfur conflict. Developing and communicating an appropriately nuanced analysis of the Darfur conflict is an

² The low rains in El Fasher in 2004 may have been mitigated by aquifers as yet unaffected by the increased demands as residual storage was drawn down. There is evidence from aquifers in some locations that both chronic and acute draw down is significant, however a greater level of analysis of the unprecedented abstractions from Basement Complex geology occurring in Darfur is needed.

urgent priority, so that the considerable environmental challenges that Darfur faces may inform the processes of peace-building.

Livelihood frameworks provide a useful means of analysing conflict relating to the environment and identifying the links between natural resources and the interaction of different groups party to the conflict. From this analysis, the restoration of equitable and sustainable environmental governance emerges as an important priority for peace-building at all levels.

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The Origins of Current Conflicts: Rural Water Provision and the Reshaping of Human Settlements and Environmental Resources in Western Sudan

Mahmoud El Zain

Abstract

This paper argues that the arid and semi-arid areas of West Sudan have great potential for developing water resources. Witnesses to this potential are the settlements which dotted the landscape of these regions for centuries, as well as the expanding herds of pastoralist communities who have traversed this region since time immemorial. In fact, the British realised this potential for water resources at the beginning of the last century and engaged in effective rural water supply development. Nevertheless, this potential has been increasingly neglected in recent decades. It is this negligence, this paper argues, which stands as the root cause of conflicts in West Sudan, resulting in ecological degradation, collapse of subsistence economies, and disintegration of groups' symbiotic relations. Rural water supply in Western Sudan is a story of genuine socio-economic development stopped short.

1. Introduction

At the beginning of the twentieth century, the British administration had engaged in the provision of water to rural communities, particularly in West Sudan, with the view of achieving sedentarisation and villagisation, both for strategic and economic reasons. For post-independence governments, rural water provision had been crucial for incorporating the western regions (Kordofan and Darfur), and maintaining this provision had continued to be the major guarantee for this incorporation. This paper argues that rural water provision for the western regions had continued steadily until the beginning of the 1970s. Following this period, rural water supply declined dramatically, where the central governments almost completely abandoned the western regions. This new attitude towards the west is largely attributed to the nature of the political regimes, where military governments in particular – for structural, ideological, political and economic reasons – failed to see the economic potential of West Sudan's traditional sector and the significance of rural water supply for this economic potential. These military regimes, reigning for longer durations and conceptualizing the economic resources from within an authoritarian development framework, had appreciated and prioritized irrigated agriculture and continued to undermine the traditional resource sector. The resultant stagnation, and later deterioration, of rural water supply had aggravated the environmental problems in the western regions, and ultimately caused the displacement of large groups of population as well as localized conflicts such as the ones currently going on in Darfur.

In addition to the above section, this paper is divided into six more sections, followed by a conclusion. Section 2 briefly addresses traditional water sources during the pre-British colonial era. Section 3 addresses the rural water supply programme introduced by the British at the beginning of the 20th century. Section 4 examines rural water supply during the post-independence era. Section 5 questions how the promising water resource development stopped short and how it can be viewed as the origins of current conflicts in West Sudan. Section 6 makes the link between rural water supply and conflicts in West Sudan. Lastly, section 7 questions why governments failed to see the economic potential of West Sudan and resume the rural water supply programme in order to actualize this potential.

2. Traditional water sources during pre-British colonial era

A premise followed here is that the Sudanese communities in different ecological zones developed codes of behaviour, which yielded a sustainable management of natural resources (for details see El Moghraby, 2003, p. 27; Shaaeldin, 1981, p. 97; Umbadda, 1981, p. 107). Sharing of water resources, in particular, have shown this sustainable management within the frame of understanding and symbiotic relationships among communities. In light of this, communities in West Sudan had historically maintained a reasonable regime of access to water sources, using their local knowledge and benefiting from a variety of water sources. The richness of the vocabulary of terms used to refer to water sources is an indicator of the diversity of these sources and, possibly, the elaborate institutions that the Sudanese communities established to organize access to water and the value attributed to this water. Tag El Khazin (2002, p. 3-4) provides 16 terms used by communities to refer to water sources. The terms he identified include *bir* (well), *rahad* (lake), *bahr* (river), *birka* (pool), *buta* (pool), *dahal*, plural *dugul*, (pool), *fula* (water hole), *hafir* (depression or man-made waterhole), *idd* (well), *khorr* (dry water course), *mayaa* (shallow lagoon), *qelti*, plural *qulut*, (water holes in rocks), *ragaba* (stream filled from a river and running inland), *rigl* (small stream), *saraf* (running stream), *shaqq* (large hole in cotton soil holding water), *tumud* (water hole), and *wadi* (dry waterhole, generally wider than a *khorr*).

The above 16 types of water sources provided by El Khazin can be re-classified into three groups. The first group, predominant in sandy areas, include *bir* (well) and *idd* (a wateryard or cluster of shallow wells), and reflect adaptation measures whereby communities pursue methods to benefit from other natural resources where water does not occur on the surface. The *iddud* (plural of *idd*) are always constructed in areas where groundwater is plenty and close to the surface, primarily on the beds of *wadis* when the latter get dry. Wells, on the other hand, are constructed where groundwater is deep. In some cases, the depth of a well can go to over 40 *rajils*, i.e. 60 to 70 metres deep. In the old days, when cement-built wells were not known, wells were

constructed through the use of local materials. In West Sudan, like in other parts of the country, communities traditionally depended on themselves to dig their wells to make water available for humans and their domestic animals or herds. Communities that depended on shallow wells had always lived where water was of good quality and easily accessible at a reasonable depth. They used the endowments of their environment to dig these wells and to maintain them. They used the bark of *Acacia tortilis* trees to make the cords used to lift up the sand they excavated, and they used the long roots of *Acacia senegal* trees, as well as a few types of grass, to build the inside walls of the well to keep the sand from sliding. The abundance of acacia trees and types of grass used in keeping the wells intact, therefore, was crucial for the peopling of areas in the sandy regions.

The second group includes the naturally occurring pools such as *rahad* (shallow lake), *birka*, *buta*, *dahal*, *fula* (all four share the same characteristics, but are generally smaller than *rahad*), *shagg* (large hole in cotton soil-holding water), *tumud* (water hole), *mayaa* (shallow lagoon which stays only for few days), and *gulta* (water gathering on rocky surface). All types of water sources in this category are filled with rainwater, naturally falling and/or flowing into them. Excavated pools, often taking the form of a *hafir*, can also be added to this group. However, unlike naturally occurring sources of water, the *hafir* represents human intervention through the channelling of flood-water into embanked, relatively shallow, clay-soil water holding areas.

Finally, the third group comprises *bahr* (river), *chor* (seasonal stream), *ragaba* (a stream branching from and filled from a river), *rigl* (small stream), *saraf* (running stream), and *wadi* (seasonal water running on surface during the rainy season and under surface during the dry season, generally wider than a *chor*). In some areas, communities had depended on renewable water running on or beneath the surface in the *wadis* traversing the arid and semi-arid areas. However, it was rare that these communities were water self-sufficient; thus, their dependence on other sources of water, particularly wells. It is the availability of water in wells which determined the *masarat* of nomadic tribes and historically engaged them with sedentary communities in well-defined cooperative relationships. In fact, it is safe to argue that water, in the past, had been a reason for bringing communities together. In the process of making enough water available to all, communities – sedentary and nomads – toiled together to construct water sources, to maintain them, and to manage access to their waters. This cooperation had provided communities with another opportunity to build, strengthen, and maintain symbiotic relationships among themselves. Conflicts may, therefore, occur if any significant disruption to this system occurs.

El Khazin (2002, p. 4) likens the 16 categories of precise terms referring to water sources to the “the classification of ‘snow’ for the Eskimos who define 12 types of snow”. He asserts, “In each case the [water] resource is a matter of life and death.”

Witness to this importance is that “Each of those water points is known by heart to both the nomads and the settlers and each is kept for visits and stays along the *masarat* or routes of the north-south-north nomadic cycles” (El Khazin, 2002, p. 4). The knowledge and the attachment to the water source should be enough reason for both types of communities to develop a common knowledge of how to obtain water from these sources and, necessarily, how to maintain and manage them. Vital for the life of humans and herds, these sources are the most frequented places for meetings of members of settler and nomad communities. The peace that communities maintained while benefiting from these sources is no doubt longer in duration than the conflict that occurs among them.

It is important to note here that the water produced in West Sudan was not only enough for settler and nomad communities, but also for the groups traversing the regions from west to east and from east to west along the Sahelian zone from outside the Sudan. It is important also to note that communities, adapting to the natural changes, used to move not only from north to south and south to north, but also from west to east and east to west to settle permanently or temporarily.

The symbiotic relationships among sedentary and nomadic communities that had resulted in sustainable water management were based on a delicate balance; precisely, on how communities observe the rules that keep the ecosystem services intact, especially those that are directly related to water constructions, namely acacia trees. In fact, human settlements in the arid and semi-desert regions largely owe their existence to the acacia trees. The sustainable use of resources, including the acacia trees, by sedentary and nomadic communities was crucial for the continuity of their symbiotic relationship. Both communities seem to appreciate the value of trees such as *Acacia tortilis* and *Acacia senegal*, particularly for their use in water sources construction. Besides the well-digging and maintenance services, acacia trees stabilise sand dunes and provide vital ecosystem services to underneath vegetation, they provide building materials and firewood for inhabitants of the area, and they provide fodder and shade for animals. In this connection, it is important to see how undermining the value of the *Acacia tortilis* and *Acacia senegal*, and the close-to-disappearance of such trees, might have jeopardised access to water.

In the remaining part of the paper, it will be argued that the traditional water sources concept, the way they were managed and maintained and symbiotic communal relations associated with them, had, due to the rural water supply programme adopted by the British in the early twentieth century, experienced significant disturbance, and increasingly became less relevant. The rural water provision programme provided by the British since the first decades of the twentieth century, and that continued rather effectively until the late 1970s through the rule of post-independence governments, has dramatically changed human settlements and the way communities pursued ways to access water.

3. Rural water supply in West Sudan during the British administration

Starting early in the last century, the British administration engaged in projects to provide water to rural communities, particularly in West Sudan, with the view of achieving sedentarisation and villagisation, both for strategic and economic reasons. The strategic importance attributed to West Sudan, and Darfur in particular, was that it borders French West Africa, the domain of Britain's principal rival. Most significantly, however, was that during the First World War, Darfur's Sultan, Ali Dinar, who was dissatisfied with the tribute he paid to the Sudanese government, "came under the influence of pro-German Turkey and the Islamic *Sanusiya* movement in neighbouring Libya." (Wickens, 2007, p. 37). This, in combination with the desire of the British colonial administration to develop the economies of West Sudan, had necessitated a legible map for the frontier of West Sudan. Sedentarisation and defining the borders between villages and communities was made to spearhead the search for this legibility, and providing rural water was its most effective attraction to the new settlements in the emerging new demographic map. In the discourse of the colonial administration, a positive discrimination in favour of West Sudan was justified because this expansive region was the neediest for water compared to the other regions in the Sudan.

The strategic imperatives for the British in the Sudan largely defined the size and placement of human settlements. The rural water supply in which they engaged was, therefore, necessitated by their plans to influence settlements in the wider landscape of Sudan, which took two forms: one was the resettlement of the discharged government soldiers; and the second was the regrouping of isolated homesteads among rural communities.

During the first two decades of the twentieth century, the British established a series of what were known as "colonisation schemes" for discharged Sudanese soldiers who engaged in a trend of settling and developing their own communities in different parts of the country (Sikainga, 2000, p. 28). The motives behind this policy, according to Sikainga (2000, p. 28), "were to maintain a degree of control over the soldiers after their discharge and to keep them loyal as a group. About 23 settlements were established between 1900 and 1922, distributed among White Nile, Kordofan, Kassala, Funj, Upper Nile and Dar Fur Provinces; they provided homes to about 2,000 settlers." These settlements were known as *Radif* or *Malakiya*, and were constructed in rural areas, where each settler was given a piece of land and farming implements; settlers were not supposed to desert the settlement (Sikainga, 2000, p. 28-9). It is notable that these settlements were located largely outside of the central riverain zone—far away from Khartoum and Gezira. The downstream riverain zone—north of Khartoum— characterised by private ownership of land, hosted none of these settlements.

The other form of influencing the landscape, the most relevant to this paper, took place during the earliest years of the British occupation—a process to which Mustafa Babiker (1998, p. 210) refers as “villagisation”. Referring to the case of the Dar Hamar (in the western district of North Kordofan), he notes,

[A]part from the Hamar ruling families’ headquarters and the *aghrāb* (non-Hamar groups), village dwelling was not the basic form of settlement in precolonial Dār Hamar. The predominant mode of livelihood—transhumance—in Dār Hamar, and its associated form of exploitation of widely dispersed natural resources dictated by the prevailing semi-arid climate, conspired (in part) to render the *arit* (i.e. isolated homestead) the preferred form of dwelling (Babiker, 1998, p. 203).

Against this background of scattered homesteads, the British had a new arrangement. According to Babiker (1998, p. 204), “in 1905 the government began a systematic regrouping of *arits* into villages with the institution of property rights in land intelligently articulated in the process.” Following this was the policy of tribal pacification and amalgamation, which implied the regrouping of different peoples together under the umbrella of one tribe with its supreme leader known as the *Nazir Umum* (for details see Al-Karsani, 1985). This process of constructing tribes resulted in the creation of territorial borders between tribes and the connection of large groups of the population to specific villages, which served as “headquarters” of the different tribes. In these headquarters, as well as in other villages, pastoralist groups increasingly became sedentary.

The British administration supported the process of sedentarisation as part of its policy of encouraging the cultivation of cash crops (Babiker, 1986, p. 388-90). In West Sudan, this encouragement became possible only through the provision of rural water supply. The sedentarisation policy continued throughout the decades of British rule, clearly disrupting the historical adaptation methods, which communities in these areas pursued. However, despite the disruption caused by the integration of local economies into the market economy during the colonial period, it seems that some of the most water-scarce areas in the Sudan witnessed a sustainable sedentarisation process. In our understanding, this may be attributed to the role of the existing effective local institutions and effective land-use rules, together with increased income of local groups from gum arabic and, importantly, maintaining their dependence on millet, which served both as a nutritious food source and as a stabiliser of the local ecosystem.

The strategic goals of the British administration were achieved, as the increased water supply did accomplish a significant level of sedentarisation. For the British, the potential of West Sudan could be realised only through rural water supply. The increased water supply during this era probably lessened the bottlenecks that might have occurred as a result of the increasing population of both humans and their herds. The regions of West Sudan appeared developable and a positive climate did prevail. The number of tribal conflicts during the British era decreased significantly. Water

sources development seems to have achieved peace, besides the economic and strategic reasons that were originally behind the British water constructions in West Sudan.

4. Rural water supply during the post-independence era

The post-independence governments, for some time, walked in the footsteps of the British. For these post-independence governments, rural water supply was crucial for incorporating the western regions, and maintaining this supply continued to be the major guarantee for this incorporation. Phrased more strongly by Shepherd and El Neima (1981, p. 14): “Through the provision of water the government can maintain the legitimacy of the West’s incorporation in the nation.” This provision of rural water actually proved efficient and governments, as Table 1 suggests, seem to have maintained it steadily (see Babiker, 1986; Davies, 1984). Thus, by the year 1978, there were 1954 water yards and 747 ponds (calculated from Table 1 and Table 2) in the whole country. The share of the western regions was 59 percent and 42 percent, respectively, of the total available for the entire country. A significant part of these water sources were constructed during the transition to the self-rule period (1953-1955), leading to independence, and the first five years following the declaration of independence. Hence, the period between 1953 and 1960 witnessed the building of 700 water yards (each with storage tanks, watering troughs, and taps for domestic use), as well as ponds, of which there were 470 by 1960 in the clay plains, while in the sandy areas, drilled bore-holes were constructed with diesel-driven pumps for lifting water (Wallach, 1989, p. 145). In light of the figures in Table 1 and Table 2, this period had witnessed the construction of 36 percent of all the water yards and 63 percent of all the ponds that were constructed between 1947 and 1978. If we ignore the lack of planning for water development, the governments that came to power during this period have no doubt paid greater attention to rural water supply.

Following the late 1970s, the central governments probably continued to provide rural water to West Sudan until today; however, only to meet some needs and not in view of a significantly growing population of herds and people. Abduljabbar Abdalla Fadul (2006, p. 42) sees that, “The situation of drinking water in Darfur has improved substantially.” This, in his view, is due to:

- Continuous efforts of the Government in investing in water in Darfur since 1984.
- The Government has encouraged the private sector to invest in water resources, so many water sources are now operating privately in most parts of Darfur.
- The international assistance for water provision in Darfur was substantial especially after the 1984/85 drought. As an example, UNICEF of the United Nations under its Water and Sanitation Project (WES) has drilled and installed over six thousand water hand-pumps in thousands of villages in Darfur. This made millions of cubic meters of drinking water available for

humans and small animals. Some studies revealed that hand-pumps in North Darfur led to increased animal population, especially sheep and goats.

- WFP in North Darfur for example has constructed over forty *hafir* (wells) and dams between 1999 and 2002 and this in turn has contributed effectively to solve the problem of drinking water for human and animals.
- Other international organisations have also provided considerable assistance in the field of drinking water provision of assistance in the water sector with the contribution and participation of the grass root beneficiaries (Fadul, 2006, p. 42).

In the section to follow, it will be argued that the seeming involvement of the government in rural water supply, in fact disguises a history of marginalisation and a distorted, inadequate water supply, which has contributed to current conflict in West Sudan. Compared to real needs, and in view of the human and herd population, the governments almost completely abandoned West Sudan.

4.1 Abandoning West Sudan: state of rural water supply since the late 1970s

Since the late 1970s, the central government seems to have abandoned West Sudan with regard to rural water supply. Despite the fact that the populations of both people and animals in the pastoral and agro-pastoral sectors of West Sudan were witnessing an increased momentum, the rate of water supply sources that were constructed during post-independence began to dwindle. Within the span of two decades, i.e. between 1956 and 1978, as Table 1 and Table 2 show, West Sudan's share in newly constructed water sources witnessed a clear decline. The share of West Sudan in *hafirs* declined from 66 percent of the total number of *hafirs* constructed in the whole Sudan during the period 1947-1956, to 62 percent of those constructed during the period 1956-1965, and then to 49 percent of those constructed during the period 1965-1978. Similarly, the share of West Sudan in water yards declined from 61 percent of the existing water yards in the year 1966 to only 42 percent of water yards that existed in 1978. As Shepherd and El Neima (1981, p. 15-7) note, this decline was mainly borne by the two semi-arid and arid provinces of Northern Kordofan and Northern Darfur.

In contrast to West Sudan, the share of *hafirs* constructed in east and central Sudan regions increased steadily. The shares of the former increased from 14 percent to 17 percent and then to 21 percent, while the share of the latter increased from 20 percent to 21 percent and then significantly to 29 percent for the same periods mentioned above.

With regard to the numbers of water yards, the share of the central region increased from 27 percent of all water yards that existed in 1966 to 49 percent of those constructed during the period 1967-1978. The shares of north, east and West Sudan declined; however with the rate of change of (-1) to the first, (+1) to the second, while the third, i.e. West Sudan witnessed a far much higher rate of change of (-21) percent.

Table 1: *Hafir* (small dam or pond) construction 1947-77

Region	1947-56	%	1956-65	%	1965-77/8	%	1947/8-77/8	%
East	33	14	41	17	57	21	131	18
Central	49	20	49	21	79	29	177	24
West	161	66	146	62	132	49	439	59

Source: Shepherd and El Neima (1981, p. 15).

Table 2: Numerical and % distribution of water yards by region, 1966 and 1978

Region	1966	%	1978	%	% change
North	6	5	78	4	-1
East	7	6	97	5	+1
Central	30	27	952	49	+22
West	69	61	827	42	-21

Source: Shepherd and El Neima (1981, p. 16).

Thus, in contrast to the claims made by Fadul above, the picture of rural water supply in the west has increasingly become grim. Since the 1980s, *hafirs* seem to have declined numerically or in terms of their capacity because of lack of maintenance, leading to a serious shortage in water supply (for details see Ali, 2003, p. 231-2). Darfur, for instance, only had 115 *hafirs* in the year 2003 (Ali, 2003, p. 231), dropping from over 260 *hafirs*. This means that a large number of these water sources had gone out of service. In one locality, namely Ad-Deain, Ali (2003, p. 240) notes that about 50 *hafirs* are currently out of service.

Hafirs in Darfur showed significant decline not only in numbers, but also in terms of their capacity to hold water. According to El Khazin (2002, p. 4), while writing about water sources in Darfur,

...the most stable reservoirs of water, which are the *hafirs* have suffered most in the cycle of nature-made and manmade catastrophes. A standard *hafir* either dug by earth moving equipment or developed in a natural depression, would have been designed to hold between 10,000 cubic meters of water to over 40,000 cubic meters of water. Due to the lack of periodic maintenance, these *hafirs* have suffered from the process of siltation (deposits of silt) as well as the erosion of their embankments, both contributing to the massive reduction in their holding capacity. A *hafir*, that used to hold adequate water for the 4-6 months of dry season, now would hardly suffice for 2 months of dry season and hence the fight for survival. Due to the reduction in rainfall by between 35% and 50% over 50 years, the increase in number of heads in the region from 13 million heads in 1974 to 42 million heads in 2000, and the increase in population from 6.7 million in 1983 to 9 million in 2001, the resources are way over stretched.

If anything, the above account clearly shows that the central government had significantly scaled down the rural water supply services to West Sudan and held back any possible funds that may have helped maintain existing facilities.

Fadul, as cited earlier, is probably right to point out an improvement in water supply in Darfur. However, this improvement is relative only to the sad condition of decline, which occurred in the 1980s. The most important question that needs to be addressed is whether “improvement” of water supply in West Sudan in recent decades remained favouring this region in terms of water provision for being the neediest, as was originally assessed during the British administration. A fair judgement of the water situation resides in what the region used to receive in the earlier decades and not what it has gotten in the latter ones. Any number of newly constructed water sources, of course, would count as improvement in view of the condition of severe decline in water supplies that preceded their construction. However, viewed in terms of the evolution of rural water supply in West Sudan, the governments’ contribution since the 1980s, if it did take place at all, remains insignificant as with regard to population and herd increase, the burden put on the economies of West Sudan and the significant contribution to the national budget.

If anything, the number of those involved in water provision, mentioned by Fadul, is a clear indicator that the situation has gotten progressively worse for many years. Leaving it almost completely to the private sector is a significant withdrawal on the part of the government from providing basic services that, in the past, not only exemplified the state commitment, but also provided it with legitimacy. The private sector may be effective in providing rural water; however, it has always sought the bigger margin of profit. It, therefore, might not venture into remote sandy areas, which are costly for water tankers; the thing that makes the price of the water delivered very high, possibly too high to afford by impoverished rural communities.

Efforts by UN agencies, other international organisations and humanitarian aid agencies provided no sustainable alternative as Fadul might assume; “Care International, Oxfam UK, Talisman Energy and others have attempted to improve the conditions and a number of *hafirs* in areas of interest for them, but with little or insufficient impact on the conflicts” (El Khazin, 2002, p. 4). Most importantly, however, is that the water sources constructed as part of humanitarian aid were not part of a national plan. In fact, many, if not all, of them were, understandably, constructed hastily as “first aid” to save lives; not in view of serving for longer periods; and therefore, are not sustainable. Additionally, these water sources, though constructed with good will, may cause losses to both the communities and local ecosystems. As new sources, they cause the abandoning of the old water sites deemed most suitable according to the feasibility studies conducted in the pre-1980s periods, including the British administration’s rural water supply projects. Moreover, by causing the abandoning of the old watering sites, the new ones may cause the dehydration of the vegetation and the small-scale horticultural farming that sprang near some of the old watering sites.

Most importantly, in particular with regard to the security situation in West Sudan, it is not clear from Fadul's accounts whether the water sources constructed are reasonably distributed across the expansive region of West Sudan and whether sedentary and pastoralists are served equitably. The interventions Fadul mentioned had possibly served humans and small animals best; however, the tribal conflicts in Darfur are largely about the involvement of big herds of big animals. Thus, the picture is not equally the same everywhere with regard to delivering or constructing water sources, both by the private sector and by humanitarian aid agencies. This unplanned construction of water points, or delivery of water through tankers, may repeat the same old scenario of concentrating water supply in specific areas, while excluding others, as will be discussed later. In fact, there are areas which received little support or none. El Khazin (2002, p. 4), continuing the discussion on water sources, notes that

One specific area that suffers most is the area of Jebel Marra, the heartland of the Fur tribe. The Fur and their Kingdom of Darfur were an independent and sovereign state until 1916. The nomads pass by this high, fertile and prosperous area from both the north (Bideiyat, Zaghawa, Masaleet) and from the south (Bani Halaba) and in process and *in the absence of fodder and water, invade the "Hakourat" or agricultural plots.* (Italics added).

The area of Jebel Marra was apparently left to its own natural water endowments, despite the significant changes in its surroundings. The ecological changes in the region at large had actually led to the significant decrease of the once abundant waters flowing down the slopes of some parts of the Jebel Marra plateau, where these waters presented a source that had met the needs of diverse communities of farmers and pastoralists in earlier decades. The decline, and ultimately the subsiding, of these flowing waters had been observed some decades back. However, this subsiding apparently did not signify to policy makers a problem to address in connection to water availability in Darfur.

5. A promising water resource development stopped short: origins of current conflicts in West Sudan

In this section, it will be argued that the evolution of the rural water supply system, described above, has generated environmental problems (see Al-Awad et al., 1985). The problem that needs to be addressed is actually present in the loss of water sources, mainly in the northernmost areas in West Sudan. This loss of water sources is, ironically, the result of rural water development in this zone; an incomplete rural water development where the state stopped short of continuing with the programme of rural water supply.

Water availability or scarcity in West Sudan was not a direct cause to conflicts in this vast region. However, there is ample evidence that water availability acts as an intermediate cause of current conflicts. The supply of rural water has contributed to

dramatic population and herd redistribution, ultimately leading to people and herd concentration in limited areas of West Sudan. The long-run consequences of this have been severe environmental degradation, decreased agricultural land productivity, food insecurity and, ultimately, population out-migration and settlement in areas that are presumed to have enough resources for the migrant as well as the host communities. This section will argue that the collision between migrants and host communities under the condition of declining rural water supply represents the direct cause of current conflicts in West Sudan.

5.1 The magnitude of environmental degradation in West Sudan

In terms of environmental degradation, the Sudan is facing the threat of total collapse of its ecosystems. Desertification and concurrent droughts have become phenomenal, though they have been the subject of debate for quite some time now. There is near consensus among scholars that the most serious environmental problem in the Sudan is centred on drought and desertification (El Moghraby, 2003, p. 33; Hassan, 2002, p. 15), "All other signs of environmental degradation, such as soil degradation, challenges of biodiversity, climatic changes, etc. are highly related to drought and desertification" (Hassan, 2002, p. 15). It is noteworthy here that the problem of water scarcity at the 1992 UNCED in Rio was addressed under the concept of "drought and desertification" (Falkenmark, 1997, p. 30).

West Sudan suffers most from this environmental degradation. The desert moves southwards about six kilometres every year, with Northern Kordofan and Northern Darfur the most severely affected (Umbadda, 1981, p. 105). H.F. Lamprey in 1975 presented an alarming picture of desertification in *Report on the Desert Encroachment Reconnaissance in Northern Sudan*. Lamprey (cited in Helldén, 1988, p. 8) states, "It is evident that the desert's southern boundary has shifted south by an average of about 90-100 km in the last 17 years."

Ulf Helldén (1988, p. 11), reviewing research contributions on desertification in Northern Kordofan, disagrees with the thesis of desert encroachment. He notes that although drought did severely impact crop yield during 1964-74, there was no creation of long-lasting desert-like conditions from 1962 to 1979 in the area of the magnitude described by many researchers. In his view, what seemed to be the desert encroaching south is, in reality, the creation of localised deserts on the southern fringes of the Sahara through claiming shrub and forest lands (Helldén, 1988, p. 11).

Large tracts of land are giving way to desertification largely due to human intervention. As Table 3 suggests, within the 42 years starting in 1956, forest cover decreased to a mere third of what it had been, with even faster depletion in recent years. Table 3 also indicates that while the average annual change was 0.5 percent for the period 1956-1990, it jumped to 0.87 percent for the period 1990-1998.

Table 3: Rates of forest depletion in the Sudan

Years	Forest cover as % of the total area	% 1956 as of the base year	Average annual change*
1956	36	100	
1990	19	53	0.50
1998	12	33	0.87

Source: Kamil Ibrahim Hassan (2002, p. 10). * Author's calculations

This creation of localised deserts was the result of territorialisation, expansion of cash crop areas at the expense of pasturelands and seasonal herd passages, and the state policies' squeezing of traditional farmers at the local village level. Negligence and failure to use underground water for enhancing productivity of farms, and for rehabilitating the vegetation zone, also played an important role in localised desert creation.

5.1.1 Decreased food production in Northern provinces of West Sudan

One severe effect of the described desertification is the decline in food and meat production that enforces the decision to migrate, or causes localised displacement of groups; "Food production has declined and continues to decline because of soil deterioration associated with desert encroachment and because of loss of land, especially land buried by sand" (Helldén, 1988, p. 8). Areas where economic activity is maintained through irrigation of gardens, rainfed agriculture and animal husbandry, such as the oases in Bara District, North Kordofan, are, "today threatened by moving sand dunes that virtually bury the oases" (Haaland, 1980, p. 21). The above processes have led to the collapse of the desert ecosystem, and economic activities therein, and induced significant rates of sedentarisation and migration by nomadic groups in particular (El Zain, 2007). Below, the real causes behind desertification and its consequences, which have led to food insecurity in the Sudan, shall be investigated.

5.1.2 Tracing the causes of environmental degradation

The process of desertification in the Sudan went on for quite some time before anyone recognised its real causes. It had been attributed to natural shifts in rain and wind patterns. Being crossed by the Sahel zone, Sudan is particularly vulnerable to desertification. According to Ibrahim (cited in de Jong-Boon, 1990, p. 356), the, "main causes for the desertification of the Sahel are over-cultivation, overgrazing, and excessive clearing of forests, which leads to their destruction. Man uses the land without [regard for] the relatively small potential of this tropical region." In his view, the Sahel zone is, in fact, overpopulated, though its average population density is less than 10 inhabitants per square kilometre. This he attributes to two factors: the first is

that the population is concentrated in regions where the supply of drinking water is secured; and the second is that soil productivity is low. In Ibrahim's view, the destruction of the yield capacity of the soil inherent in population concentrations around watering places was further accelerated by the settling of nomads after the beginning of the twentieth century (see also Ahmed, 1987, p. 138). Sharing these concerns, Mohamed Salih (1999, p. 58) notes that the national stock herd in the Sudan is concentrated on less than 30 percent of the total grazing lands in the country. This particularly applies to West Sudan, where the degree of herd concentration is exemplified by the expansive territories of Kordofan and Darfur, which until 1978, were dotted with only 827 water yards (Table 2) and 439 *hafirs* (Table 1). What made things worse, is that the number of watering points are actually decreasing or deteriorating, as discussed earlier. In other words, desertification was largely the result of ill-planned and biased policies of rural water supply.

State policies for increasing rural water supply contributed significantly to deforestation. Soil compacting and deforestation became serious around water points, especially following the "anti-thirst campaign" in the 1960s. Sand dune movement helped accelerate the rates of desertification (El Moghraby, 2003, p. 31). The situation was exacerbated by the fact that, "no management unit or ethnic groups in a given area can strike an optimal balance between pasture resources and number of animals. The concentrated distribution of water sources has been a very important factor leading to overgrazing" (Ahmed, 1987, p. 138). It could be said that the new concentrated sources of water supply have resulted in sedentarisation on a relatively smaller scale, primarily determined by water availability or accessibility. At the local level, this sedentarisation has become the principal cause of deforestation, thus leading to the creation of localised deserts. The most significant damage as a result of sedentarisation, however, was that it has affected some of the most important species in the semi-desert zone; namely the acacia trees and millet.

- Losing the acacia trees: The immediate impact on acacia trees had followed the construction of new villages that started to dot the larger regions of Darfur and Kordofan. Communities used acacia trees as building materials in the northern parts of these regions, not only because these trees are in relative abundance, but most importantly for their stronger timber. Thus, they used their small trunks or thick branches as *sha'aab* (pillars) to hold up the straw huts, as *kao* to make the grid upon which they fix the straws, and they used their roots to make *karas* to hold the *kao* together. Most, if not all, of the timber used in building a hut is from acacia trees. There is no doubt that by the time villagisation had taken momentum, larger numbers of acacia trees were cut down. The negative impact of sedentarisation on acacia trees, however, would not be felt before the 1970s, when these trees started to lose their economic value.

Sedentarisation might be the principal condition for deforestation, resulting in the creation of localised deserts. Other factors, primarily, the influence of the hegemonic culture—particularly what I refer to here as its “sub-ideology” of appreciating irrigated farming only, providing it with all forms of support — lead to the neglect of the rainfed sector. Despite reasons for encouraging sedentarisation, particularly during British rule, it has resulted in conflict between the plantation of cash crops, on the one hand, and *Acacia senegal* trees, millet and other subsistence crops on the other hand. This, in other words, is a clash between the centralised riverain zone and West Sudan. In this respect, the sub-ideology of appreciating irrigated farming has only contributed to exacerbate deforestation and make it structural, particularly in connection with changes in the “value” of *Acacia senegal* trees and millet.

A number of factors have, in fact, caused the decline of the *Acacia senegal* trees. These factors, according to de Jong-Boon (1990, p. 335), are, “climatic (drought), demographic (increasing human and animal population leading to clearance for agriculture and grazing), political (e.g. the abolition of native administration) and socioeconomic (farmers obtain low prices for the trees because government takes too large a share).” The share that the government took from gum producers was never reciprocated in any significant way. In fact, the government neither supported this sector against the predators, namely desert locusts, nor provided technology that might have improved the traditional tapping tools to improve productivity or to lessen the damage of the acacia trees. The most important outcome is the loss on the part of gum producers of a significant source of income, leaving them wholly dependent on farming and grazing, both of which contribute to environmental degradation. Keeping the trees standing was probably the best strategy that governments should have adopted in West Sudan. However, *Acacia senegal* trees that had been Sudan’s top source of revenue until the late 1930s, and ranked second until the late 1960s (El Zain, 2007), had increasingly lost value in a way that appears hard to justify. An ideology that conceptualises resource value in the Sudan, however, seems to be behind this irrational attitude towards the negligence of the second most important export good of the country: gum arabic— the produce of *Acacia senegal*.

The introduction of cotton – the “white gold” of the riverain elite – contributed, both directly and indirectly, to environmental degradation. The direct impact was through the capture of the central riverain region’s land for cotton, thereby overwhelming marginal lands in other regions with groups displaced from the captured lands. In West Sudan, the eastern and northern districts of Kordofan had received an influx of groups displaced from the Gezira and the White Nile provinces. The indirect impact occurred through the changing of the country’s priorities with regard to which crops to produce.

The *gum of Kordofan*, which used to top the exports list, suddenly became a mere supplement to the flourishing *cotton of the Gezira*. Gum was now only secondary and, as such, no longer received the attention it used to. The increase in the value of cotton devalued both gum arabic and the *Acacia senegal* trees that produce it. The modern cotton sector came under strict regulation and monitoring, and was subject to scientific experiments to determine the best methods for sustaining high output (Pollard, 1985), whilst the gum arabic sector, though structurally linked to the *modern* market, had to make do with *traditional* regulations still riddled with *pre-modern* imageries. This represents a typical shift from forest-value to plantation-value, where in the modern logic, the latter historically “conquered” the former – increased commercialisation through assigning market value and need for cash.

Because of their soil-improving and stabilizing qualities, these trees provide the key to the prevention of desertification (de Jong-Boon, 1990, p. 335). Their decline is catastrophic to West Sudan because it was in this region that they covered the largest tracts of land. Given their contribution to the traditional rural water sector, it is safe to argue that the decline of these trees had made it too difficult for communities to resume their traditional well construction, especially when the modern system failed.

- Abandoning Millet: A similar process of commercialisation allowed sorghum, grown mainly as a cash crop, to marginalise millet (the staple food of people in West Sudan). Abandonment of millet is observed by a number of scholars (see e.g. Abdelkarim, 1992; O’Brien, 1985; Umbadda, 1981). Replacement of millet by sorghum has been part of a process which structurally involved rural areas in meeting the demands of the urban population as well as the international market for oil seeds, meat, etc. The expansion of capitalist agriculture gave birth to yet another contributing factor to the depletion of the environment by the way it generated the need for cash and structurally linked rural producers to it. In addition to turning those who once had land into rural landless, the colonial mode of production integrated small-scale peasants and nomads into the market economy through the imposition of a tax system, which forced them to seek cash-generating activities to pay their dues (Al-Karsani, 1998, p. 180; O’Brien, 1985, p. 27-8; Umbadda, 1981). This essentially meant a further expansion of cultivated areas beyond what was necessary for subsistence needs. Referring to the Khuwei-Mazroub area in northern Kordofan, Umbadda (1981, p. 112) states that the opening of new land for growing cash crops, in addition to charcoal activities, added greatly to the removal of the vegetation cover of the area, which was already seriously over-grazed by the increased herds. Shepherd and El Neima (1981, p. 11) note that the area cultivated in the fragile sandy-clay soils of northern Kordofan increased from 1.5 million *feddans* in 1961 to 5 million in 1977.

Greater need for cash also affected the complementary and protective nature of crop diversification. In the 1970s, farmers abandoned the cultivation of millet because it was too labour-demanding and vulnerable to birds, and as such, deemed unprofitable under the new market regime. In the past, farmers cultivated millet beside sorghum, as the former protected the latter from parasitic weeds (O'Brien, 1985, p. 28). However, millet was increasingly overtaken by falling market value (for details see O'Brien, 1985, p. 28) and farmers ultimately abandoned producing it on the scale they used to. Thus, the ecosystem-balancing crop was abandoned in favour of the weed-vulnerable, ecosystem-degrading sorghum. Moreover, as yields of the latter dropped, more land had to be claimed/captured and, as a result, more trees were felled. The ensuing deforestation of ecosystem-sustaining trees, such as *acacia*, meant an accelerated degradation beyond logging and clearing for agriculture. The dynamics of cash crop introduction also led to a decline in the number and size of protectors, and an increase in predators and settlements.

West Sudan was overwhelmed by the production of cash crops and meat for export to the powerful regions of central Sudan and to the international market. This export was not reciprocated by adequate infrastructure necessary for the sustainability of the cash crop and meat sector. By the mid-1970s, animal herds increased dramatically, while the development of the necessary infrastructure was slowing down. From the mid-1970s until 2001, herds more than tripled in West Sudan, while the rural water infrastructure was deteriorating as discussed earlier. Climatic changes have worsened this situation; "Due to the reduction in rainfall between 35% and 50% over 50 years, the increase in number of heads in the region from 13 million in 1974 to 42 million in 2000, and the increase in population from 6.7 million in 1983 to 9 million in 2001, the resources are way overstretched." (El Khazin, 2002, p. 4).

The water crisis that occurred because of this deterioration and climatic change is hard to address by communities alone, primarily due to the fact that these communities have become almost totally dependent on facilities constructed by the government, or facilities that could be constructed by private companies. The latter was too difficult to afford, given the increased poverty that communities have started to experience in recent decades.

6. The nexus between rural water supply and conflicts in West Sudan

In his reference to water supply, which was cited earlier, Fadul (2002, p. 42) notes, "water in Darfur is not one of the elements causing conflict between the stakeholders." I beg to disagree with Fadul. Alternatively, I would like to advance the following

argument: environmental degradation, as the result of concentration of water sources, has an indirect impact on communities inhabiting semi-arid regions by decreasing their traditional self-help capability to augment their water supplies, therefore, making them almost completely dependent on governments to provide water services. It has also a direct impact, namely forcing the communities to move out of their homelands and seek other water sources. Both the indirect and direct impacts contribute to conflicts among communities in West Sudan.

6.1 Dependence on government for rural water supply

The introduction of modern cement-built and artesian wells had significantly decreased the importance of *acacia* trees in connection to water source construction. This, among other factors, contributed to significant decrease in their numbers, or even their total disappearance from some areas, ultimately making it fruitless for local communities to continue to dig wells by themselves. Forest and shrub degradation has increasingly made communities dependent on modern wells. Some communities had, due to dependence on these modern wells for decades, lost their traditional skills of excavating and building wells. Additionally, dependency on modern state amenities has actually changed the symbiotic relationships among communities. Sedentary communities hosting the modern water facilities have increasingly developed a sense of ownership of these facilities, excluding nomadic communities from service. Conflict among communities, hence, arises from the weakened symbiotic relations among them.

6.2 Moving out in search of water

The failure of the government to maintain existing wells and to dig new ones to meet the needs of the increased inhabitants and their herds, especially in the arid and semi-arid regions, paralyses the communities inhabiting these regions. Losing their traditional well-construction skills, combined with the lack of necessary resources, these communities, in most cases, are left with only one option – moving out and seeking new water sources. The most important thing to mention in connection with the increase in population is that under conditions of water scarcity, it induces migration which, in turn leads to population concentration in localities where water is more accessible than in other areas. No doubt, the decline of water supply, particularly in the arid and semi-arid provinces, had prompted movement of larger groups to the southern provinces of Darfur and Kordofan in search of better access to water sources.

A useful classification of the geographies of conflict (and possibly their scale and intensity) into three centres is due here. According to Tag El Khazin (2002, p. 2), in the West Sudanese regions of Kordofan and Darfur, there are different geophysical and demographic centres of conflict, where the latter occur due to the struggle for renewable resources and traditional enmities. The first centre, in his view, involves

south Kordofan and south Darfur, where pastoral nomad tribes (of Arab origin or identifying themselves as Arab) of the Rizaygat, the Misiriyya, Humr, and the Habbaniyya live. These tribes are cohabited by other smaller Arab tribes such as the Hawazma, and Aulad Hameid; and tribes of African origin, including the Nuba to the east, and the Fallata, Masaleet, Beigo, Birged, Maalya and Gemir to the west.

The second centre, in the middle-belt of West Sudan, houses the Hamar, Manasra, Kababish, Bidieriya, Kawahla, Ziadiya, Bani Garar, Dar Hameed, Miheirya, Eriegat and Bani Hussien. In this centre, there are hardly any tribes of pure African origin that may ignite conflicts on ethnic grounds.

Finally, the third centre, which he describes as the hotspot of conflict, lies westernmost of West Sudan,

where conflicts are not only between Arab and African designated tribes, but between African and African tribes as well. The center houses the large and entrenched tribe of the Fur, in addition to the Dagu, Masaleet, Zaghawa, Berti, Guraan, Tungor, Bergid (north) and Meidoub tribes as ethnic African. It houses as well the powerful and well-armed Arab tribe, the Bani Halaba. Other nomadic tribes from the southern and central centers roam up and down with rains along “*Masarat*” or designated passages and enter into frequent and bloody clashes with the indigenous and settled inhabitants of this region. Most of the Chad-Chad conflicts and Chad-Libyan conflicts [were] fought in or from this region.

The above three centres of conflict can be described as interaction systems, where each is reshaped by the history of interactions between its’ inhabitant groups, specific internal factors, and the external factors that frequently intervened with the system. Thus, in the same manner that competing groups engage in conflicts, they also convene to find solutions to these conflicts. In some periods, conflicts were probably easier to solve than in other periods. This, at least, applies chronologically, where, generally speaking, in the pre-1970s era, conflicts were easy to solve as compared to the decades that followed.

All nomads move up and down with the rain. Due to competition over grazing land and water and due to the lack of mechanisms to articulate and regulate sharing, personal conflicts occur that would more often than not lead to tribal fighting. Before 1969, such tribal fights were successfully contained through traditional mechanisms called (Judiah). Elders from both sides of the conflict would meet, debate, investigate and then decide who started the offense, what are the losses in lives and wealth, and decide how to resolve the conflict. Normally both tribes abide with the resolution. One of the possible objectives of a diagnostic study would be to analyze why this pattern has changed. (El Khazin, 2002, p. 5)

In an attempt to address the puzzle of why the pattern of abiding by solutions reached by communities has changed, it can be argued that the ecological changes in West Sudan, associated with the deterioration in rural water supply, have disturbed the *masarat*, where groups started to change directions in search of water sources. This

change of *masarat* may have resulted in migrating groups encountering newly settled and other migrating groups with whom they did not share established symbiotic relations; thus, the lack of an understanding to address conflicts smoothly and effectively. It is safe to argue that communities in each centre of conflict had historically engaged in conflicts; however, they had developed the social capital, the channels, and the language through which to address these conflicts. Any significant disturbance to the existing arrangements and balance of power among communities, such as the coming of new groups and possible new alliances resulting accordingly, would disturb relations among communities of the “centre of conflict”. It is also safe to argue that communities losing the ground of symbiotic relationships have become increasingly vulnerable and ready to strike alliances with other communities that share the same feeling of vulnerability. This is likely the cause behind new ethnic alliances and the construction of, and resorting to, ethnic identity in general. The cause behind all these, therefore, was the stopping short of the development of rural water supply in West Sudan—put in other words, the distorting of the traditional water management institutions in West Sudan and failure to sustain the modern institutions which displaced them. The question will then become: *why did post-independence governments stopped short the effective rural water supply to West Sudan, which was considered the neediest among Sudanese regions?*

7. Power, ideology, and the evolution of rural water supply in West Sudan

The solution to current resource conflicts in West Sudan resides largely in the resumption of the rural water supply programme. This section will address why this programme stopped in the first place and why governments did not want to resume it.

Conflicts in West Sudan are simplified by attributing them to immediate causes – causes that are apparent to grasp, namely drought and desertification, which took place in recent decades and for which enough evidence is provided that these causes were originally triggered by the concentration of rural water supply. Most recently, however, the crisis in Darfur has been attributed to the most current fashionable cause – climate change.

Generally, such explanations of the causes of conflict in Darfur do not only simplify the conflict, but also provide governments with an excuse for the atrocities they commit. In fact, if we go deeper into questioning the crisis in Darfur, we may find political and ideological causes to the conflict that also help answer the question of why central governments had undermined the rich resources of West Sudan, despite this region’s significant contribution to national income. Why did the elite fail to create a robust national economy through recognising the enormous potential of West Sudan? Why was the enormity of the economic potential of West Sudan met with negligence of this region? Why was it classified as a poor region with an insignificant contribution to national income and deemed not worthy of investment? Is it the

competition among ruling elites and their struggle for power that undermines the economic potential of West Sudan?

7.1 It is not worth it to continue the rural water supply for West Sudan!

In the remaining part of this section, it will be argued that rural water supply was clearly used by ruling elites to politically influence social and political dynamics in West Sudan. The Umma party, which headed all post-independence democratically elected governments, saw in West Sudan valuable electoral constituencies, while military regimes saw in the west their enemy in as far as it brought power to the Umma Party. Thus, generally speaking, while West Sudan did “benefit” from the policies of Umma Party-headed cabinets, it was punished by military regimes through its gradual dehydration. Rural West Sudan, in this respect, was a victim to its political bias, being predominantly a constituency of the Umma Party. The latter had headed democratically elected governments since 1956, and always lost power to military officers who always saw in it, and as a corollary its supporters, the real threat to their military regimes. The military governments, which were largely dominated by riverain elites with an economic bias to irrigated agriculture, saw in the west a region with no resources worthy to develop. It is not surprising, in this respect, that the first military government had cancelled the Omdurman-Fasher project, which was conceived in the last years of the British administration, as well as other major projects designated for West Sudan, including the construction of the University of Kordofan. Believing in maximising the benefit from existing infrastructure around the Gezira Scheme, the Abboud military government had brought to an end the Omdurman-Fasher project, which could have led to the rise of numerous watering points that would have sprung along the east-west extending road, traversing a significant portion of the *masarat* of migrating tribes. It is also not surprising that the second military government ignored this road. Equally not surprising is that the current military regime had, in the name of that very road, collected contributions from the people of West Sudan (who had been selling their subsidised sugar quotas on the black market), only to reallocate the contributions collected to serving other regions. Over 50 years have elapsed since the Omdurman–Fasher road project was conceived, and until this moment, it remains incomplete.

West Sudan was, in fact, valued only politically by ruling elites; in other words, the elite were very aware of the role that West Sudan would play in national politics. Thus, while for the democratically elected governments West Sudan was a political asset that needed to be maximized in the form of representatives in parliament; for the military regime, West Sudan represented a threat that needed to be permanently stemmed by all means. The most comfortable means was to declare it undevelopable, that it had no economic potential, its resources no economic value, and, thus, exclude it from large funds that might help it actualize its enormous economic potential. The concept of large-scale projects that the military regimes entertained – their

authoritarian economic revenue-driven development – left no room for small farm-development projects that suited West Sudan. Thus,

The original bias in favour of investment in the west during the colonial period, *perceived as the most needy area, as it still is commonly perceived*, has been scaled down, arguably because of the political dominance of the central area of the country during the post-colonial era when the Sudanese class structure has been the prime influence on investment decision-making (Shepherd and El Neima 1981, p. 15, italics added).

It was mentioned earlier that significant rural water sources were designated to central Sudan. However, in the period following independence, accelerated rural water provision only took place in the richer regions; those which already had relatively better water supply systems; “In terms of the distribution of water, the coming of the national politics to the Sudan has favoured the central area of the country – an area already favoured by its rivers” (Shepherd and El Neima, 1981, p. 15). This trend actually shows a concentration of political and economic power in central Sudan, despite the claims of decentralisation that governments very often masticate.

Inherent to this new bias towards Central Sudan are political (partisan) and sectoral (ministerial) competition between this region and the West Sudanese constituencies. On the one hand, while the Umma Party tended to favour West Sudan and other regions with similar economies, the military regimes largely favoured Central Sudan, primarily by advancing economic feasibility of the projects to be constructed. Agricultural policies had largely reflected the conflicting political positions of the two political blocks. The Umma Party had opted to create a full-fledged ministry to take care of the traditional pastoral sector; while the vested interests in Central Sudan, which often coincided with the interests of the military regime, had stood against the creation of such a ministry and instead, prioritised the ministry that would take care of irrigated agriculture.

Thus, the year 1965, as Shepherd and El Neima (1981, p. 24) note, witnessed the establishment of the Rural Water and Development Corporation (RWDC) with the goal of carrying out the first Anti-Thirst Campaign outside the irrigated and riverain areas of the country. The three years to follow witnessed a significant increase in rural water supply facilities; on average about 33 *hafirs*, for instance, were constructed annually. “Drawing on funds donated by Sweden, Great Britain, Egypt, Yugoslavia, Czechoslovakia, and Italy, the Sudanese government launched three annual “anti-thirst campaigns” between 1966 and 1968 to dig more than one thousand shallow wells, to drill and equip almost five hundred new water yards, and to excavate another hundred ponds” (Wallach, 1989, p. 145). This increase was justified by the fact that the government of the day received most of its support from beneficiaries from these facilities; “Significantly, under a government dominated by the Umma Party with its support coming from pastoral and semi-pastoral areas of the country (Darfur, Kordofan, Blue Nile Province), the RWDC was placed under the Ministry of Animal

Resources” (Shepherd and El Neima, 1981, p. 24). No doubt, this was in recognition of the importance of the traditional sector and the necessity to develop it.

Under the revolutionary May regime, this recognition seemed to sustain. During the first years, the increase in *hafirs* was even faster—about 50 new *hafirs* per year until 1978 (Table 1). This increase reflects real needs of real populations. However, most of the *hafirs* seem to have been constructed in the good days of socialist zeal. Heinz-Ulrich Thimm (1979) notes that between 1967 and 1972, “the number of wells in the west increased fourfold.” Under the May regime, the RWDC and the Cooperatives Department were merged to form the Ministry of Rural Development and Cooperatives (MRDC), “with a view to integrating peripheral areas of the country more fully into the national economy, using an old carrot – water supplies – as well as a new package – rural development.” Given the mixed economies of these regions, the placing of the RWDC under the Ministry of Animal Resources was probably a fair decision, and likely more genuine than creating a separate ministry. However, the fact that the ministry charged to enhance agriculture in all its sectors, in irrigated and rainfed sectors alike, interestingly, would undermine this move.

According Shepherd and El Neima (1981, p. 24) the ministerial status bestowed on MRDC, “was clearly threatening to vested interests (e.g. the Ministry of Agriculture) operating mostly in the powerful riverain areas of the north, and the Ministry [i.e. MRDC] was disbanded in 1974.” Later, rural development was reduced to a section in the Soil Conservation, Land Use and Rural Water Planning Agency (SCLURWPA), a division of the Ministry of Agriculture whose budget was slashed every year to the point that it could no longer carry out new works and had to reduce staff drastically (Shepherd and El Neima, 1981, p. 24). Comparing the staffing of this division to the “proper” divisions in the Ministry of Agriculture may bring striking results. West Sudan and similar rural settings in the country at large were abandoned. Sectoral interests, reflecting those of the population in the downstream riverain zone, clearly obstructed the philosophy that should have uplifted the status of thousands of rural households in West Sudan, especially if rural development associated with rural water supply had had a supplemental irrigation³ dimension.

The rural water supply programmes also created disparities at the local level in West Sudan. Political representation in association with certain constituencies, as Shepherd and El Neima (1981) may argue, actually generated water scarcity in rural areas. In West Sudan, local power relations also determined which areas would benefit significantly from central government water supply programmes and which would get less or none. Many areas rich in pasture continued to be water stressed, while many others with poor vegetation had more livestock watering points.

³ Supplemental irrigation refers to the use of underground or stream water to bridge a serious dry spell to help rainfed crops in drylands ecosystem survive (SIWI, 1999, p. 13).

7.2 Infrastructure as discriminatory criteria undermining the economic potential of West Sudan

Cancelling the projects assigned for West Sudan (mentioned earlier), the first military regime chose to construct new agricultural schemes in the proximity of the Gezira Scheme. The infrastructure thereby operated as a discriminatory criterion among regions.

The infrastructure, operating as a discriminatory criterion among regions, is best reflected in how the central government allocates development grants. Thus, if we look at government development grants to regions, which often included a package for water supply, a striking bias towards the “enriched” regions becomes evident in contrast to the “impoverished” ones. “When revenue allocated to the regions is related to their population size”, as Table 4 shows, “the Northern Region came out as the most favoured, followed by Central, Khartoum, Eastern and Kordofan, with Darfur ranking last” (Fadlalla, 1986, p. 217). It becomes more striking when we see the criteria for allocating the central government funds. These are (i) the degree of relative backwardness; (ii) population size; (iii) measure of tax effort; (iv) special locational and social characteristics; (v) commitment to major national schemes (contribution to GDP); and (vi) habitable area (Fadlalla, 1986, p. 221).

Table 4: Revenue allocated per capita, 1983/84 (£S)

Region	Allocated revenue	Population	Revenue per capita
Northern	52,000,000	1,083,024	48.0
Eastern	37,000,000	2,208,209	16.8
Central	72,000,000	4,012,543	17.9
Kordofan	47,500,000	3,093,294	15.4
Darfur	38,000,000	3,093,699	12.3
Khartoum	31,000,000	1,802,299	17.3

Source: Fadlalla (1986, p. 217).

Relating this to actual allocations, a clear mismatch manifests. Giving a weight value of 40 percent for degree of backwardness, 30 percent for size of population, 10 percent for tax effort, 10 percent for locational and social characteristics, 5 percent for contribution to GDP and 5 percent for habitable area, Fadlalla (1986, p. 225) points out this bias. According to him, if criteria were applied soundly, “the Northern Region, though relatively poor, is less competitive for help on other grounds and hence would have suffered a remarkable 36 percent reduction in its grant. Similarly, the Central Region would have had a reduction of 27 percent.”

From the above, we may observe that the larger the share of the pastoralist sector in the economy of a region (or, to be more precise, the larger the herd of a region), the more neglected the region or the less development funds it received. As Table 4 and

Table 5 indicate, the largely pastoralist regions of Kordofan and Darfur received a revenue of less than 16 Sudanese pounds per capita, the Eastern Region received more than 16 pounds per capita, and the richer irrigated regions of Central and Khartoum received more than 17 pounds per capita. The Northern Region, receiving 48 pounds per capita, remains an odd case. Even the above empirical criteria shows the width of disparity and bias of development policies towards the irrigated regions. A clear bias to these irrigated regions, whose per capita share ranges between 17 and 48 pounds per capita, while that in the pastoralist regions were between 12 and 17 pounds per capita, is presented in Table 4.

Table 5: Growth in human and livestock population and crop areas within Sudan's central belt 1973-2007

Region	Human population (million)		Livestock population (million)		Crop areas (million ha*)	
	1973	2007	1973	2007	Average 1971-1976	Average 2003- 2007
Khartoum	1.096	6.506	0.506	1.310	0.01	0.08
Central	3.623	8.079	7.031	31.603	1.64	3.48
Eastern	1.497	4.335	2.472	8.955	1.07	2.87
Kordofan	2.098	4.128	6.819	24.529	2.57	3.91
Darfur	2.077	7.198	11.039	30.374	0.94	3.23
Total	10.391	29.943	27.867	96.771	6.23	13.57
Growth (%) **	3.02		3.56		2.2	

* 1 ha=2.38 *feddans*. ** Average annual growth (%) -exponential for human and livestock population. Source: Faki *et al.* (2008).

However, looking more closely, we realise that the contribution to GDP is the area of controversy *par excellence*. The criteria applied assume that all regions get equitable input allocation. Whereas there are regions that benefited from receiving all forms of production inputs since the 1920s, others received hardly any. Along with Walter Rodney, Babiker (1986, p. 392) describes this situation in connection to peasants of a locality in Kordofan where, 'The Hamari peasant...went [into] colonial rule with a hoe, came out with a hoe, and is, after nearly thirty years of political independence, still with a hoe'. The Hamari peasants' homeland, Dar Hamar, is an area probably second only to Gezira in producing groundnuts, for instance, which are largely for export. With regard to gum arabic and sesame, Dar Hamar is almost certainly the major producer compared to other localities in the Sudan.

Table 5 shows that Darfur alone hosted 39.61 percent of the total herd in the Sudan in the year 1973, making it the richest region in terms of herds by all standards. The two regions of West Sudan had 64 percent of the total herd in the country. In 2007, Darfur had a relatively lower share with 31.39 percent of the total herd in the country. The

two regions, which were devastated by droughts, desertification and, recently, civil war, counted for 56.73 percent of the total herd.

The contribution of national herd to the national economy is significant. One prominent Sudanese researcher on pastoralism, Omer Egeimi, interviewed by Baaijens (2005) notes that, "The livestock sector annually contributes \$140 million to the national economy. That is 23 percent of total [national] exports." Egeimi adds, "this income from the nomadic sector is second only to that of the oil" (Baaijens, 2005). West Sudan contributes the largest portion of this revenue in addition to its contribution to the local and national consumption from the livestock sector (see Ibrahim, 1996, p. 260).

Yet, the pastoral and agro-pastoral sectors, with significant potential, suffer from acute neglect; "The Ten Year Plan (1960-1970) completely neglected the nomads, and the share of their sector in the government investment plan was insignificant (only 0.65 per cent)" (Ahmed 1987, p. 134). Even the Five-Year Plan (1970-75), with its objective of increasing livestock production by 75.5 percent, allocated only 0.98 percent of its public fund to the pastoral sector (Ahmed, 1987, p. 134). The state marginalisation of the pastoral sector has continued even under the current government, which, unlike previous ones, seems to develop feverish rhetoric about the pastoralists and developing the pastoral sector (for further details see Egeimi, 1996, p. 42; Ibrahim, 1996, p. 269). Of the proposed fund of 464 million Sudanese pounds to be allocated to the management of range and pasture in the period 1989-94 as part of the National Comprehensive Strategy (NCS), only 16 percent has been spent (Ibrahim, 1996, p. 265). Although the allocations pointed out above are small, they have actually served to expand state bureaucracy, as the central government has proven generous in allocating funds to various personnel budgets, while it is minimal regarding general services and development budgets (Doornbos, 1986, p. 304). The NCS plan has also maintained the old bias towards agriculture and avoided raising the issues that directly affect the pastoralists, curbing their development – "the question of land tenure and entitlement to land use and the impact of all this on the pastoral sector were not raised" (Ibrahim, 1996, p. 269-70).

7.3 Seeing only irrigated cotton, taking no cognizance of agro-pastoral produces

Unequal development and allocation of central government grants stems from overlooking the potential of sectors and comparative advantages in other regions – perhaps stemming from a "cotton ideology", which largely disguised this potential while propagating that of the Gezira irrigated scheme. This ideology redefined the resources in the Sudan – which of them should be conserved or financially subsidised and, therefore, which communities would benefit from state amenities and which would not. Even the areas with high potential for cash crops were considered marginal for government investment, as they continued to pour their produce into export

markets free from any significant contribution by the central government. A striking example is the regions which produce gum arabic, primarily Kordofan Region, which shows how the “cotton ideology” effectively disguised its economic potential.

In the nineteenth century and before cotton took over, according to Suliman (2000), Kordofan had the economic lead among all regions in the Sudan. According to Stiansen (1998, p. 83), “Gum arabic export increased from roughly 3,000 *qantars*⁴ at the turn of the century to an average of 20,000 *qantars* (or roughly 900 tons) in 1850.” With the advent of the British, gum arabic exports gained momentum, increasing from 2,000 tons in 1899 to 19,615 tons in 1912, contributing as much as 43 percent of total export earnings (Stiansen, 1998, p. 84-5). In the good season of 1931/32, export reached 27,000 tons and kept increasing to average just below 50,000 tons in the 1960s, before decreasing in the 1970s (Stiansen, 1998, p. 85). Gum arabic, together with groundnuts, sesame and livestock represented the main export items in the first three decades of British rule (Abdelkarim, 1992, p. 14). Until today, Kordofan is the main region for producing and marketing gum arabic (Suliman, 2000, p. 204), though recently its produce dropped dramatically due to drought and desertification. According to Al-Mahal and Omer (1992, p. 45), Kordofan currently contributes half of Sudan’s gum arabic, which has an 85 percent share of world production, with the remaining produced in Kassala, Blue Nile, Darfur, and White Nile states. Despite this potential, Kordofan is now one of the most impoverished regions in the Sudan – more telling is that it is the region with the highest out-migration rates in the country (El Zain, 2007). What would rural water supply have added to gum arabic production? Elsewhere, where nations are keen about protecting their national resources, it may not be surprising to suggest that acacia trees be irrigated – receiving supplemental irrigation. In Sudan, such a suggestion might immediately be ruled out – it is just not right to irrigate trees of this kind! Such a rejection is not informed by feasibility; rather, it is determined by the sector it belongs to.

Even while the prevailing order facilitated and prioritised irrigation, small-scale irrigation in certain rainfed regions denied assistance or positive engagement; “The existence of massive pasture resources and huge herds of animals in the West and East went largely unnoticed except as security problems by a government concerned to promote a stable support group of yeoman farmers” (Shepherd and El Neima, 1981, p. 14-5). The traditional sector, represented by the Hamar area in Kordofan Region, for instance, seems to be completely overlooked, generating all forms of marginalisation, which further implicates it in yet further negligence.

The condition of poverty generated by the centre became the yardstick for allocating government funds and investment. *Impoverished* regions, thus, were judged as being permanently poor. Poverty, and not impoverishment, was viewed to be the norm in those regions – it was viewed as a constant historical feature in the presently

⁴ One *qantar* equals 50 kg = 1/20 of a tonne.

unchallenged situation. Economic marginalisation in this process became a “natural” consequence, though at a later stage it contributed to further forms of marginalisation. However, this economic marginalisation was largely caused by political marginalisation. According to Shepherd and El Neima (1981, p. 14), “there are natural resources outside the central growth area which have not been developed because the political impetus was repressed.” The political marginalisation of pastoralists can be seen, according to Egeimi (1996, p. 42), in their non-involvement in state-designed and implemented development policies, as embodied in the budget allocations of the central government. The evolution of this ideology, the perceptions about regions’ resources, is part of a structural regime of control.

The imperatives of controlling the Sudan, to the British, necessitated the maintenance of the nineteenth century seat of power at Khartoum, and the creation of a new political alliance involving riverain farming communities in the vicinity of Khartoum and in the region pacified earlier to its north. These imperatives led to the economic development of the central riverain zone earlier than the other parts of the country, namely by using Nile water for irrigation. In fact, the political alliance itself came to be defined through this means of production. The Nile Valley, which rose as the most politically dominant area following the Turkish conquest in the nineteenth century, would now consolidate its political and economic power under the British administration. It would concentrate economic development in its domain and facilitate the economic superiority of communities living on its riverbanks over the largely traditional farmers and pastoralists in the rainfed areas of the Sudan. From their hegemonic position, the ruling elite started and entertained that economic development equalled developing irrigated agriculture, and in irrigated agriculture, what they appreciated most was the cultivation of cotton – the main source of revenue for the state in the largest scheme in the world. A “cotton ideology” seemed to have evolved, defining the fortunes of regions, where the irrigated Gezira started to take the lead, while regions, such as Kordofan, which had previously been leaders in economic development, deteriorated rapidly. Almost all development projects were constructed in the central riverain zone, while most of the regions suffered the lack of basic needs. Thus, while the central riverain zone’s source of water, basically the Nile, was developed rapidly, throughout all the other regions, water resources were either marginally developed in a way that entailed significant negative impacts, or were totally neglected.

8. Conclusion and policy recommendations

West Sudan is resourceful and is developable. Conflicts that have devastated this region in the last three decades can be overcome by resuming the rural water supply programme, which was initiated by the British at the beginning of the last century. West Sudan, up to this moment, remains the neediest for rural water supply and the positive discrimination that the British conceived at the beginning of the twentieth

century is still valid. An adequate rural water supply may quell the environmental deterioration in West Sudan and, in the end, may significantly decrease the tribal conflicts that have haunted this vast region. Ten policy recommendations are proposed below to inform a national and international strategy for helping West Sudan to actualise its economic potential, which ultimately should serve national strategic interests. Providing adequate rural water supply is at the heart of each of the ten proposed policy recommendations.

8.1 Supplemental irrigation to rehabilitate local ecosystems and to quell the localised deserts:

The federal and state governments of West Sudan should adopt a policy to lessen environmental problems, while continuing to incorporate the rural communities into the national polity. This paper argues that the soundest policy that serves to this effect, is the enhancement of the rural water supply with the goal of its decentralisation, i.e. increasing the number of stations in wider areas in order to decrease herd concentration, as well as using it to increase the productivity of pasturelands. In other words, sound rural water supply should have increased the number of watering sites in an accelerated manner; in parallel to increases in human and herd population with the aim of covering thousands of villages to provide, not only for drinking water, but also, additionally, for supplemental irrigation.

Supplemental irrigation has become a necessity because of the continued erratic behaviour of the climate and, most importantly, because it provides the only possible way to quell the devastating impact of the mobile sand dunes and desertification in general. The strategy suggested here is one of rural development through small-scale supplemental irrigation with the primary purpose of rehabilitating the localised ecosystem and encouraging the nomadic communities to irrigate small plots for producing fodder for their herds. Especially if it reinstates the indigenous species, use of supplemental irrigation may have, in the long run, a significant impact on halting the creeping desert. Such a strategy serves as a mid-way solution to keep the nomadic mode of production and cultural heritage “intact”, while lessening or eliminating the havoc the nomadic tribes may cause in their strife to access resources.

8.2 Encourage voluntary sedentarisation:

Resettlement of nomadic communities should be viewed as an option if their vulnerability subjects them to abuse by resource looters or those who wish to nationalise the localised conflict in order to meet their own political interests. Nomadism is a dear cultural category for many Sudanese, and to eliminate it is not a good option. In fact, nomads are the best group to make sense of the scattered valuable resources in the Sudanese landscape. However, the harm caused by its abuse is enormous, to the extent that eliminating it as a mode of production might be an option

available to some policy-makers. Strangely, the urbanite discourse of the current fundamentalist regime had, for some time, given incredible praise to the nomadic way of life.

Therefore, where necessary, federal and state authorities should encourage small-scale sedentarisation – especially in instances where nomadism may be contributing significantly to conflicts. Sedentarisation follows naturally from providing the necessary amenities, including rural water, first to meet basic needs, and secondly, to stop the horrific tribal feuds that have recently questioned the very existence of the state as a legitimate entity. Small-scale supplemental irrigation leading to increased output of staple food crops and fodder for animals may help to achieve a greater degree of sedentarisation of nomadic tribes, or at least reduce the mobility of herds and, as a result, the potential conflicts associated with passage. It may also help to achieve a degree of forestation, especially through the planting of fodder trees, thereby helping to prevent environmental degradation and, ultimately, to rehabilitate and regain the integrity of local ecosystems. To rehabilitate the localized ecosystems and resettle nomadic communities, the rural water supply must be developed by increasing the number of water stations with the goal of decreasing herd concentration.

8.3 De-politicizing the rural water supply to serve the national interest of strategically peopling the whole national landscape and diversifying the national export produce:

There is a need to establish adequate channels for interaction between nomadic and settled communities, and to build modern state institutions which protect local communities against state oppression and resource predation, as well as to protect communities from predation from each other. The conflict presently going on in Darfur, while it has resulted in some communities capturing the resources of others, has also led to the evacuation of some communities from their areas, leaving empty spaces. Building lasting peace in the Sudan requires the continuing deconstruction of the current perceptions of resources in peripheral regions. Decision-makers must realise that these resources do not only have economic value; in fact, they equally have cultural, psychological, and environmental values. The return of communities to their homelands does, therefore, not only serve to do justice to communities, but is also important for keeping land productive for economic use, socially and culturally peopled, and strategically monitored.

8.4 Rural water supply for restoring symbiotic relations between tribes:

A policy that would attentively distribute water sources to confine groups to their old designated *masarat*, therefore, bringing them back within the domain of their post symbiotic relations, would significantly help decrease groups' conflicts. This paper calls for resuming the rural water programme with the goal of increasing the number

of watering sites in wider areas in order to decrease herd concentration. This should be part of conscious government policy of not only expanding the coverage, but also of widening the scope, of rural water supply to include irrigation of small plots. Rural water provision should be viewed within a broader rural development policy that should not only address the economic, social and political issues, but also the environmental, eco-system balancing and dietary issues.

8.5 Support the nomadic mode of production to serve national strategic interest:

Given that the problem is primarily one of the large population of herds, support for, and maintenance of, nomadism is crucial for optimising the use of resources. Omer Egeimi, who did extensive research on pastoralism, interviewed by Baaijens (2005) notes that, “Half of Sudan consists of land that is not suitable for agriculture. Only nomads know what to do with these areas. The fattest sheep and camels for the market are reared in marginal areas where no human being wants to live.” The camel-herding sector should be given special support in this respect, given that the units currently herded by communities do not provide a decent income under today’s increased linkages to national and global markets. Strategic geopolitical consideration should be given, in this respect, particularly with relation to Sudan’s important regional neighbour, Egypt, where camels represent an important commodity exchanged between the two countries. The nomadic sector is important for the economic interdependence between the Sudan and Egypt:

Camels have been exported to Egypt centuries ago. Records from Sudan’s Ministry of Animal Resources show that the first official export of camels to Egypt took place in 1904, when 10 animals were sent north. Today, Sudan officially exports 50,000 camels to Egypt annually, but the border between the two countries is long and difficult to monitor, and thus the real numbers are generally agreed to be higher. In recent years, camels have comprised as much as half of Sudan’s exports to Egypt, resulting in a post at the Sudanese Embassy in Cairo for an envoy specialized in camel commerce (Bakheit, 2008, p. 3-4)

In globalising economies, economic interdependence is one means of decreasing conflicts. In this regard, camels provide a link with Egypt, providing fresh “virtual water” that Sudan may export to lessen Egypt’s scarcity of water of the shared Nile River. As part of the geopolitical consideration, desert communities are the only guards in the vast territories they occupy in northern Sudan, and it is only rational that the state, for national security reasons, should start investing into these expansive areas with the goal of populating them.

8.6 Greater appreciation of the rainfed agricultural sector—adding the organic tag:

Agriculture, irrigated and rainfed, must be regarded as the most valued asset in the Sudan. The Sudan should value its pastoralist sector by providing the necessary facilities that sustain its lucrative produce and significant contribution to the GDP. The

government should further appreciate this sector by tagging its produce as organic and stop selling it cheap on the international market. This should aim at decreasing the abject poverty of the producers in this sector.

8.7 Payment for environmental services:

The government should adopt a policy of payment for environmental services (PES). The Sudan needs to rehabilitate its ecosystems, and this implies land reform and recognising individual titles for rural land in the same manner that these titles are recognised in the downstream riverain zone. Most importantly, however, governments should recognise the constructive role nomadic communities and their herds play in revitalising the environmental resources in the desert and semi-desert regions. Rehabilitating the desert fringes and the designation of the *masarat* should receive priority in this PES policy.

Passages/pastures should be viewed as part of a conservation policy – in this case, they should be conserved against farming and the cutting of trees. They can be the natural stores for seeds, especially those that remain intact while herds are away. There is the risk here of diminution of the pastureland areas through conservation measures. To avoid such diminution, a policy of *expanding the pasturelands* is needed and it can be achieved through providing water where it is not available. Expand the national grazing lands through bringing some indigenous ecosystem balancing species back, and by making the isolated pasture-rich pockets accessible.

Nomadic and settled communities who own acacia trees should be supported through payment for the environmental services they provide. They should be paid for keeping their trees standing green and productive. The environmental services they provide to their localities, and the country at large, is their caring about the acacia trees, which have special qualities of balancing the ecosystem and proving other species with the necessary habitat. The payment to these communities could take the form of facilities to make supplemental irrigation possible. This strategy could then be expanded to pay for more communities who would like to bring the acacia trees back. The acacia trees as well as other tree species will expand the pastureland vertically. In the longer run, the organic produce from West Sudan may contribute to cover part, if not all, the cost of PES.

In the same manner of bringing back the acacia trees, communities should be encouraged to *re-indigenise millet (dukhun)*. Millet is not only at the centre of the diet culture in West Sudan; in fact, it is the crop that fits well with the produce of pastoralist communities, namely their milk products. Supporting *dukhun* will decrease the (unnecessary) demand for other commodities. Providing pastoral communities with *dukhun* and gas tubes is the best form of payment for the environmental services these communities provide. Millet should be reintroduced in many areas in West

Sudan, not only because it is the original food in the region – being the child of its environment, but most importantly, because ‘it is good for the ecosystem – it has a bushy stem, in fact a number of stems making a thick cluster in the way of water flow, unlike sorghum stems which are thin and cannot block or hold water for long. Additionally, millet is more nutritious than sorghum for a region that is haunted for quite some time now with food insecurity.’ (El Zain, 2007, p. 439). Moreover, food which has a millet component costs less – millet is used for making *aseeda* (porridge) and different types of bread in rural areas, which are best complemented with milk products from these areas (see El Zain, 2007, p. 331).

8.8 Land reform:

For all the above proposed policies to succeed, land reform is a necessity. There is need for land reform which recognises the right of communities to own their land. This should necessarily help in the de-legitimising and de-institutionalising of the entrenched mentality of preying on communal resources, which has characterised the state’s attitude and behaviour in recent decades.

8.9 Stop unorganized cross-national border tribal migrations:

Current communal ownership of land, as well as corrupt measures of preying on communities’ land, have encouraged groups from outside the Sudan to come and engage in the looting of resources, which, in some cases, are encouraged by governments. Land reform would contribute positively to decreasing the intrusion of such communities. However, stopping these intrusions should be carried out with great caution in order not to disturb the symbiotic relationships between kin communities and the integrity of the social, cultural, and economic networks involving border communities. It is important to recognise the significance of social, cultural, economic, political and military networks involving cross-border communities, using them for establishing peace rather than for igniting conflicts, and using them to serve egoistic interests, including vengeance targeted against leaders of other nations.

8.10 Appealing to national and global environmental and ecological movements:

To address the current environmental crisis, West Sudan has to frame its local and regional environmental issues within the global discourses of communities’ rights to safe environment, and rights to land and resources as identity markers. The whole discussion on environmental refugees, as well as the encroachment of the desert and its devastation of productive regions, should be put within the regional political stability frame to invite more active actors whose involvement is significant for putting pressure on governments, and for making economic development and environmental protection materialise.

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Discussion

Conference participants discussed whether there has been more or less rainfall in Darfur in recent years. They conceded that there has been an increase in the amount of rainfall in Darfur since the late 1980s, although they asserted that it has not recovered to its previous level. Some participants, however, contended that even though the rainfall has increased, it has not produced the expected vegetation cover that can support the increased herd size in Darfur.

Furthermore, it was argued that rainfall is unpredictable, thus exerting a negative impact on the livelihoods of farmers and cattle herders. It was also added that the total rainfall as such is not a good indicator, for there is high spatial and temporal variability. Various participants, on the other hand, stated that the impacts of climate change are exacerbated by policy failures in managing the water resources. One even went further and asked, “If we can bring oil from Kordofan to the Red sea, why can’t we bring water from the River Nile to Darfur?”

Some participants explained the case of the northern part of Darfur, stating that even though the area has enough water for survival, the groundwater resource is not well utilized. Drilling wells and managing access to water sources requires a strong commitment from the government. It was also noted that resources are not being developed due to the attitude of the Khartoum-based policy-makers towards the region.

During the discussion, it was also noted that there is a need to disaggregate the conflict in Darfur into different levels, for the Darfur crisis has many dimensions including political, social, and environmental. There are also different levels of conflict ranging from rebel fights for political reasons, to community contests for limited resources. To this end, Mr. Bromwich added that disaggregating the conflict into different levels is vital in that it enables a clear view of the different levels of conflict—be it at the local, national and regional levels.

Along the same lines, some participants stated that the Darfur conflict has to be analysed by separating it into three different levels: the perennial natural resource conflicts (for instance, those linked to water resources, land, pasture, etc.); the dispute between the government and the rebel groups; and the regional conflict involving Chad and Libya. They further asserted that the warring groups have used the competition over natural resources as one way of aggravating the conflict.

Other participants, however, argued that the conflict is directly linked to a failure of governance, contending that bad governance is the main cause for the crisis. It was noted that there is an absence of strong institutions to manage natural resources and contain conflicts over access to resources. The lack of established governing

mechanisms at state level has compelled local communities to formulate their own mechanisms, which are often unsustainable. They also linked the issue of environmental degradation to bad governance, which has resulted in the poor management of natural resource endowments.

The discussion also made clear that poor management of natural resource endowments contributed to the crisis, as the benefits were not equitably distributed amongst the population. Participants remarked that lack of development, coupled with the absence of natural resource management, is the underlying cause of the crisis. Hence, they suggested that fostering development in the region is an essential remedy for the crisis, in addition to addressing administrative and political setbacks.

Mr. Bromwich was asked to share his views on whether resolving environmental problems would lessen the conflict. He replied that he is not of the opinion that the environment *per se* has a high role in resolving the crisis. However, he reminded the participants that there is a prior need for addressing the issue of environmental governance before heading to any major peace process.

Overall, participants conceded that the issue of governance should be addressed in order to resolve the crisis. It was also suggested that there is a need for good governance that can effectively address the poor management of natural resource endowments. Ideally, however, having a wide-ranging peace agreement that allows political accommodation for all stakeholders was seen as a vital solution. Additionally, participants emphasised the need to develop solid economic rules and institutions to promote economic development in the region. For instance, strong leadership is required to bring indigenous plant species back to the pastoralists, as they are useful sources of fodder and food staples. Some participants further argued that replacing some of these indigenous species with commercial ones is a deliberate action of the government.

Furthermore, many argued that farming has to be practised regularly in order to remain effective and to allow the transfer of farm-related skills to the next generation. Despite this, most farmers currently opt to stay in refugee camps for fear of risking their lives, due to which the traditional knowledge of farming is giving way to urban living. Participants stressed the need for encouraging the profession of farming in lieu of bringing food from outside.

It was also added that natural resources should not all be viewed in the same manner. Land, for instance, is not only a natural resource but also a political resource. With regard to the multi-national corporations currently operating in Darfur, such as the Malaysian and Chinese companies, some participants cautioned that when peace finally prevails, these companies may claim ownership rights to the lands they currently lease.

Another question raised was whether there is a clear picture of change in land-use since 2003. Mr. Bromwich responded by stating that the picture shown in his presentation is not a comprehensive land-use map. A more complete map is not available as the contract entered to develop a complete land-use map was cancelled by the government for security reasons.

On further discussion, it was noted that the issue of dryland management in Sudan has been neglected by the State, due to which there is no established institution in charge of such issues. Some participants also added that drylands have been marginalised, as have the pastoral communities in the region. Various participants also cautioned that there is a need to have more experts in the area of dryland management as there are very few experts all over Sudan.

Prof. Manger was asked to share his thoughts on the issue of environmental administration in Western Sudan. He stated that the environmental administration is in need of assistance in terms of foreign capital and other resources. He added that he has witnessed demand from the pastoral groups, which do not seem to be satisfied with the state's efforts.

By and large, participants agreed that strengthening environmental administration is vital. Moreover, it was noted that all parties should recognize that the establishment of environmental administrations has nothing to do with overshadowing other state interests with respect to either the agricultural sector or the economic use of land.

In the discussion about water provision in Darfur, participants underscored that water issues are day to day political issues. They maintained that the problem Darfur is currently facing has come after the centralization of the management of groundwater and other water bodies. It was also noted that due to the high level of politicisation of water resource management, communication between those in charge of water resource management and the public at large seems to be impeded.

Participants also discussed the major lack of investment and the absence of maintenance of dams, which are partially or completely silted, as a result of which the number of water points has declined. They also noted that the rebuilding of the Emda Fuk dam, which has a 10 million cubic metre storage capacity, has changed the migration pattern of pastoralists. The dam is now facing a massive concentration of different groups which, according to the participants, leads to localized environmental degradation and, potentially, to conflict.

Regarding water supply during the last few decades, participants argued that the current government has done nothing to assist the water supply sector. It was also noted that all recently added water supplies in Darfur have been established either by the community or by international NGOs through the participation of the community.

However, it was stated that as soon as new water supplies were established, the government intervened and started regulating access. Participants also raised a concern about the water quality, noting that water quality should be given equal importance to water supply.

Explaining the effects of the British colonial administration on water supply, Dr. Mahmoud El-zain underscored that the advent of such an administration changed the water balance in a very dramatic way. He added that the presence of the British had fostered the development of water sector in West Sudan on top of empowering the Nile region very significantly. This has created a historical empowerment in the Nile region compared to all other regions in Sudan.

Various participants argued that policies in Sudan are often short-lived, noting that the cotton ideology has now become obsolete. Hence, the government's policies should continuously be assessed. Concerning the structural problem of governance, participants suggested that there is a need for a system of governance, right across the country, whereby there would be devolution of powers associated with allocation of resources necessary to enable regions to set priorities for themselves.

Talking about resource management in Sudan, Dr. Mahmoud stated that it is a question of democratisation. He further stressed that such a question should be addressed at the macro level with the goal of providing rights to the people. He also cautioned that western Sudan has been abandoned by the government since the late 1970s and early 1980s.

On further discussion, the increase in frequency and severity of local level violence as a factor in the full-blown crisis of 2003 was raised. It was noted that the violence has intensified in recent times due to the trafficking of small arms. Participants asserted that the proliferation of small arms indicates interference by outsiders and cautioned that the conflict has reached the point where mediation has become difficult.

It was further said that particular attention should be given to the youth due to the fact that it has delinked itself from the centre because its needs are not met by the government. Hence, it was further noted that the youth have become agents of the conflict as they can be easily mobilized by any group. It was stressed that the problem of the youth should be given particular emphasis during the formulation and implementation of the post-conflict development strategies.

Theme 4

Pastoralism: Vulnerability and Adaptation to Climate Change in Darfur

Introductory Notes

The Inter-governmental Panel on Climate Change (IPCC) (2007) report considers the entire continent of Africa to be one of the most vulnerable to climatic variability and change because of multiple stresses, such as poverty and a low adaptive capacity.

Drought has forced communities to ensure their survival by violating traditional resource sharing norms and boundaries. Those traditionally accessing these resources have felt increasingly threatened by the growing competition from rival groups and have strived to maintain their privileged position. The ruling elite and the state have also played their part in the weakening of traditional institutions, thereby often distorting relations between groups.

Soils in the Sahel are inherently fragile, low in carbon and poor in plant nutrients. The aggregate food production has been declining due to rapid population growth. In many areas, the disappearance of fallows and the shrinking of pastures have led to overgrazing, further impoverishing land resources (Serigne, Louis, and Jens, 2006, p.5).

The variability and extremes in climate, particularly variability of rainfall and periods of persistent and widespread drought, are the greatest climatic hazards for farmers and pastoralists. The desertification process has intensified since 1968 because of declining precipitation, a southward shift of the rainfall belt, increased variability of rainfall, and enhanced human activities such as over-cultivation, overgrazing, woodcutting, and deforestation.

Pastoralism has provided food security for African populations for over seven thousand years. Pastoral groups have dealt with recurrent drought and other extreme climate events in a number of ways. Pastoral livelihoods in the Sahel were historically supported by systems of negotiated access to water and pasture, and by reciprocal arrangements between pastoralists and agriculturalists.

Mobility in search of pasture and water in neighbouring areas has been an important livelihood strategy of pastoralists, and they have adjusted their seasonal movements in response to periodic drought conditions. However, because of changing climatic conditions and socio-political factors, experts argue that the adaptive capacities of pastoralists have eroded, so that they have become more susceptible to climate change than ever before. Consequently, their coping mechanisms may no longer be considered as effective options for mitigating the adverse future climatic impacts.

Conflict, Displacement and Migration Patterns in Western Sudan

Pastoralists in Western Sudan used to take their herds between dry and wet season grazing areas and that has been a part of their adaptive capacity in response to

changing weather conditions in the past. Political unrest and armed conflicts however affected the migration patterns of pastoralists.

Conflict has also caused changes in livestock migration patterns with potentially disastrous consequences. Hostility between Arabs and non-Arabs, and the control of some critical areas along the traditional migratory routes by rebel groups, has resulted in the restriction of access for the pastoral population to the wet season grazing reserves. Camels and sheep, belonging to the *abbalas*, were prevented from moving north during the rainy season and remained confined to the south of the Jebel Marra Mountains.

The violence has significantly affected the movement of many semi-nomadic groups, including the seasonal migration in search of pasture, and the trekking of animals to markets for sale and export. Severe restrictions were placed by rebel movements on livestock migration, signalling a potentially disastrous impact on livestock health due to the depletion of pasture and water resources, as well as an increase in the risk of disease (Jaspars and O'Callaghan, 2008).

Schimmer (2008) further says that since 2003, herds in Darfur have been reported migrating southwards in search of safety, even during the rainy season. The violence has further restricted grazing ranges and, for security reasons, surviving livestock are being contained in concentrated areas, especially in the south, throughout the year.

In areas which have been abandoned by internally displaced people, a 'greening' process of increasing vegetation has been observed. 'The internally displaced have fled their homes and live elsewhere, away from their normal means of income, often on the outskirts of towns. As a consequence, agriculture is largely neglected and livestock dispersed. The consequence for the vegetation is abandoned fields and reduced grazing pressure'' (Olsson et al., 2005).

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Pastoralism and Adaptation to Climate Change

Bereket Tarekegn

Abstract

Pastoralism in Africa has survived years of changing climatic conditions through an effective and sophisticated system of resource management. However, in recent decades it is increasingly threatened by the impacts of climate change, mainly in the form of drought and its associated pressures. Despite the unprecedented change in climate and variability, the paper argues that the weakening and demise of local pastoralists' institutions in arid and semi-arid Africa had a far greater impact. This has led to increased vulnerability and diminishing adaptive capacity of pastoralists to climate change, due to loss of knowledge and expertise in managing risk and resolving conflicts that arise over competition for scarce resources. The paper further suggests that reinstating the capacities of these institutions is imperative to restore and sustain the pastoralists' resilience vis-à-vis the changing climatic conditions.

1. Introduction to the concepts of adaptation to climate change

'Climate variability' is the variation in climatic parameters from the normal or baseline values, whereas "climate change" is a change in the long-term mean value of a particular climate parameter (Abebe, 2008). 'Vulnerability' is defined as the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate change and the variation to which a system is exposed, alongside its sensitivity and adaptive capacity (Intergovernmental Panel on Climate Change [IPCC], 2007b).

According to Burton et al (1993), the term 'adaptation measures' covers eight categories: bearing losses, sharing losses, modifying the threat and thus preventing effects, changing use, changing location, accessing new research-based technologies, disseminating knowledge through education to change behaviour and restoration. Others classify the different forms of adaptation as anticipatory and reactive adaptation, private and public adaptation and autonomous and planned adaptation (IPCC, 2001). This implies that local innovation for climate adaptation needs to be assessed together with environmental, socio-economic and policy changes.

2. Pastoralism and its adaptation to climate change

Pastoralists are people who depend on herding livestock for a living (Simel, 2008). Pastoralism in East Africa is generally accompanied by a nomadic or semi-nomadic lifestyle. The resources that pastoralism most heavily relies on are grazing lands and

water resources. Pastoralism is an effective and sophisticated system of resource management in the dry lands, is characterised by mobility and communal management, and involves extensive production of livestock.

“Pastoralists have very sophisticated knowledge and skills for managing their environment. Their skills may have limitations in transferability outside their system, but within their system they know how things work, they know what to do, and they have institutions that help them to put this into practice,” said Mrs. Khadija Razavi of the Centre for Sustainable Development and Environment, Islamic Republic of Iran (IUCN, 2007).

In Africa, pastoralism as a system has sustained years of changing climatic conditions. Archaeological evidence also indicates that pastoralism in Africa developed in direct response to long-term climate change and variability (Brooks, 2006). Pastoralism has evolved in response to harsh environments of very high spatial and temporal variability in rainfall (Morton, 2007). The persistence of pastoralism into the present day has proven its adaptive and resilient ability to respond to pressure and change.

Pastoral groups have dealt with recurrent drought and other extreme climate events in a number of ways, “including depending on social networks and trusts, switching between capital assets, and migrating to other areas to look for work until droughts have passed” (DFID, 2004). Pastoralists also use supplementary feed for livestock - whether it be purchased or cut from trees - as a coping strategy.

A review made in the Sahel region shows that local people have developed a variety of strategies ranging from diversifying crop production and harvesting wild fruits and other tree products; to raising cattle and doing business and other paid jobs; to migrating to cities and other countries to earn a living. Pastoralists engage in herd accumulation and evidence suggests that this is a rational food security measure against drought. During drought periods, communities make use of fallback grazing areas unused in normal dry seasons because of distance, land tenure constraints, animal disease problems or conflict.

With increased development assistance, flourishing small towns and accompanying job opportunities, pastoralists have managed to survive the bad years of famine. Pastoralists have now begun to use bank accounts, alongside informal saving and credit mechanisms to accumulate wealth. Indeed, these strategies have helped pastoralists to absorb the pressures posed by climate variability and other sources of stress.

Recent studies (e.g. McPeak and Barret, 2001) have focused on the coping strategies used by pastoralists during droughts in Northern Kenya and Southern Ethiopia, and the long-term adaptations that formed their basis. Gray & Kevane (1992, p. 1-2) argue that the idea of resilience or indigenous coping strategies is short-term only. In the long-term, the reality is a depletion of assets, which has made survival in

each subsequent crisis weaker. Desperate short-term coping strategies are often confused with long-term resilience among proponents of adaptation.

Many are claiming that pastoralism – as a way of life – is threatened by the impacts of climate change, mainly in the form of flood and drought cycles and their associated pressures. The pressures of drought lead to famine and competition for resources whilst flooding brings about a subsequent decreased mobility, disease and the pollution of surface water. The severity of the 1970s and 1980s droughts is noted to have stretched the indigenous coping methods in Darfur to their full capacity (<http://www.dickinson.edu>).

Pastoralism has been increasingly impacted by other factors besides climate in recent decades. Pastoralists have increased their reliance on non-pastoral resources due to the deterioration of life-sustaining resources, such as the lack of pasture for their cattle. The loss of land productivity of their neighbouring farmers has also resulted in concentric expansion from both ends and further resulted in competition over fertile land between the two groups.

Others argue that, combined with the additional uncertainty caused by economic globalisation, - which may endanger the economic viability of local production, climate change makes local risk coping strategies increasingly difficult and the option of successful risk management more challenging.

Pastoralism in the region has adapted to changing climatic conditions either through keeping the very characteristics of the system (i.e. livelihood based on livestock production), or by the evolution of a different way of life (i.e. diversification in the basis of livelihood). The recent trend in livelihood diversification away from pastoralism in this region, predominately took the form of a shift into low income or environmentally unsustainable occupations, such as charcoal production, rather than an adaptive strategy to reduce ex-ante vulnerability.

An appreciable scope of adaptation has been lacking to say that pastoralism in its strict terminology adapted itself to climatic conditions without changing its distinctive characteristics or without undergoing transformation. Clearly, identifying pastoralist drop-outs and non-drop outs in the said process of adaptation has also been very difficult. The case of Djiboutian nomadic pastoralists who became environmental refugees in this regard is example of such drop-outs.

Adaptation – when applied to climate change – is a very broad concept, which is defined differently in the literature, as indicated below:

- Adaptation to climate change is the process through which people reduce the adverse effects of climate on their health and well-being, and take advantage of the opportunities that their climatic environment provides (Burton, 1992).

- The term adaptation means any adjustment, whether passive, reactive or anticipatory, that is proposed as a means for ameliorating the anticipated adverse consequences associated with climate change (Stakhiv, 1993).
- Adaptability refers to the degree to which adjustments are possible in practices, processes, or structures of systems to projected or actual change in climate. Adaptation can be spontaneous or planned, and can be carried out in response to or in anticipation of changes in conditions (IPCC, 1996).

As we can see from the above definitions, ‘adaptation’ is initiated in response to, or anticipation of, change in climate. However, authors aren’t clear on attributing or co-attributing it as a reaction to other social, economic and policy changes. In other words, adaptation is a question of whether pastoralism has remained resilient to change in climate or whether it has been evolving to other forms of livelihood due to other intervening factors.

Literature on vulnerabilities and the trend in the adaptive capacity of communities in West Sudan expose the extent to which climate change and environmental factors attributed to the ongoing strife and humanitarian crisis in Sudan’s Darfur Region. The adaptive capacity of communities in the Sudan and other African countries, which is noted later in this paper, has also been impacted by the changes in policies toward access to the crucial life sustaining resource - which is land.

The autonomously developed adaptation measures in Darfur were made as part of a continuous community-level risk management process that encompassed non-climate as well as climate related risks. It was said that “local innovation for climate adaptation needs to be assessed together with the environmental and socio-economic and policy changes” (Mariana, Miranda & Ann, 2009). Local institutions have been at the core of the pastoralists’ adaptation to change in climate. The change or weakening of pastoralists’ institutions led to a lesser adaptive capacity of pastoralists to climate change, due to a loss of both indigenous knowledge and expertise of resource management. The challenge, however, was attributing climatic factors, alongside other variables, to this change in a distinctive manner.

3. Conflict and climate change adaptation

“The scale of historical climate change, as recorded in Northern Darfur, is almost unprecedented: the reduction in rainfall has turned millions of hectares of already marginal semi-desert grazing land into desert. The impact of climate change is considered to be directly related to the conflict in the region, as desertification has added significantly to the stress on the livelihoods of pastoralist societies, forcing them to move south to find pasture.” (UNEP, 2007)

Conflict is a recurrent feature in the lives of pastoralists. Conflicts in the dry lands are mainly over natural resources, such as water and pastures, or because of problems often triggered by land tenure changes. A decade ago, the World Bank claimed that

judicial mechanisms to deal with disputes between owners over traditional versus modern land rights were urgently required. Climate change also plays a crucial role in inter-ethnic conflicts among pastoralist communities, as thousands of environmental refugees flee from droughts, which result in pasture and water shortages for livestock.

Mobility – temporal and spatial strategic movement of pastoralists – has shifted in recent decades to distress migration due to ecological hazards, mainly drought. Distress migration refers to the permanent occupation or co-habitation of land, which may not be accepted by the locals and owners of that land. The change from seasonal mobility to quasi-permanent migration may also be an indication of the level of vulnerability, or distress, to livelihood threats because of climate change.

Peters (2004) believed that reports of pervasive competition and conflict over land contradicted the current image of negotiable and adaptive customary systems of landholding and land use in sub-Saharan Africa. He instead revealed processes of exclusion, deepening social divisions and class formation. It was also argued that violent conflict in East Africa also increased the region's vulnerability to climate change and worsened the prospects for future adaptation (Orindi & Murray, 2005, p. 7). These conflicts have reduced options for effective management of the region's resources.

4. Human-induced vulnerability

In order to situate the impacts of climate change on conflicts in Africa and Sudan in particular, it is imperative to look at historical experiences, cultures and traditional institutions that helped communities to become resilient to changing ecological and climatic conditions over the years. Changes in these systems at certain points in time due to factors – both natural and human – can be argued to have altered the adaptive capacity of these communities to changing climatic conditions.

A real or perceived environmental threat may increase the propensity of communities to ensure their survival, by infringing traditional resource-sharing norms and boundaries or by pursuing violent means. On the other hand, politically ruling elites may play their part in destroying traditional institutions and altering power relations between contending groups based on 'ethnic' or class distinctions.

Relations between communities and their traditional land tenure and use arrangements have been affected by politics. Politics has exploited the tension between groups with competing livelihood strategies. It has manipulated the varying identities of communities such as Arab versus non-Arab in Darfur, Hutu and Tutsi in Rwanda and Burundi respectively, and Hema and Lendu in DRC. Scarce resources – mainly land – have also been used in shaping the power relations between these competing groups.

Changes in tenure rights to land as a result of colonial and postcolonial regimes, have affected the adaptive capacity or resilience of communities in the Sudan and other African countries such as Rwanda, Burundi and DRC.

De Waal (1989, p. 110), in his analysis of the 1984-1985 famines in Darfur, argued that the Darfur economy was resilient to the famine partly because it was isolated from the national economy.

Within the science community, there is now broad consensus on the reality of human-induced climate change. The effects of the years of drought in the early 1980s in Sudan had far-reaching consequences on the ecosystem of the region. The aridity intensified the desertification process, which was exacerbated by human response to the changing environment, as farmers continued expansion of cultivation into marginal and fragile areas to make up declines in yields, and resorted to the generation of income from the sale of tree crops to support their falling income (Teklu, Braun & Zaki 1991, p. 30).

Failure of rains had nothing to do with the food shortages in 1929, 1945, 1950 and 1959 in Sudan. It was contemplated that it was probable that those food-shortage situations resulted from the fact that local people were subjected to some kind of grain scarcity, as a result of social, administrative or political reasons (Ibid., p. 26-27).

4.1 Weakening of local institutions as a factor in climate change vulnerability

The problems impeding socio-economic development in African countries are often the same as those that increase vulnerability to climate change. Poor communities are not only located in high-risk areas, but their lack of economic and social resources mean they are ill-equipped to adjust to the long-term changes in climate (Orindi and Murray, 2005, p. 2-3). According to Kelly and Adger (2000), the extent to which East African countries are vulnerable to climate change depends on both exposure and sensitivity to changes in climate, as well as the ability to adapt to new conditions.

Despite the important influence of climate extremes, resource management practices do not respond to these climatic stimuli alone. Non-climatic forces such as institutions, policies and social networks, clearly have significant implications for natural resource decision-making (Abdelatti et al., 2003). Local, traditional institutions have been at the core of the pastoralists' adaptation to climatic, social and political changes and conditions. For decades, pastoralists' institutions have managed their natural resources. They had strong traditional institutions responsible for resolving conflicts, managing natural resources and devising early warning systems (United Nations Office for the Coordination of Humanitarian Affairs [OCHA], 2008).

Environmental management strategies, employed by rural populations of Sudan for years, have increased the resilience of communities to cope with drought and its effects. Mobility has been at the core of the pastoralists' adaptation to spatial and temporal variations in rainfall. Today however, encroachment into, and

individualisation of, communal grazing lands, and the desire to settle in order to access human services and food aid, have severely limited the efficacy of this strategy.

The prominent role played by community leaders in Darfur has been significant in ensuring the sustainability of important indigenous knowledge, cultural values and wisdom, and their transfer between generations. Moreover, under the traditional system of local administration, the responsibilities of the traditional leaders include: land allocation, protection of common natural resources, organisation of management of natural resources, security and organisation of foreign tribes who passed or resided in the area, the definition and delineation of nomadic routes and the settlement of tribal disputes (Balgis et al., 2006, p. 29).

A number of intra-community mechanisms which used to distribute both livestock products and the use of animals to the destitute, appear to have broken down because of other pressing needs within communities. Thus it would be pragmatic to assume that pastoralists in East Africa became vulnerable to climate change, at least in part, due to the weakening of their traditional resilience structures.

Customary management institutions and knowledge are often weakened through state control of resources, as a result of inappropriate aid interventions and incomplete democratisation, as well as through the emergence of new elites that do not conform to the customary institutions.

The change in government policies and institutions led to the replacement of traditional administration with different government structures, which is among the major factors contributing to the current conflicts in the Darfur Region (Ibid.). In 1980, the tribal homelands were also abolished, which made it difficult for people to keep outsiders away. This happened at a time when the need for movement into certain areas became more important as a result of drought and war.

The policy neglect of Darfur's traditional agricultural and livestock sectors and drought before the conflict, led to the breakdown of environmental governance, specifically communal management and stewardship of forest resources (UNEP, 2008).

Similar developments have also been observed in Ethiopia. Due to the declining attention to traditional values, together with the diminishing authority of the tribal hierarchic structure, destructive environmental behaviour increased in pastoral areas. The modern administration couldn't curtail such misuse because of competing interests and lack of awareness. Existing conflict-avoidance or conflict solving institutions was discredited. Community members, elected to administer the property, had no legal power to deal with natural resource management issues (Soeftestad and Wabnitz, 2004, p. 5).

A study conducted on local innovation in climate adaptation by pastoralists in the Afar Region of eastern Ethiopia, underlined that the root cause of the communities' vulnerability was closely connected to the lack of good governance. The authors stated that the modern pastoral leaders were highly corrupted and were not accountable to the community (Yohannes and Mebratu, 2008, p. 15).

During the conference at the UN Convention to Combat Desertification (UNCCD), in Buenos Aires on 22 March 2007, it was underlined that "inappropriate development has exacerbated the degradation of dry lands and, in consequence, increased poverty". Seemingly, the social consensus-supporting customary norms breakdown and the traditional means for resolving disputes fell apart in the case of Darfur. Not only does the central government ignore traditional land rights, but it fails to provide impartial tribunals for dispute resolution (Boudreaux, 1994).

Marc Lavergne, a researcher with the French National Center for Scientific Research, agrees. "The problem [in Darfur] is not water shortage as such, and water shortages don't necessarily lead to war. The real problem is the lack of agricultural and other development policies to make the best use of available water resources since colonial times." (SEED, 2006)

The neglect of traditional smallholding, which is marked by low levels of food production and income base, means a low level of preparedness on the part of the farming population to survive consecutive seasons of crop failures. In the case of the 1984-1985 famine, because of low and variable income, farmers were ill prepared in the obtaining of staple foods, especially in the western regions of Darfur (Teklu, Braun & Zaki, 1991, p.18).

5. Conclusion

This article illustrates that pastoralist communities have undergone tremendous transformations due to climate change and human factors. Such transformations have impacted on the effectiveness of local institutions to adapt to varying climatic conditions.

Traditional social institutions were responsible for managing natural resources and land use, providing early warning, and for resolving conflict, which were at the core of the coping mechanisms of pastoralists for many years. Social organisations, such as the *hakura* land management in Sudan, underwent profound transformation through time, which resulted in lower adaptive capacity of pastoralists and increased vulnerability to climatic impacts – mainly drought. Reinstating the capacities of these institutions is thus pivotal to restoring local environmental governance and in preventing conflict that arises as a result of competition over scarce life sustaining resources, such as pasture and water.

There is a need to strengthen the capacity of these institutions to invoke meaningful effort in mitigating the impact of climate change in arid and semi-arid regions in Africa. Development actors working on pastoralist issues have to work toward building viable pastoralist institutions. The pastoralist communities and their institutions must be empowered to take the lead in their development and response to climatic change.

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Pastoralism, Power and Choice¹

Helen Young

Abstract

This paper heavily depends on a recent Tufts report. The impetus for this research study is the recognition by a number of local, national and international stakeholders that the knowledge and understanding about the nomadic camel-herding groups are extremely limited. The main purpose of this research is to address the gap in understanding the livelihoods of these groups and their particular vulnerability. The study also aims at identifying the historical and prevailing institutional, environmental and policy processes that are shaping and driving livelihood vulnerability, and exploring how these play out in terms of livelihood adaptations and power relations between groups. This study was designed to be both exploratory and a preliminary first step, due to the fact that these groups were thought to be 'hard to reach'. It applied qualitative methods which included: a desk literature review, stakeholder interviews in Khartoum and in capitals of the states of Darfur, actual case studies that included key informant and focus group discussions, and a strategic review of recommendations with stakeholders. The paper concludes by highlighting the narrow view of vulnerability underlying western models of humanitarian assistance, which is based on food security and displacement to camps and towns. Finally, the research outlines eight broad areas of recommendations.

1. Introduction

Despite five years of global focus on the Darfur conflict, little is known about either the lives or livelihoods of the Northern Rizaygat – the groups of camel-herding nomads (*abbala*). The Northern Rizaygat are seen as one of the main protagonists in the Darfur conflict, as many are members of the irregular armed forces, pejoratively known as the *janjaweid*. The impetus for this research study is the recognition by a number of local, national and international stakeholders that the knowledge and understanding of these camel-herding nomadic groups are extremely limited. Partly as a result of this, the Rizaygat *abbala* have been relatively excluded from various forms of international action on Darfur, including humanitarian programming, international peace processes and international advocacy campaigns (except as antagonists).

¹ This paper is based on a recent Tufts report: Young et al., (2009). Livelihoods, Power and Choice: The Vulnerability of the Northern Rizaygat, Darfur. Medford MA, Feinstein International Center, Tufts University. <https://wikis.uit.tufts.edu/confluence/display/FIC/Livelihoods%2C+Power%2C+and+Choice+--+The+Vulnerability+of+the+Northern+Rizaygat%2C+Darfur%2C+Sudan>

The situation of pastoralists in Darfur must be seen in the broader context of pastoralism on both an international and regional scale. Darfurian nomads have a lot in common with pastoralists in the wider East Africa region and globally, particularly in terms of their social, economic and political marginalisation and the challenges they face. Governments systematically favour development of agriculture and settlement at the expense of pastoralism and nomadism (Bovin and Manger, 1990). Historically, tenure rights have been framed in terms of land occupation and improvement of the land by agriculture, while uncultivated land has not been considered ‘fixed property’ (Gilbert, 2007). “The principal rationale behind such an argument was that nomadic peoples were regarded to be in a sort of pre-political state of nature with no proper laws or institutions dealing with property in land” (ibid., p. 686). In most countries, without properly defined rights, pastoralists face discrimination and are frequently labelled as uncivilised, or even criminal beings (Gilbert, 2007; Markakis, 2004).

In the past century, there has been a distinct bias in both literature and government policies toward sedentary cultivators, a bias that has its roots in 19th century colonial culture, where land ownership associated with sedentary cultivation was predominant. As a result, regional government policies have tended to favour sedentary cultivators over pastoralists. Often, in the wider analysis of pastoralists in the East Africa region, the pastoralists of Darfur have been forgotten, but none more so than the nomadic camel-herding groups. Lessons learnt about such groups from Darfur have much wider regional and international policy implications. They provide a more holistic and balanced view of the recent conflict and crisis, and broaden horizons on how specific problems can be addressed in the future.

Since 2004, Tufts have included pastoralists as part of our ongoing livelihoods research programme, recognising the importance of both pastoralism and the necessity of reporting and analysing the problems facing all groups.

The need for this particular research study was identified locally in Darfur during a series of four livelihood workshops in 2007 (Young et al., 2007). The workshops brought together more than 180 national and international actors, who, through a participatory process, were able to reach a consensus. The actors produced a shared and common understanding of the impact of conflict on livelihoods and, based on this, developed a more strategic approach for the support of livelihoods through humanitarian assistance. Participants agreed that conflict and insecurity were continuing to destroy livelihoods, and that the adaptations that particular livelihood groups were making were, in themselves, fuelling further conflict. They identified the breakdown and failures in local governance, particularly in relation to the competition over natural resources and local conflict resolution as a major problem. They felt this contributed to the acceleration of environmental degradation, particularly in areas of high population concentrations as a result of displacement. The inequitable distribution of humanitarian livelihoods programming was recognised, with some groups – particularly the pastoralists – seen to be widely neglected. The workshops recommended that the humanitarian community should aim to include all marginalised

livelihood groups, particularly pastoralists. This recommendation provides the impetus for this study. This research builds on a series of earlier Tufts independent research studies on the impact of the conflict and crisis on livelihoods, trade, migration and remittance flows².

The purpose of this research is to analyse the evolving vulnerability of pastoralist livelihoods in Darfur, in order to:

- Promote understanding and raise awareness about the livelihood challenges facing specific pastoralist groups in Darfur, both in Sudan and internationally
- Engage a broader group of stakeholders and promote dialogue, in order to broaden participation in relevant national- and international- level processes around peace and recovery
- Sharpen the focus and effectiveness of strategic humanitarian action aimed at supporting the livelihoods of these groups, now and in the future

In this research, vulnerability implies the state of being vulnerable – in terms of weakness or susceptibility to harm, damage or loss of livelihoods (rather than the outcomes of vulnerability)³. From this perspective, the research is concerned with understanding and analysing the causes of vulnerability, which are deeply rooted in history and are embedded in complex interactions between human beings, the environment and institutional and policy processes. The overarching research interests are a) to identify the historical and prevailing institutional, environmental and policy processes that are shaping and driving livelihood vulnerability and b) to explore how these play out in terms of livelihood adaptations and power relations between groups.

This study was designed to be both exploratory and a preliminary first step because these groups were thought to be ‘hard to reach’. Therefore, they are perceived to be difficult to research because of their nomadic way of life and conflictual relationship with the international community in recent years. They are widely perceived by the international humanitarian community to be less vulnerable and therefore less in need of assistance. Consequently, they have had relatively little contact with humanitarians

² Tufts/Feinstein International Center has been engaged in field research in partnership with a range of local, national, and international partners in Darfur, and neighboring Libya, since 2004. This has included surveys of the livelihoods of IDPs in Zalingei and Kebkabiya (2006 and 2007) and a study of trade and markets in 2007. In 2005 Tufts contributed a livelihoods situational analysis as part of the Darfur Joint Assessment Mission and also participated in the World Bank Wealth Sharing Workshop for parties to the Darfur peace talks. In 2007 Tufts/ Feinstein International Center facilitated participatory processes of livelihoods analysis among key UN, INGO, and government actors, which have actively promoted livelihoods approaches in the Darfur region as reflected in the UN Workplan. The aim was to develop a more strategic approach for humanitarian support of livelihoods that integrated livelihoods, conflict, protection, and natural resource management. As a result of this work, national and international actors have sought to integrate an understanding of livelihoods as part of international peace processes and worked to ensure local humanitarian efforts provide more strategic support to livelihoods.

³ In food security contexts, vulnerability is often defined in terms of an outcome, such as hunger, acute malnutrition, food insecurity, or famine. See Max Dillely and Tanya E. Boudreau (2001), “Coming to terms with vulnerability: A critique of the food security definition”, *Food Policy*, 26(3), pp. 229-247.

over the past five years. There was also a sense that these groups would deeply mistrust researchers as a result of the highly politicised aspects of much international advocacy.

This research applied qualitative methods which included: a desk literature review, stakeholder interviews in Khartoum and in capitals of the states of Darfur, actual case studies that included key informant and focus group discussions, and a strategic review of recommendations with stakeholders.

The Darfur region has been the site of the most appalling violence. All parties involved in the conflict have deliberately targeted civilians. While the scale and ferocity of the conflict diminished after 2003, gender-based violence has continued to be reported by all sides. This continued violence is not the subject of this research but needs to be acknowledged. Despite investigating the livelihoods of some of the groups associated with the government-backed militia, this research didn't seek to condone or excuse the violence, or even to make sense of it. Rather, the aim was to address the gap in understanding the livelihoods of these groups and their particular vulnerability.

2. Historical livelihoods in Darfur

Historically, rural livelihood systems in the Darfur region have been shaped by migration, ecology and ethnicity. Immigration has been encouraged by the region's strategic geographical location – with few natural obstacles to movement – alongside Darfur's position as the junction for multiple trade routes. Migration, trade and the strategy of the Fur Sultanate (which ruled the region until it was incorporated into Sudan by the British in 1916) to attract immigrants, have all increased the number of tribal groupings and the linguistic diversity of the region.

In the past, many of the *kabilla* (tribes) of Darfur were distributed very broadly according to ecology and livelihood. Camel-based pastoralism was practiced in the arid northern areas (with migration to the south) by the *abbala*. Arable cropping was often combined with more sedentary animal husbandry in the central and western areas on the sandy and alluvial soil. Cattle-based pastoralism was practiced by the *baggara* (the term widely used for Arab cattle-herding pastoralists) in the wetter southern savannah area. This area of heavier clay soils was hardly used by cultivators prior to the introduction of mechanised equipment.

The number of 'real nomads' – groups of people who have no fixed home and move with their livestock in response to seasonal variations in rainfall and pasture – are declining. Conversely, agro-pastoralism – where households combine long-distance livestock herding and more sedentary localised farming activities – has increased over the years, particularly as many adapted their livelihoods to the pressures of drought in the mid-1980s. The importance of ecology and tribal affiliation in influencing livelihoods remains important, despite the massive rural-urban demographic shifts, which have occurred as a result of displacement in recent years.

3. Who are the Northern Rizaygat?

The Northern and Southern Rizaygat form a confederacy of Rizaygat tribes in Darfur. The Northern Rizaygat are traditionally camel herders (*abbala*), while the Southern Rizaygat are cattle herders (*baggara*). The Northern and Southern Rizaygat have three branches in common, which include both *abbala* and *baggara*: the Miheiryia, Nu'ayba and Mahamid. There are two additional Northern Rizaygat groups who are uniquely *abbala*: the Ireyqat and Iteyfat.

The Southern Rizaygat groups are found in South Darfur and are united under one tribal administration. In contrast, the northern camel-herding Rizaygat are found separately under their individual Tribal Administrations of Mahamid, Mahriyya, Nu'ayba, Irayqat and Iteyfat. Efforts to bring them under one tribal administration with the Southern Rizaygat, or to organise them collectively during the colonial period, have not been successful. They were not allocated their own tribal homeland by the colonial administration, partly for this reason.

4. The pastoralist domain and importance of mobility

Pastoralism in Africa came about precisely as an adaptation to climate variability and long-term climate change, around 7,000 years ago. Pastoralism predated agriculture by several millennia and coexisted with hunting and foraging (Brooks, 2006).

Traditionally, the Northern Rizaygat are the most mobile of all pastoralist groups in the region, and there are officially 11 migration routes specified by the government for use by the Northern Rizaygat. They follow a seasonal migratory movement from the fringes of the Sahara to the rich savannah in the south. Both of these extremes are ecologically very important as part of their pastoralist system.

In the past, the Northern Rizaygat's nomadic lifestyle and love of camels defined their traditional relationship to land, the management of natural resources (water and pasture) and their social relations with settled farmers. This earlier stage of 'ecological integration' between nomads and farmers reflected the integration of the two production systems in such a way as to maximise mutual benefits for both groups (Manger, 1990).

However, since the 1970s, a number of combined pressures introduced remarkable changes in land-use patterns that negatively affected pastoralists and their relationships with the people around them. Blocking of migration routes started long before region-wide conflict erupted in 2003 as a result of a series of tribal conflicts (with the Zaghawa in the north in 1997), and the Fur in the central areas, which revolved around access to pasture and water. In North Darfur, nomads and their livestock have now become concentrated in certain rural areas, including the areas between Kutum and Kebkabiya, which provide alternative pastures, because they cannot move north beyond Kutum (due to conflict). Southerly movements from North

Darfur via Kas and Zalingei are also restricted because inhabitants refuse to let them pass.

5. Disempowerment, long-term neglect and marginalisation

The long-term marginalisation of the Darfur region by the central government of the Sudan is well documented. However, less is known about the long history of active and passive neglect of pastoralism and pastoralist groups, including the Northern Rizaygat, which is taking place within this wider marginalisation of peripheral regions of Sudan. This has led to tensions between pastoralists and regional and national authorities, and also with sedentary agriculturalists. Both sets of tensions have implications for the current situation in Darfur. Impoverishment and marginalisation result from socioeconomic, political and ecological processes. The relationship between the state and the nomads has contributed to their exclusion from power and to the current pattern of resource distribution. Pastoralist groups have become powerless, with limited access to resources. The Darfur crisis is thus long-term and its scope extends beyond the boundaries of the region.

A number of long-term historical processes and institutions have shaped vulnerability over time. The most important include:

- Long-standing (and inequitable) systems of land tenure and natural resource management that have their roots in the sixteenth-century systems of the Fur Sultanate, and were further institutionalised under colonial rule and post-independence governments
- Passive and active neglect by national authorities of pastoralist groups, which took place within the wider context of the marginalisation of Darfur
- The impact of recurrent droughts on the Northern Rizaygat, which led to changes in land use patterns and the development of new and disadvantageous rules that influenced their access to pasture and water
- Local conflict with reference to the Fur-Arab war and the conflict between Arabs and the Zaghawa, a semi-nomadic group that speak a Central-Saharan language and who live in Chad and Darfur, with whom the Rizaygat have long been in conflict
- National conflict with reference to the impact of the protracted civil war between the northern government and the Sudan People's Liberation Movement, which ended in 2005
- The regional conflict and tensions with Chad and Libya

The Northern Rizaygat, as *abbala*, were left in a state of impoverishment, frustration, hopelessness and desperation as a result of a lack of good governance, political tension, militarised tribalism and marginalisation. As a result, they feared for their survival.

The relative power of nomadic groups in the build up to 2003 was less than that of sedentary cultivating groups who enjoyed more secure access to land and other natural productive resources. The long-term processes that affected their daily lives and livelihoods generated a sense of social, economic and political exclusion, which built up over time and pushed them into alliances and violence at the end of the 1980s. These groups feared for their survival and believed that an element of the rebel insurgency was directed at their destruction.

With a long history of local tribal conflict with the Zaghawa to the north, the Fur in the central rangelands and the Masaleet in the west, the Northern Rizaygat saw the war of 2003 as a war against themselves – an impression that the government did nothing to disabuse them of, but everything to encourage. Faced with what they perceived as a threat of further marginalisation and impoverishment, or subjugation by other groups, and possibly even of extinction or expulsion from Darfur, their decision to mobilise in support of the government appeared the only rational choice. Failure to pay attention to these factors could result in a flawed peace process, or recovery plans that simply entrench the same grievances that led to the violence in the first place.

6. Post 2003: livelihoods in transition

The livelihoods of the Northern Rizaygat are going through rapid transition, partly as a result of the massive impact of conflict since 2003. Traditional livelihood strategies, linked to camel-based pastoralism, have declined with the loss of access to seasonal pastures and the massive increase in salaried military service. This has been accompanied by sweeping changes in pastoralist lifestyles, as their seasonal movements are restricted to safe zones. This restriction denies them access to their favoured pastures, particularly in the north. The control of this northern area of Darfur by the Zaghawa has blocked former Arab livestock trade with Libya and Egypt, an important source of livelihood for a large number of people. The Zaghawa now dominates most of this trade. This restricted access also negatively affects labour migration to Libya, another traditional livelihood strategy of the Northern Rizaygat. In the past, male migration to Libya was part of the way of life of the Northern Rizaygat – first by camel and later by truck.

The forced displacement of many rural farmers to towns and camps, as a result of the government's counterinsurgency against the rebels in 2003, gave pastoralists the upper hand in these rural areas, but, at the same time, removed a critical part of the social and economic fabric of their society. The displacement of rural farming communities has destroyed local markets, which nomads depended on to buy essential goods and to sell their own produce. At the same time, the increasingly urbanised IDPs represented a captive market for firewood and grass, for example, as they are constrained from directly accessing these natural resources themselves. Firewood, especially in West Darfur, provides a significant source of income for the increasingly sedentary pastoralists. There is clearly a wider context of the new livelihood strategies of the

Northern Rizaygat, including their role as militia in the conflict and the use of intimidation and violence to control access to resources.

The Northern Rizaygat were also directly affected by the conflict and insecurity, in terms of violent attacks, livestock raiding, blocked migration routes, kidnappings and killings. As a result, they moved to safer areas and were, in effect, displaced. These effects generally received little international acknowledgement, let alone a response, i.e. they lacked visibility except in a very negative sense. Various reasons for the lack of visibility of the losses of the Northern Rizaygat include: the scale of the counterinsurgency and human rights reporting on this, the low visibility of pastoralists generally, and the way in which western models of vulnerability and displacement tended to prioritise IDPs in camps and towns over other affected categories of displaced persons.

Whilst the Northern Rizaygat adapt and diversify into new livelihood strategies, these are often maladaptive in the sense that they are short-term, war-related strategies that provide quick returns but have no future, because they are not based on any legal entitlement or rights. Rather, they may depend on either a distorted market, in which IDPs are captive, or, alternatively, they are linked to conflict, violence, intimidation and possibly coercion (militarisation and possibly violence as a means of controlling firewood resources). The grossly distorted economy provides these groups with a cheap source of food in the form of food aid for use as animal fodder, whilst the large numbers of humanitarian aid workers, peace-keepers and even IDPs provide a market for their livestock, livestock products and firewood. IDPs depend on, to a large extent, the purchasing of firewood from the market for cooking, and claim that they are prevented from collecting it themselves because of insecurity and the threat of gender-based violence. In addition, the war has provided the Northern Rizaygat with their first regular, salaried income as government-backed militia.

There are several extremely serious consequences of such livelihood maladaptations. Firstly, acts of violence and intimidation associated with livelihood maladaptations are an abuse of human rights, and second, livelihood maladaptations negatively affect the livelihoods of others by preventing them from going about their business. Moreover, there is the consequence that the livelihood maladaptations of the Arab *abbala* fuel tensions between them and other groups, generating further polarisation and potentially local conflict and thus reinforcing the livelihood-conflict cycle. Maladaptive livelihood strategies are not only unsustainable in terms of their illicit nature; they are incompatible with localised peace, wider economic recovery and sustainable environmental governance.

These shifts in livelihood strategies have directly affected the livelihood assets portfolio of the Northern Rizaygat. At first glance, certain livelihood capitals would appear to have increased, particularly as a result of two factors: increased financial capital (through military salaries, livestock, and firewood sales); and increased access to natural resources (in terms of better access to water, pasture, and cultivable land

within a more confined area, i.e., within the contracted pastoralist domain). But even though financial and natural resources appear to be increased (with the exception of the contracting pastoralist domain), this is based almost entirely on maladaptive strategies linked to the war economy, forced displacement, the captive market of IDPs, conflict, and violence. It is not based on legal rights and entitlements and therefore has no foundation. At the same time, social, human, and political capital have further decreased below what were already extremely low levels before 2003. This distinctive and very skewed pattern of livelihood assets is illustrated in Figure 1. Note this figure is a figurative illustration of the typical pattern, rather than based on actual indicators for each of these different types of assets.

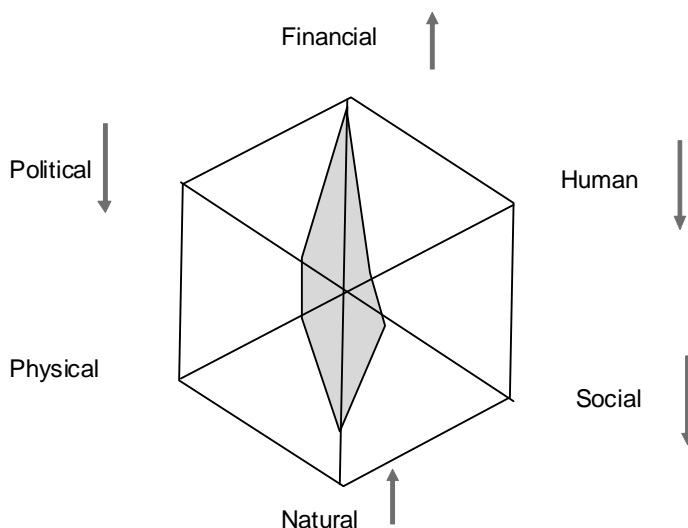


Figure 1: A comparison of the typical pattern of livelihood assets for the camel nomads

7. Ongoing processes shaping vulnerability and livelihood goals

The livelihood maladaptations of the Northern Rizaygat over the past five years have been influenced by a number of ongoing processes that have negatively impacted their livelihoods. These include:

1. *The rapid acceleration in processes of sedentarisation:* The pastoralist livelihoods of the Northern Rizaygat are at different stages of transition along a spectrum, from true nomads, who do not cultivate or engage in the newer livelihood strategies, to fully sedentarised households, which are rapidly diversifying their livelihood strategies to take advantage of any new opportunities. In between these two extremes are groups at various stages in the process of sedentarisation. The diverse patterns of displacement and sedentarisation do not fit neatly with the sweeping generalisations about ‘land

- occupation' by the Arab *abbala* and the reports of entrenched patterns of coercion and exploitation.
2. *The militarisation of youth:* which is probably the most significant change to the livelihoods and culture of the *abbala*. It is mainly youths and young men who are targeted and directly recruited into the civilian army (*defah shabeh*), which provides both themselves and their families with a regular income. Women actively encourage their husbands to join because of the salary and livelihood implications.
 3. *Loss of local and transnational markets:* The dire effects of the conflict on Darfur's economy, markets and trade were not foreseen by the Northern Rizaygat, and therefore account for some of the major negative impacts on their livelihoods. As explained earlier, the loss of transnational livestock trade to Libya and Egypt directly affected the Northern Rizaygat, probably more than that of any other group.
 4. *Failing governance and leadership:* representation of the Arab nomadic groups in local government, civil society and among international agencies tends to be very limited. This limited representation is largely due to the nomads' lack of education (and low literacy rates), but also because of discrimination and domination by other tribes. In both West and North Darfur, Arab groups expressed disillusionment with their most senior traditional tribal leaders and the tribal elites in Khartoum and the state capitals. Extremely few local NGOs delivering humanitarian assistance in Darfur work with Arab pastoralist groups of North and West Darfur, and many view those that do work with nomads as partial and pro-government.
 5. *International processes of exclusion and misrepresentation:* There is a widely held perception amongst the Northern Rizaygat, that the international humanitarian community favours particular groups. At the same time, they believe that the international peace processes have excluded them, giving them no voice. Of additional concern is the way that the western media, human rights groups, and 'Darfur activists' have demonised and blamed the Northern Rizaygat for the war and human rights abuse. The humanitarian community has made more effort than any other international actor to engage and respond to the petitions of Arab *abbala*.

These factors represent the myriad of influences associated with the institutional and policy environment that continue to drive and shape the livelihood goals of the Northern Rizaygat and the choices available to them. These goals are closely linked with seeking power, rights and influence. Seeking power includes both the traditional power invested in the camel and *abbala* culture, and the modern power of education and militarisation.

Historically, the traditional role and cultural significance of camels within nomadic society have shaped their relations with the environment and settled populations. In contrast, the Arab *abbala* have witnessed how the power of modern education enables them to secure influence in tribal affairs and political power more broadly, which in

turn has influenced their livelihood choices and decisions to settle. Lastly, in more recent years, militarisation – joining the armed forces – has proved an effective means especially for youth, of acquiring status, wealth and of protection of individual and group interests and, when necessary, the subjugation of rivals. Therefore, the livelihood choices and adaptations have directly impacted on the power relations between groups.

8. Conclusions – no quick fix

This brief review has helped to identify the historical and prevailing institutional, environmental and policy processes that are shaping and driving livelihood vulnerability, and in this way has illustrated the way in which vulnerability is embedded within the political economy and political ecology of conflict. Recognising the rights to the pastoralist domain, the importance of mobility between the far north rainy season pastures (the *Jizzu*) and the southern grazing areas, are both crucial to the sustainability of camel herding pastoralism.

This review has also highlighted the narrow view on vulnerability underlying western models of humanitarian assistance, which is based on food security/displacement to camps and towns and a narrow range of interventions dominated by food. There is an urgent need for the extension of currently short timeframes for analysis and response. Furthermore, there is a need for the generation of a greater understanding of pastoralism as an adaptation to climate variability and the importance of mobility for its success. Humanitarian actors are urged to take account of the particular vulnerability of pastoral groups, and to recognise that their needs are qualitatively different from those of IDPs. Exclusion, neglect and marginalisation are the unfortunate legacies of colonial and post-colonial policies, which the international community, including humanitarian actors, must not continue to legitimise and reinforce.

Local peace initiatives are occurring in Darfur but need to occur of their own accord. Such initiatives will have limited impact unless they are supported by wider systems of good governance. Strengthening governance at every level will help to promote and improve dialogue and consultation between citizens, civil society and government, and enhance participation in policy formulation and implementation. Finally, international peace processes must be more attentive to nomads. This requires getting to the heart of, and really understanding, local tensions and conflicts, and links with national and international level processes. This task is not just about looking back at events of the past five years of conflict in Darfur. It must primarily focus on tackling deep-rooted processes of marginalisation and unrepresentative governance systems at all levels.

The research outlines eight broad areas of recommendations intended to promote:

- 1) A participatory policy review of pastoralism in order to encourage policy coherence between ministries concerned with pastoral issues

- 2) Space for local and national civil societies to develop a comprehensive advocacy strategy on camel pastoralism and the economic importance of the *abbala* to the national economy
- 3) Localisation of the peace process and stronger linkages from local to higher-level peace initiatives
- 4) Linkages between pastoralist livelihoods and development; education, health and women's development as priorities
- 5) Improved accountability, transparency and responsiveness through building the capacity of key governance institutions, such as the Sudanese government's Pastoral Commission and Women's Commission
- 6) A new generation of leadership through civil society development and by enabling youth to engage with government authorities and the military
- 7) Reversal of the processes of militarisation linked to livelihoods
- 8) Best practice, joint research and collaborative learning, which include building the capacities of local universities and integrating issues of pastoralism, livelihoods and conflict in their curricula.

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The Conflict-Livelihoods Cycle: Reducing Vulnerability through Understanding Maladaptive Livelihoods⁴

Helen Young

Abstract

As the Darfur conflict enters its sixth year, different livelihood groups remain polarised – socially and ethnically, economically and politically. More broadly, in the prevailing context of limited livelihood options and increasing vulnerability, livelihood choices can be ‘maladaptive’. For people who have been forcibly displaced and are living in urban settlements, this may involve the over-exploitation of limited resources, such as water, for resale in town or for brick-making. For other groups, maladaptive livelihood strategies may be linked with violence or coercion, such as military careers and firewood collection. Although these provide quick financial returns, they depend on an economy that is distorted by conflict, and a captive market of Internally Displaced Persons (IDPs). Worse still, these maladaptive strategies exacerbate vulnerability for both victims and perpetrators and threaten Darfur’s longer-term recovery. On the one hand conflict directly and indirectly destroys livelihoods. However, on the other hand, pressures on peoples’ livelihoods combined with weak local governance can fuel or exacerbate conflict and contribute to further intimidation and violence, as well as the unhindered destruction of the environment. This polarization between livelihood groups reinforces localised cycles of conflict and violence. Ways out of the conflict-livelihoods cycle and the beginning of new relations are possible, but unless they are supported by wider systems of good governance and linked in some way to higher level peace processes their impact will be limited. There is a need to strengthen governance at every level in order to promote and improve dialogue and consultations between citizens, civil society and government, and to enhance participation in policy formulation and implementation.

1. Introduction

Competition between livelihood systems, namely sedentary farming and transhumant pastoralism, are integral to the underlying causes of local conflict in Darfur. Since the escalation of conflict in 2003 to a full-blown rebel insurgency and counter-insurgency, livelihoods have been devastated most visibly as a result of the systemic destruction of livelihood associated with direct asset-stripping and forced displacement. More insidious but equally devastating has been the ongoing systematic or indirect

⁴ For the past five years, the Feinstein International Center at Tufts University has been researching livelihoods and conflict in partnership with local, national and international organisations in Sudan. This paper brings together some of the key findings from a number of recent reports published by the Feinstein International Centre and authored by Helen Young and a large number of co-researchers, including Abdalmonium Osman, Karen Jacobsen, Dan Maxwell, Ahmed Malik Abusin, Michael Asher, Omer Egemi, Margie Buchanan-Smith and Abdaljabbar Abdalla Fadul. A full list of these reports are found in the references.

destruction of livelihoods. Lack of mobility and access has restricted the livelihood strategies of all groups, including rural and urban residents, displaced and transhumant groups. Locally, many of the grievances on different sides and underlying causes of local tensions and conflict, involve livelihood issues (land tenure, access to water, pasture, access to markets and economic opportunities, development of human capital etc.). Therefore, an emphasis on livelihoods is central to any lasting solutions to the conflict.

A livelihoods framework of analysis is of far greater utility in seeking peace and recovery than the frequently applied genealogical approach. While livelihoods may broadly be divided along ethnic lines, ethnicity overall is little more than a historical construct, with limited value in understanding the conflict and groupings in Darfur. A genealogical approach has been shown to be more of a reflection of de facto power relations between groups than of actual historical provenance. Worst of all, it glosses over the centuries-long processes of amalgamation, fission and assimilation that have resulted in the current tribal groupings in the region (Hassan, 2003; O'Fahey, 1982). Rather than a region populated by distinct 'African' and 'Arab' tribes, Darfur can be regarded as being inhabited by a number of interconnected African tribes, some of whom speak Arabic as their mother tongue. In modern-day Darfur, people have multiple layers or dimensions of identity, and identify and consider themselves as part of many 'communities' based on identities informed by gender, age, caste and ethnic affiliation; as well as economic position (Manger, 2005). Tribal identity is generally not a rigidly defined concept, but rather has a fluid and permeable nature. In this way, tribes are continually merging and splintering populations, rather than inflexible distinct entities, with groups expanding or shrinking depending on prevailing conditions. Essentially, a tribe represents a coalition through which groups and individuals can secure their interests in different situations. The cultural diversity found in Darfur is underpinned by tribal and livelihood system differentiation. Tribe and ecology have interacted over time to influence rural livelihood systems and relations between groups. Most livelihood systems transcend tribal groupings, for example camel herding is practiced in Darfur by many groups collectively referred to as *abbala*, and is often described as a culture. The emphasis on ethnicity has in part come about from the way in which ethnicity has been mobilised to serve the interests of the main warring parties. Too often, however, this emphasis is simplistic and misleading and certainly does not provide a good basis for understanding the crisis.

Since 2004, our research in the Darfur region has focused on the impact of the crisis and conflict on people's livelihoods in Darfur, including the role of migration and remittance flows. Based on this understanding and analysis, we have sought to inform international humanitarian programmes, as well as informing international peace processes (such as the rounds of talks in Abuja), and the recovery initiatives linked to the Darfur Peace Agreement, such as the Darfur Joint Assessment Mission in 2007. We have undertaken a range of independent action research studies in Darfur, central Sudan, eastern Sudan and Libya between 2004 and 2008. In 2007, we co-organised a series of four Darfur-level workshops, in which we introduced a participatory

approach to livelihoods and conflict analysis. This shared and public analysis was remarkably consistent and served as the basis for sharpening the strategic direction of livelihoods programming in Darfur and incorporated livelihoods approaches within the UN work plan for 2008 (Young et al., 2007). We recently published a series of four comprehensive research studies (Buchanan-Smith & Fadul, 2008; Young, Jacobsen, & Osman, 2009; Young & Maxwell, 2009; Young, Osman, Abusin, Asher, & Egemi, 2009).

2. Integrating livelihoods, conflict and vulnerability analysis

Our explicit aim has been to more fully integrate conflict analysis with the livelihoods approach. The livelihood approach that we have adopted as the basis for our research in Darfur is adapted from the Sustainable Livelihoods discourse and framework, with a shift in focus from ‘sustainability’ to ‘vulnerability’ and the explicit incorporation of political ecology and political economy.

The original work on the Sustainable Livelihoods Framework (SLF) took as one of its five broad elements, “livelihood adaptation, vulnerability and resilience” (Scoones, 1998, p. 6). Scoones builds on the important work on adaptive livelihood strategies led by Davies (Davies, 1993), and the concept of vulnerability, risk, and resilience of Chambers in the context of food insecurity and famine (Chambers, 1989). Chambers viewed vulnerability as having two sides, “An external side of risks, shocks and stress to which an individual or household is subject and an internal side of defencelessness, meaning a lack of means to cope without damaging loss” (ibid, p. 1). This two-sided perspective has been widely adopted, and is directly reflected in the subsequent Sustainable Livelihoods discourse and framework.

Scoones’ definition of sustainable livelihoods indicates that, “A livelihood is sustainable when it can cope with and recover from stresses and shocks.” (Scoones, 1998, p. 6). Similarly, sustainable livelihoods are those, “That can avoid or minimise such stresses and shocks and/or that are resilient and able to bounce back” (Chambers and Conway, 1991, p.11). This view reflects the dualistic views of hazard (external) and coping (internal), yet has moved away from explicitly focusing on ‘vulnerability’ towards ‘sustainability’. Bankoff (2001), argues that this two-sided view of vulnerability has its roots in Western cultural perspectives on the relationship between human beings and nature, which are often presented as being in opposition and separate. As described by Oliver-Smith (2004, p. 14), “Society exists as a collection of human constructs and relations and the environment is ‘out there’ waiting to be acted upon in the cause of sustaining human life....this has led to a construction of hazards as disorder, as interruptions or violations of order by a natural world that is at odds with the human world.” This is problematic for two reasons, firstly because it says little about the causes of vulnerability and how causes and symptoms evolve with any attempts to address them and, more importantly, because it ignores the way in which many rural livelihood systems, and especially pastoralist livelihoods, are an adaptation to a fragile habitat in which climate variability is the norm. Thus, pastoralism, more

than most livelihoods, endeavours to be in equilibrium with the natural world rather than in opposition. In other words, pastoralism endeavours to achieve a balance with nature, rather than harness, tame or otherwise overcome its disorder.

This western dualistic view continues to permeate approaches to disaster prevention and development. Within the disasters discourse, the focus is often on 'disaster risk', which is a function of hazard (exogenous) and vulnerability (endogenous) in terms of capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard (Blaikie, Cannon, Davis, & Wisner, 1994). In this case, vulnerability is concerned with the internal capacity of a group to cope, and is therefore conceptualised as endogenous, whilst the hazard remains an exogenous threat, usually related to the environment. Whilst causality relates to both sets of risk factors, prevention of natural disasters has tended to focus on the intrinsic factors that render a household unsafe.

In recent years, scholars of disasters and vulnerability have moved on in rethinking the relationships between society, economy, and nature (Bankoff, Frerks, & Hilhorst, 2004) and there is now wider recognition of the mutuality of nature and culture, and a discarding of the dualism in human-environment constructs (Oliver-Smith, 2004). As is often the case, however, the practitioners lag behind the theoretical discourse, and this dualistic perspective remains central to the sustainable livelihoods approaches adopted by a wide array of international actors. Within the diagrammatic representation of the sustainable livelihoods framework, there is a physical separation between the 'vulnerability context', which represents 'shocks, trends, and seasonality' (i.e. hazards) and the livelihood system. Similarly, in the adaptation of the livelihoods framework by Collinson, the vulnerability context is viewed as a separate entity which impacts on all the components within livelihood systems (Collinson, 2003). This physical separation of the vulnerability box from the other elements in the conceptual framework is indicative of a dualistic approach, with roots in nineteenth-century cultural perspectives regarding the relationship between human beings and nature.

Some progress has been made in considering livelihood systems in conflict. Lautze and Raven-Roberts have reconceptualised vulnerability as endogenous to livelihood systems in violent settings (Lautze & Raven-Roberts, 2006). They argue that livelihood assets may become life- and livelihood-threatening liabilities in times of conflict. Numerous examples of asset-stripping exist in the literature, in the form of predatory raiding (Keen, 1994), scorched earth tactics, gender-based violence, and direct theft and looting (Duffield, 1994), all of which are common to the recent Darfur conflict. Often, these actions are sponsored by actors outside the immediate livelihood system with criminal or political motives (Hendrickson, Armon, & Mearns, 1998), or indeed, as in the case of Darfur, are deeply embedded within the system of governance and tactics of war. To view predatory raiding or other violent acts as a one-off shock, however, is to ignore the important indirect effects as a result of a state of insecurity and the knock-on or secondary effects generated in terms of limiting coping strategies normally resorted to (Hendrickson et al., 1998). A further indirect effect may be the

exacerbation of inter-communal violence through lifting of cultural taboos, and extending tit-for-tat violence.

Lautze and Raven-Roberts (2006) argue that their reconfiguration of the livelihoods framework is relevant to violent settings. The adapted livelihoods framework in Figure 1 illustrates how households manage and acquire their livelihood assets or capitals in order to undertake livelihood strategies in pursuit of livelihood goals. Livelihood assets are best illustrated using a specific livelihood system as an example. For pastoralists, the main livelihood assets include:

- Natural: seasonal availability of water, pasture, access to long-distance livestock migration routes, and cultivable land for agro-pastoralists. This encompasses access to rights and land ownership or tenure.
- Social: the social resources people use to pursue different ways of making a living, including networks, group membership, relationships of trust, and institutional arrangements with land owners on migratory routes. The concept of reciprocity is important, as are the exchanges which facilitate cooperation.
- Physical: the basic infrastructure and producer goods needed to support livelihoods.
- Human: rich indigenous knowledge of herders and guides to manage herds, livestock health and migration; food processing and marketing skills.
- Financial: related to production and consumption, and the availability of cash or credit which enables conversion to other types of capital. In pastoralist communities, financial capital is based on the ownership of livestock. People consume directly from livestock (e.g. milk) and sell livestock products (MoARD, 2008).

Household decisions are influenced by the prevailing policy and institutional environment, as well as processes or trends (policy, institutions, and processes—PIPs) which in turn affect the net asset gains (or losses) to the household from pursuing a specific range of livelihood strategies. An analysis of PIPs would include a stakeholder analysis, identifying and mapping all the relevant stakeholders, including formal and informal institutions and even influential individuals holding positions of authority or power. A stakeholder either has the power (or authority) to influence the livelihoods of a particular group through their policies, practices, customary law and traditions, or alternatively could represent another group or body that is influenced or otherwise affected by the livelihood system in question. The term ‘institutions’ is used to refer to customs, rules or common law that have been an important feature of a particular group or society for a long time; the Native Administration in Sudan is a good example. The term is also used to mean an established body or organisation. Power relations between institutions are clearly of paramount importance in the context of a complex political emergency.

An analysis of PIPs should also take account of the wider environmental and climatic trends, and how these affect local livelihood systems. Climate variability is a feature

of many vulnerable livelihood systems, many of which have developed adaptive strategies to cope with the vagaries of the weather. Much can be learned about the implications of climate change, simply by reviewing historical processes of livelihood adaptation to climate variability.

Previous studies by Tufts/Feinstein International Center on livelihoods in Darfur have identified a range of policies, institutions and processes that continue to shape and influence livelihoods. These PIPs influence and interact with livelihood assets, strategies, and goals in a dynamic manner, which is represented by the “feedback loop” in the livelihoods framework (Figure 1). The explicit analysis of this feedback loop, which introduces a crucial temporal dimension into the analysis, is crucial in order to capture the dynamic, evolving nature of livelihood systems. While livelihoods appear to change and develop under their own volition, the available livelihood choices are a function of not only the range of livelihood assets available, but also the prevailing policies, institutions and policies. That choices can be influenced, manipulated even, by the policy environment is very clear in a rapidly changing conflict setting. Analysis of trends over time, comparisons of pre and post conflict, or acute versus protracted phases, are all powerful tools for understanding livelihoods.

A further dimension is the geographical and administrative range of the livelihoods domain. For example, livelihood systems are subject to the policy and institutional environment that applies in their immediate locale, as well as those in distant lands where people may migrate at certain times of the year, or where individual household members may temporarily reside.



Figure 1: Humanitarian livelihoods framework. Source: Lautze and Raven-Roberts, (2006)

In summary, we would emphasise that in a conflict setting, a household’s vulnerability is embedded within the livelihood system itself – particularly the prevailing policies, institutions and processes that mediate household assets and influence the strategies that people are able to adopt. In this sense, vulnerability is embedded in social processes and phenomena. The risks that people face are often close to home and integral to the livelihood system itself in that setting. We would also emphasise the dynamic nature of livelihood systems, with PIPs constantly mediating and influencing assets and strategies through the feedback loop. For this reason, long-term

perspectives are needed, both of the past history that has brought groups to this point in their livelihoods, as well as future scenarios and the livelihood choices that are available. At a local level, conflict, violence and crime are not exogenous to livelihood systems and household level dynamics, but rather are often part of livelihood systems and the competition between livelihood groups that has escalated into violence.

In our analysis presented below, three new conceptual features of livelihoods analysis in conflict are revealed:

- 1) The diversification and maladaptation of livelihood strategies and shift in livelihood goals
- 2) How livelihood adaptations can fuel or drive local conflict, thereby creating a livelihoods conflict cycle
- 3) The development of new forms of local governance linked with the international humanitarian system and the politicisation of humanitarian claims

2.1 Diversification and maladaptation

The vast majority of the IDPs within the conflict-affected population were in fact displaced more than 6 years ago in 2003/ 2004, which means that the situation has now become a protracted long-term crisis. Overall, the numbers of conflict-affected have ratcheted up; it is often a feature of protracted humanitarian crises that numbers affected are 'sticky upwards' – often increasing in relatively small increments but rarely going down.

2.2 Shifts in livelihood goals and strategies for all groups

Since 2004, livelihood strategies for all groups have diversified, particularly among IDPs and residents in urban areas, but also among rural residents and pastoralists. After five years of displacement to urban areas, the livelihood strategies of IDPs have changed to reflect the shift from their former rural-based farming systems to their new, urbanised environments. Access to food through own-production (agriculture or livestock) generally remains restricted for IDPs. Two household surveys among IDPs in Zalingei and Kebkabiya indicated that income derived from the sale of agricultural products and trade in livestock, had all but disappeared; less than 2% of Kebkabiya IDPs said that their income came from agriculture and livestock in 2007, and in Zalingei less than one percent reported either activity in 2006 (Young et al., 2009). Unable to pursue their traditional rural activities, IDPs in urban areas have switched to a mix of urban and seasonal rural strategies, supplemented where possible by labour migration for some households. This shift to more diversified urban livelihoods does not add up to an adequate source of food security or income, partly because many IDPs are chasing the same limited opportunities and some strategies, such as daily casual labour, are short-term. Most IDPs continue to depend on food assistance, which despite 50% ration cuts in May 2008, comprises a significant share of their food sources.

Livelihood goals have also shifted to incorporate goals associated with changes since becoming IDPs. A participatory exercise with groups from Zalingei revealed the following IDP goals:

- To meet survival needs
- To control or maintain links with their original land
- To reduce personal/family risks
- To preserve their dignity and self-respect
- To pursue urbanised ways of living (through education, media, markets)
- To meet increasing social responsibilities (women)
- To access new skills (slab-making)
- To acquire urban property – preferably in the town, to have even after they return (Young et al., 2009)

These goals reflect the immediate risks of food insecurity, protection threats, and threats to their land tenure; but also the opportunities presented by their new environment, particularly in terms of acquiring livelihood assets which have an urban rather than a rural association.

Many of the new livelihood strategies are maladaptive. For example, some of the new strategies adopted by IDPs, such as the sale of firewood, water-selling and brick-making, are unsustainable either because they over-exploit limited natural resources in a fragile ecosystem, or because they are linked to markets distorted by the presence of the international community and humanitarian assistance. Firewood collection puts considerable pressure on natural resources around IDP camps, which have been reportedly cleared of tree cover for many kilometres. Borehole water, provided for humanitarian purposes, is often collected and sold to urban residents, thereby exhausting or at least over-stretching a limited resource.

The construction boom in urban areas, which is linked to the demand for housing from residents and IDPs, plus the increasing scale of the international interventions in Darfur, is driving brick-making. However, researchers have concluded that, "The environmental consequences are devastating. Rough estimates indicate that the brick kilns are consuming over 52,000 trees-worth of wood per year; and since the conflict began much of this is green wood. The brick kilns are occupying and in many cases destroying valuable agricultural land by digging up clay soils around towns." (UNEP, 2008). Failures in natural resource governance, which not only limit access to crucial livelihood assets, but also lead to the over-exploitation of limited natural resources, such as timber, are critical.

In contrast, among some groups of pastoralists or former pastoralists, maladaptations are also occurring (which are described in the previous paper). In this fragile and politicised context, many long-standing livelihood institutions have been decimated, including markets and trading networks and customary natural resource governance.

There has been a complete breakdown in local natural resource governance, which severely restricts IDPs' access to land and other natural resources as these are now all controlled by other groups. In such a context, livelihoods are extremely precarious and very few IDP livelihood strategies could be considered secure or sustainable in the longer-term.

3. Livelihoods and conflict, lessons learned about their inter-relationship

The issue of natural resource conflict driven by scarcity has preoccupied Sudanese scholars and commentators for decades (Gilbert, 2007; Hardin, 1968; Ibrahim, 1984; Shazali & Ahmed, 1999). More recently in 2005, a government committee—established by the Minister of Interior in his capacity as the president's representative on Darfur—identified natural resource conflict as one of the root causes of the Darfur conflict. Its report noted that, “The committee attributed the current conflict to seven factors. The first factor is the competition between various tribes, particularly between the sedentary tribes and nomadic tribes over natural resources as a result of desertification.” (as reported in International Commission of Inquiry, 2005, p. 57). Similarly, groups in Darfur have at times been in conflict over access and control of trade routes. This competition and conflict between livelihood groups is underpinned by complex and often inequitable power relationships that reflect a background of broader social and political relations, from the local, to the national and even regional level. These local and transnational power relations are therefore crucial to understanding the conflict.

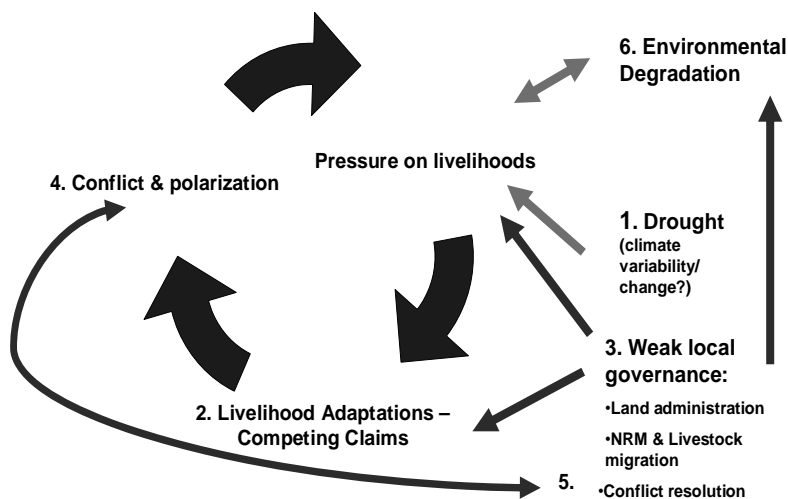
While the basic causes of national level conflict play out in the power relations between political parties, at a local level this is overlaid with specific grievances often linked to livelihoods. In particular, access to natural resources continues to be a major underlying cause of conflict locally. The extent that competition between livelihood groups continues to lock groups into a cycle of conflict with their neighbours tends to be overshadowed by the higher level conflict dynamics between political parties.

Within the Darfur region, while conflict and insecurity have destroyed livelihoods, the livelihood adaptations that people are making now are themselves fuelling, or driving, further conflict. This local conflict cycle is not occurring entirely independently from national conflict, and the crucial links can be found in local governance. An example of a local conflict livelihoods cycle is illustrated in Box 1.

Box 1: The conflict livelihoods cycle

1. Drought puts pressure on livelihood systems.
2. As a result of this pressure, groups resort to livelihood adaptations, which include competing claims over natural resources (land, pasture and water).
3. These pressures are not alleviated nor managed well by local systems of natural resource management and conflict resolution – which further pressurises livelihoods and contributes to local conflict.
4. The result is conflict between competing livelihood groups, which further pressurises livelihoods and polarises livelihood groups.
5. Conflict also weakens and undermines effective local governance.
6. A further complication is environmental degradation, which puts further pressures on livelihoods and in turn, as a result of pressure on livelihoods, further increases environmental degradation, competition and conflict between groups.

Livelihoods-Conflict Cycle



The conflict livelihoods cycle is evident in the inter-relationships between urban based IDPs and pastoralists who are living in rural areas or on the periphery of urban centres. For example, the control of firewood, forestry resources for building, and grass for fodder provides a lucrative income for those that can access it, but is denied to those who are forced to live as IDPs in camps and towns. IDPs in insecure settings represent a captive audience, who depends on the market for fuel for cooking and heating. The threat of gender-based violence in particular restricts their movements. Around the IDP camps of Zalingei for example, Arab groups collect the firewood, but as they do not have access to the camps they then sell it to IDP women, who will take it into the

camps. This is an example of two otherwise hostile groups having some form of economic relations, although to what degree this is coercive or predatory is difficult to determine. It would seem that competing livelihood strategies between IDPs and pastoralists have fuelled violence, especially gender-based violence. The problem of gender-based violence cannot be addressed until these critical livelihood issues (from all perspectives) are also understood. This also illustrates the maladaptations that occur in a conflict setting with extremely weak natural resource governance.

From a local perspective, a major challenge for peace and recovery in Darfur is how to break this vicious cycle of conflict destroying livelihoods, and competition over limited livelihoods driving further conflict. Solutions are possible, examples of local conflict resolution alongside livelihoods programming are available, but they can only be derived locally by local actors and, if this is to happen, it must not be undermined or interfered with by external actors.

4. Development of new forms of governance

The above examples are indicative of poor governance, where the local political and social institutions are unresponsive to their constituencies, lack accountability, and fail to uphold the law and defend people's basic rights. In the Darfur region, there are two parallel and often overlapping systems of local governance in operation. These include the national state administration based on national, regional and local level government civil and political structures, and the local traditional tribal administrative systems that have evolved over the past two hundred years. The former has undermined and weakened the latter in recent decades, leading to increasing localised conflict associated with tribal affiliation and increasing polarisation between educated Sudanese and local tribal leaders.

The traditional tribal-based systems originate in the feudal systems of the Fur Sultanate and have subsequently been shaped and institutionalised by consecutive governments, including the colonial administration from 1916 to 1956, and national governments thereafter. The traditional tribal systems in the past represented a powerful indigenous system of local governance and customary law.

In the past 30 years, however, local governance in the Darfur region has been undermined and politicised as a result of both government legislation and the economic and political marginalisation of the region more generally. Under the national government, the power and authority of the traditional tribal administration was subsequently challenged by the 1951 and 1961 Local Government Act which paved the way for a greater role for local councils. However, the tribal authorities continued to wield considerable administrative responsibilities and power. The 1971 Peoples Local Government Act radically changed this as it essentially abolished the powers of the traditional leaders, by transferring them to the provincial governments and the newly elected local councils established by the Act. Their role was essentially

changed from a judicial one to a purely administrative one, with responsibilities for land administration being maintained.

An anomaly in this system was in regards to the nomadic camel-herding groups, collectively known as the Northern Rizaygat, who had no officially allocated homeland or *dar*. Their livelihood systems as camel-herding pastoralists meant their pastoralist domain and livestock migration routes spanned many hundreds of kilometres of Darfur, from the arid edges of the Sahara in the north to the southern fertile savannah zone of the south. Under the colonial administration, the various sub-branches of the Southern Rizaygat (cattle herders of South Darfur) had been united under one tribal administration with headquarters in Ed Daein in South Darfur, and each sub-branch was awarded their own respective homeland or *dar*. In contrast, the various sub-branches of the Northern Rizaygat were small, and efforts by the British to unite them under one *nazirate* failed. Under national government rule and democratic systems, the control of a *dar* became linked with political representation (i.e. the tribe that controlled the *dar* were the majority group within the local council area, and hence could control who they would return to the national assembly). This politicisation of the tribal administration is one of the roots of the current crisis and a cause of the tensions between groups (Young et al., 2005).

The reorganisation and creation of multiple administrative units triggered tribal conflicts on a wide scale in Darfur, as a locality belonging to one tribe could be controlled by another. The government continues to the current day to reorganise and upgrade different administrative units, for example in Kebkabiya locality, and in Um Dokhun where administrative units have been upgraded to become localities with their own Commissioners. This has implications for the political importance and representation of these areas, as Commissioners obviously have greater political authority than a local Administrative Officer.

Traditional governance has also been directly affected by the past five years of conflict and international interventions. The forced displacement of 2003 had a huge impact on the tribal leadership of the groups affected. A significant number of local leaders were directly killed in the conflict. In all areas, the displacement was not always direct to towns or safe areas, and often people were in hiding for weeks or months, often separated from their *sheikhs*. In West and North Darfur, in the areas bordering Chad, some leaders fled over the border, sometimes leaving their people behind. Subsequent displacement inevitably undermined local leadership by breaking up communities.

With the massive scaling up of humanitarian operations, which cover more than 50% of the population of Darfur, new parallel governance structures have also evolved associated with the international humanitarian community. This includes the local NGOs often contracted by INGOs, who often have responsibilities for camp management and distribution of assistance (also known as UN Cooperating Partners); the UN agencies responsible for sectoral coordination and management; the donors responsible for financing the system; and the Humanitarian Commission within the

Sudan government. The bottom layer at the local level was the many hundreds of local 'Relief Committees' made up of representatives from the local community and committee chairpersons. As a new governance institution, the humanitarian system has its own structures, rules and procedures which run in parallel to the civic administration and the tribal authorities.

As relief distributions got going in 2004, traditional leaders took responsibility to act as the interlocutors with international agencies. Where traditional leaders were absent or stepped aside from their former role, new leaders were quickly appointed. Among the IDPs, the former traditional functions of leaders have changed, as their role has shifted to become more of an interlocutor with the agencies, bringing a different type of power and authority. Despite this changing role, the tribal administration has renewed importance to people in Darfur generally.

The authority and responsibilities of the newly appointed camp *sheikhs* was different to that of the traditional sheikhs in the villages. In the village, the Sheikh was considered a *hakim*, a respected authority or wise person with the capacity to wield local power. Previously, the Sheikh would have had his own wealth, and would have used that to entertain visitors etc. As one respondent put it, "In the village the Sheikh is the ruler; here he is just the organiser. Before, in the village, they were self-sufficient but in the camp they are like a chicken in a cage."

A further difference is that before, in their home villages, all Sheikhs were known to all the government departments, were responsible for tax collection – the *zakat* – and even had the power to arrest criminals, to sort out local disputes, and to issue fines. Their relations were principally with the government. Displacement has cut their former relatively close contact with government, although some leaders continue to liaise with the authorities and police, for example to report crimes and ensure security. After displacement, the main contacts and relations for Sheikhs were with international organisations and NGOs. However, in both periods (before the conflict and currently) the Sheikhs have worked to solve their people's problems.

In West Darfur, the people and leadership in the larger displaced camps, for example Zalingei, Mornei and Geneina, were drawn from the communities, families even, of many of the rebel leaders. These camps were also located close to rebel controlled areas. Because of these links, these camps have always been highly politicised and, as a result, some have become closed to the outside world to a degree, meaning that they have evolved their own governance structures, markets and even possibly their own security, which to some extent have controlled and governed these populations. This can be seen in their public demonstrations against the re-registration exercise in 2005, and again to the partial signing of the Darfur Peace Agreement in 2006. Where IDP identity is relatively politicised (i.e. linked to these political claims for protection or longer-term solutions), the claims for food aid or wider humanitarian assistance are potentially equally politicised, which is potentially challenging in terms of upholding the principles of neutral and independent humanitarian action.

5. Conclusions

Conflict and livelihoods are inextricably linked to one another in the Darfur region. While it is understood that conflict and insecurity destroy livelihoods, it is not well recognised that the livelihood adaptations that people make are themselves fuelling or driving further conflict. These adaptations become part of a self-perpetuating livelihoods-conflict cycle, where such livelihood adaptations generate further polarisation between tribes. The shock or risk is not some externally-driven phenomenon; rather, it is embedded within culturally diverse and increasingly competitive livelihood systems in the context of weak local governance.

IDP strategies are diversifying and shifting in response to the partial blocking of previous livelihood strategies, and the new urban opportunities available to them. Urban labour markets and opportunities, however, have quickly become saturated and many of the new, semi-urbanised livelihood strategies are either inadequate, insecure or, in some respects, maladaptive in terms of damage to the environment and the social relations between livelihood groups.

More recently, there has been some evidence of individual arrangements and agreements between previously hostile groups, particularly where there may be mutual benefit to their livelihoods, for example, in accessing trade routes or markets. Such developments represent a way out of the conflict-livelihoods cycle, and the beginning of new relations, but they will be of limited impact unless they are supported by wider systems of good governance and linked in some way to higher level peace processes. Strengthening governance at every level will help to promote and improve dialogue and consultations between citizens, civil society and government, and will enhance participation in policy formulation and implementation.

The vulnerability of peoples' livelihoods in Darfur, whether they are IDPs, urban or rural residents, remains deeply embedded in the policies, institutions and processes that influence their access to livelihood capitals, and the power relations between different livelihood groups and livelihood systems. A certain power resides within each of the livelihood capitals, which is legitimised, protected and preserved by the prevailing PIPs. Livelihood vulnerability and powerlessness results from a deficiency in any of the livelihood capitals.

Assessments by international organisations tend to focus on particular capitals, especially economic poverty and food security, and in Darfur what are often missed are the gaps and inequalities in human and social development within the region, and the inequitable power relations that have resulted from inequitable development. Recovery and development approaches need to be mindful of local conflict dynamics, and should be pursued with the utmost caution and conflict sensitivity, which means they should be based on an in-depth understanding and analysis of livelihoods of all groups.

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Sustainable Livelihood Approach for Assessing Adaptation to Climate Change: Case Study AIACC-AF14 Project

Balgis Osman-Elasha

Abstract

This paper attempts to reveal how exposure to climate variability and extremes, most particularly drought, pose substantial risks to people living in the arid and semi-arid parts of Sudan. Communities living in these harsh environments have historically managed to survive dry conditions through applying specific livelihood measures. The paper puts forward that these measures also build resilience and adaptive capacity that lessen the vulnerability of rural communities to future climate change. Additionally, the paper describes research based upon a sustainable livelihood conceptual framework that has been developed and applied in three case studies in Sudan. The framework was used to evaluate the performance of sustainable livelihood and environmental management measures for building resilience to today's climate-related shocks, and to assess their potential in reducing a community's vulnerability to future climate change. In addition, a sustainable livelihood assessment was carried out with the intention of capturing the perception of local people regarding their vulnerability to drought, and generating an understanding of the role and impact of certain sustainable livelihood interventions on improving their overall adaptive capacities.

1. Introduction

This paper is an attempt to provide some ideas on the impacts of certain sustainable livelihood/environmental management strategies (SL/EM) on the coping capacity of local communities in drought-prone areas in Sudan. It is also aimed at understanding the socio-economic context, policies and institutions within which these SL/EM strategies interact. The sustainable livelihood approach was used to evaluate the impacts brought about by the implementation of a number of activities in three different sites. The assessment was done by measuring changes in some attributes of one or more livelihood capitals, directly related to reducing vulnerability to climatic variability and change. Accordingly, these impacts were found to be present across the different livelihood capitals: financial, physical, natural, social and human, which are often interdependent. To find out how the measures for increasing resilience to the current climate have worked across the five livelihood capitals, an assessment was made covering four dimensions: productivity, sustainability, equity and risks, and uncertainty encountered, i.e. what barriers did the implementation of these measures actually face or expect to face?

With reference to the elements of sustainability, productivity, equity and risks, this assessment aims to identify whether these adaptations have effectively reduced

vulnerability to current climatic variability and whether they will effectively reduce the potential future impacts of climate change.

This paper is based on the outcome of research work by the AIACC-AF14 project in Sudan, with the hope that it will help improve the understanding of the impacts and the role of policies and institutions in shaping the livelihoods of poor people. The project is part of the "Global Assessment of Impacts of and Adaptation to Climate Change (AIACC)" which is funded by the Global Environment Facility (GEF) through the United Nations Environment Programme (UNEP), executed by the International Academy of Science and implemented by the Higher Council for Environment and Natural Resources (HCENR) of Sudan.

The main objective of this project is to enhance the scientific and technical information, to assess the impact of climate change and to design cost-effective response measures which are needed to formulate national policy options. Three case studies were conducted to assess the impacts of climate change on a range of socio-economic sectors and ecological systems at the national level and to develop a range of adaptation options. The goal of the case studies was to clarify and establish that certain sustainable livelihood (and natural resource management (NRM)) measures increase a community's resilience to today's climate-related shocks, and to show that it is possible to determine how such measures can be effectively implemented, supported and scaled-up for lasting impact. To show this, each case study attempted to provide an assessment of SL/EM strategies adopted by the communities as well as an assessment of the local and national policies and conditions that support or inhibit successful measures. An important assumption on which the project was based is that sustainable livelihoods can fill the practical and conceptual gap that exists between local vulnerability to climate change and national/intergovernmental policy processes.

2. Sustainable livelihood approach

The project employed the SL framework for this analysis. According to Scoones (1998, p. 1) the SL framework for analysis shows how, "in different contexts, sustainable livelihoods are achieved through access to a range of livelihood resources (natural, economic, human and social capitals) which are combined in the pursuit of different livelihood strategies (agricultural intensification/extensification, livelihood diversification and migration). Shankland (2000) considers the analysis of the range of formal and informal organisational and institutional factors that influence sustainable livelihood outcomes as central to the framework.

More specifically, just as the term 'sustainable livelihoods' is used to describe both an approach to human development and a framework for analysis, the project's hypothesis consists of two similar elements. First, that the sustainable livelihoods *approach* can respond, on the ground, to climate change adaptation needs of the most vulnerable groups, and second, that the sustainable livelihoods *framework* can facilitate the process of adaptation assessment, policy making and implementation.

The project attempts to respond to this hypothesis by employing the framework to assess the impact of the approach on community resilience and, by using policy process analysis to define the linkages of the approach to the larger policy process (Pasteur, 2001). With this in mind, the purpose of the case studies—the central research element of the AIACC Sudan project – is to enable the project to show that certain SL measures operate as climate change adaptation options and that such measures can be integrated into the planning of national adaptation strategies. Moreover, the case studies have a specific objective in relation to policies and institution analysis, which is to generate informative background material on each community's unique context, vulnerabilities, assets, coping strategies, and to employ policy and cross-scale analysis techniques. The latter explore the relationship between community resilience-building activities and micro-, meso- and macro-scale policies, institutions and processes, which is the focus area of this paper (see Figure 1 on the sustainable livelihood framework).

The sustainable livelihoods framework (Thomson, 2000) guided this study. Analysis was conducted to understand the diverse set of livelihood strategies pursued and their impacts on the community's coping capacities. Resilience of peoples' livelihoods depends on their capability to adapt to internal and external shocks and stresses. Moreover, in order to measure changes in coping and adaptive capacity over time, the study assessed how people viewed their current conditions in terms of assets, capitals, and capabilities, compared to past conditions using the Livelihood Assets Tracking System (LAST).

Quantitative and qualitative indicators were combined for use with the LAST system. The methods of data-collecting to assess all indicators included a literature review, questionnaire, group discussions with community members, meetings and interviews with stakeholders from the government and NGO sector and general observations. The meeting with the farmers' committee focused on drawing a comparison of community conditions prior to and after the project, identifying areas of outstanding project success and the underlying factors behind that success.

2.1 Policy analysis

Beside the assessment of impacts of SL measures on local community livelihoods, the researchers assembled a series of policy and institutional linkages through the:

- Identification of key policy and institutional issues and definition of their relationship to the sustainable livelihoods project. This step involved identification of policies and institutions (at the macro, meso and micro-scales) that are seen as important to the development, implementation and success of the SL project and carefully exploring the relationship.
- Exploration of the policy development process. Once key enabling factors are identified, the challenge is to explore how and why these came to be. So, researchers examined how the policies and institutions of interest were

developed by seeking insights into the process, such as key actors and common strategies.

- Establishment of a picture of the policy, institutional and process contexts. This step was intended to clarify why enabling factors came to be. This series of nested pictures described first the micro – focused on the village or village council; the meso – focused on the district or sub-national scale; and finally the macro – focused on the national or regional scale. This will lead to a better understanding of the sort of groundwork that needs to be in place in order for certain SL activities to take root.
- An understanding of the contextual factors that shaped the policy, related to the social, political and economic environment. Moreover, a review of changes in the policy context over time, which can add valuable insights to the policy analysis.

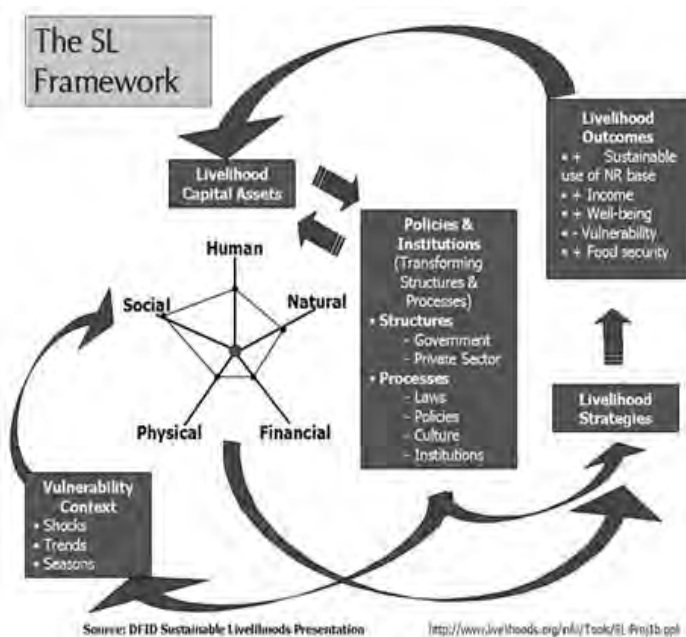


Figure 1: Sustainable livelihood framework. Source: Ashley & Carney (1999)

3. Water harvesting technique as a coping mechanism to climate variability and change (drought) in North Darfur state

Darfur was one of three case study areas considered under the AIACC-AF14 project, alongside Bara in Kordofan and Arbaat in the Red Sea State. The Darfur case study focused on an adaptation that was autonomously developed by communities (meaning the SL strategies were originally developed and adopted by the communities, then supported and built upon by an NGO). The other two case studies, however, presented

a reactive type of adaptation that had been introduced into the area by means of a project in response to specific climate stimuli.

The study area lies in a region characterised by high climate variability, leading to harsh environmental conditions. Most of the study area is deficient in water even in the wettest months of July to September. Moreover, during June – the hottest month – temperatures regularly reach over 45°C and in January – the coldest month – temperature reach as low as 18°C.

The region is one of the most drought affected regions of the Sudan. The drought years of 1983 to 1985 greatly affected the demographic and socio-economic conditions of the area. Large numbers of people left their homes because of increased poverty and land degradation. This was accompanied by tribal conflicts, the growth of shanty towns, changes in the pattern of livestock rearing and agricultural production. During this time, most people lost over half of their cattle (being the most vulnerable animal to droughts), as well as large numbers of sheep, goats and camels.

3.1 Environmental management strategies

The prevalence of harsh environmental conditions forced the residents to develop adaptable livelihoods. Examples of the measures developed and used by the people in response to harsh environmental conditions include:

- Adoption of water-harvesting technique (*trus*).
- Construction of terraces: This helps the farmers to grow vegetables, including okra, eggplant and tomatoes, which can be harvested up to five months after the end of the rains.
- Re-stocking of gum trees (*Acacia senegal*) and retention of part of the tree cover in the agricultural fields with alluvial soils, for the provision of fuel wood.
- Cultivation of clay soil: This decreases the human pressure on the sandy soil (*qoz*) areas, which are favourable for gum trees.
- Extensive use of traditional methods of food storage like *matmura* (a pit in the ground lined with chaff) and *sweeba* (a container, made of unburned mud, mixed with straw and cow dung, which is kept in the family hut).
- Utilisation of organic fertilisers, crop and weed residues, to improve the soil nutrient status.
- Utilisation of traditional knowledge, wisdom and practices to conserve and manage the resource base and improve livelihoods.
- Social safety nets through sticking to their traditional method of mobilising community labour. For example, organising a work party locally known as *nafir* (El Siddig, 2002).

4. Intermediate technology development group (ITDG)

In 1998, a livelihood support program was launched in the area by a non-profit organisation, Intermediate Technology Development Group (ITDG). However, ITDG has been working in the area since 1988 and mainly focuses on humanitarian and community development initiatives, aimed at improving poor people's ability to conserve and sustain their livelihoods through increased food production and processing and provision of basic services.

A key approach adopted by ITDG's food security programme is their approach of building on indigenous knowledge and involvement of local communities in all the project activities, particularly water-harvesting techniques. The aim of such techniques is to harvest as much of the rain water, and store it, for as long as possible to be used during times of scarcity for irrigation and household uses. The main intervention in this case is the establishment of earth dams to capture increased amounts of floodwater from streams. Other interventions employed by ITDG included the following environmental strategies:

- Provision of tractors for performing different agricultural operations
- Construction of a central grain store for communities to store the surplus production for use in times of scarcity
- Support of diversified income generation activities by availing employment opportunities
- Making credit services accessible to the farmers
- Provision of training and other skill-upgrading exercises to local people on how to manage their resources and diversify production
- Further involvement of women in different economic activities (mainly in the production of vegetables)
- Help in the formation of social networks and cooperatives, including organising of farmers' unions and women groups

4.1 Contributions to building the adaptive capacity

With the adoption of the abovementioned environmental management strategies, Darfur communities witnessed a general improvement in their livelihoods. This was reflected in:

- The increased soil fertility
- Increased agricultural production and diversification of crops
- Availability of physical assets necessary for sustaining their livelihoods (through the use of the constructed storage facility to store the surplus production for use in difficult times)
- Creation of community organisations and better team work with better management skills

- Diversified income sources, poverty alleviation, good quality of food and improved general household conditions
- Increased community participation in decision making processes and enhanced women's participation and involvement, improving agricultural production and better health conditions (improved nutrition)
- Improved communication channels between the local communities, ITDG, NGOs and CBOs
- Use of home gardens or *jubraka*, a backyard farm which is mostly operated by women and used for growing fast maturing crops and vegetables like okra, pumpkins and cucumbers
- Use of shifting cultivation to minimise the risk of crop failure, on both sandy soils and clay alluvial deposits

The sandy soils were used to grow millet, sesame and groundnut (providing the greatest portion of family subsistence needs), while the clay soils were cultivated using water harvesting techniques to grow sorghum, vegetables and, in some cases, the cash crop tobacco. Although the activity of water harvesting in Northern Darfur is a locally driven innovation, ITDG adopted the innovation for the sake of provision of necessary assistance and to develop the activity on a large scale. The organisation managed to construct dams and to train the local farmers in the techniques of construction of the crescent-shaped terraces. While in North Kordofan, Corporation of American Relief Everywhere (CARE International) contributed to the conservation of the environment in the area.

4.2 Role of traditional leaders in natural resource management

The role of the traditional leaders in the management of natural resources is appreciable because they have recognisable influence on the central government, where the leaders can use their tribal weight in the election of governors. Moreover, through the traditional leaders, it is possible to establish ethnic balance in regional governments.

Traditional administration has played a major role in NRM for a very long period in different parts of Sudan. This system kept tribes living in different ecosystems working in harmony and was consequently kept intact and firm. Problems between herders and farmers were always under control and routes of migrating tribes were well known by other settled tribes. Traditional leaders respected and considered each other, and their communities respect them and their decisions in return. Local leaders, such as El-Omdah and El-Sheikh, led and supported certain good activities and values, for example, El-Nafeer - working in groups in a cooperative manner. Most of their activities were extremely connected with natural resource management (NRM). The local leaders directed people towards rotational grazing, i.e. grazing a particular area whilst another is left fallow to regenerate.

In Darfur, the system of administration is based on the hierarchy of traditional leadership starting from *Sherati*, the head of a geographically defined territory (locally called *dar*) and ending with the Sheikh, the head of a village. A group of Sheikhs are under the supervision of *Sherati*, who have wider authority over the whole area, while the Sheikhs have more power and direct control at village-level. the reverse of what is said above

Across the three case studies, it was generally agreed that the traditional system constituted an opportunity involving local administration and communities in resource development and management. The responsibilities of the traditional leaders included land allocation and settlement of conflicts, protection of communal natural resources, sharing of natural resources, keeping the local security intact, cooperation with foreign tribes cohabiting their land, definition and delineation of nomadic routes and settlement of tribal disputes. This was illustrated in the Darfur case study, where traditional leaders had largely contributed to the success and sustainability of the water-harvesting technique. Additionally, traditional leaders maintained control over the tribal land, provided protection of common natural resources, organised the usage of natural resources, implemented security and organisation of foreign tribes existing in their areas, clearly defined nomadic routes, settled tribal disputes and adopted fast new techniques within the tribal territory. Moreover, this situation of social welfare contributed to the widespread use of water harvesting techniques among the different community households in Darfur and improved their production in terms of quality and quantity.

4.3 Local knowledge and religious and cultural values

Deeply-rooted knowledge, traditions and values have been developed and adopted by the community members who have lived following them for centuries. In many circumstances, these values represent the unwritten rules and policies by which all community members or specific tribal groups abide. They deal with different issues related to social, natural, financial or human capitals and are maintained and conserved by the traditional leaders who inherited them from their ancestors and are responsible to pass them onto the coming generations.

During assessment works it was found that some common values are shared across the three case studies, and others that are unique to each area. For example, in Darfur, people believed that according to the *sharia* law⁵, they should share three things; water, range land and fire. Based on this, they allowed poor people in the tribe and moving nomads accessibility to water and pasture. This situation, however, could not be sustained under extreme climatic variability. Particularly during drought – when resources become very scarce – the law of survival supersedes all other social and cultural values. The current situation in Darfur is an ideal illustration, whereby drought triggered tribal competition over natural resources that used to be shared among farmers and nomads, leading to a critical social conflict and political crisis.

⁵ Islamic laws

Another social system in Darfur, as well as in many parts of Sudan, is the formation of *nafirs*⁶ at harvest time or times of crisis. For example, if a field is ablaze, a *nafir* is called upon by the traditional leader to assist in putting out the fire and opening up fire-lines to prevent the wildfire from spreading to other areas. This system proved effective as a safety net against sudden or expected incidences, as well as contributing to the conservation of the natural resource base.

4.4 Main policies, institutions and stakeholders relevant for the assessment

This assessment covered different relevant stakeholders, including a broad range of government institutions, NGOs and Community Based Organisations (CBOs) in addition to individuals from the private sector, scientific research communities, education and donors. Of course not all of these stakeholder groups have been assessed in each case study. Moreover, government institutions identified and assessed differed from one case study to another with the Ministry of Agriculture being common across the three case studies.

Figure 2 depicts the policy influences map highlighting the different policy levels and their links to sustainable livelihood. The figure presents some examples of policy decisions that have been issued at different levels and have brought about significant impacts to the community's livelihoods. Examples include: the agricultural reforms at the national or macro-level; subsidies to agricultural inputs at the state or meso level and the local ordinances and laws (sanctions) at the local or micro levels. Analysis of these policies and their interaction provide a good insight on how communities perceive and react to policy decisions. It also shows what the policies that favour and enable the development of sustainable livelihoods are and what the ones that hinder their development are.

5. Conclusions

Using the SL approach in this study enabled the identification of the types of measures that could bring about positive impact in each of the livelihood capitals and the main requirement for these measures to be implemented successfully. The following are the results obtained from the evaluation process.

5.1 Natural capital

Common measures which addressed the natural capital were found to focus mainly on issues related to water harvesting and management, introduction of new crops or species (palm in Arbaat, fodder in Bara and vegetables in Darfur) and improvement of vegetation and green cover (horticultural and acacia trees as home gardens and shelterbelts) (Sanjak, 2003; Spanger-Siegfried, 2005).

⁶ Nafir is the grouping of people in response to an emergency call, usually made by the local leaders to perform an urgent task in a cooperative manner, e.g. rescuing the agricultural crop from the invasion by locusts or to perform a group harvest of individual farms etc...

However, the main people responsible for implementing those measures were mostly found to be settled farmers who really needed to adapt and who consequently accepted the changes. Although under normal conditions people tend to resist change, when it becomes a question of survival they are forced to accept and adopt new ideas. Other main players were government officials and NGO members whose role complemented the farmers' roles, i.e. supervision, extension and guidance.

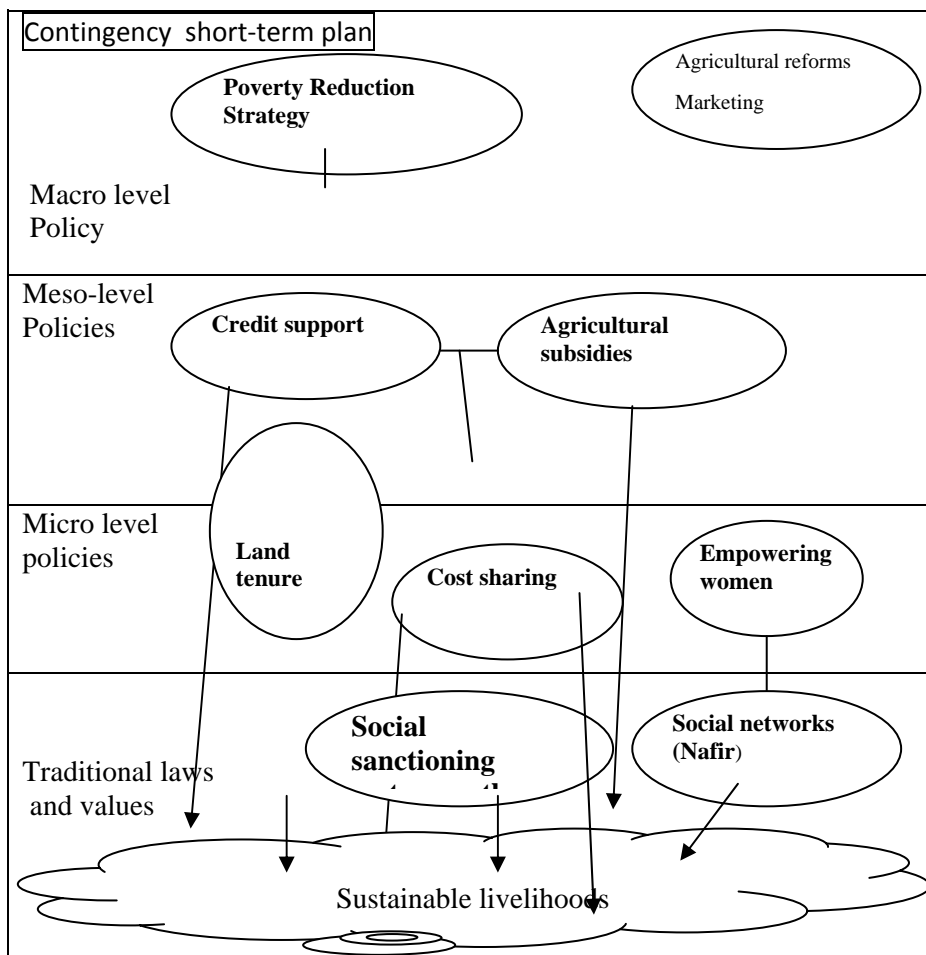


Figure 2: Policy influences map. Adapted from Pasteur (2001)

Women in the three areas played a significant role in making the required change, especially in areas where women used to traditionally confine themselves to household activities and remain isolated from any sort of income generating activities or involvement in public life. A case in point is the Beija women in Arbaat (Eastern Sudan). They were traditionally denied outdoor activities or the practice of any productive roles outside their family domain. Surprisingly, they happened to play a major role in the success of the Khor Arbat Rehabilitation Project (KARP) project

activities, completely transformed into very active community members. According to Abdelati and Khor (2003), Beija women are the ones who have developed, and were managing, home gardens. Moreover, they helped in implementing different forms of income-generating activities, have largely contributed to food security and have increased the cash incomes of their households.

5.2 *Financial capital*

Flexible credit policies played a major role in improving the financial capital in the Darfur case study areas. The net results were the diversification of production (new crops and new breeds), improved economic conditions, improved purchasing power and stability in production in terms of quality and quantity. All in all, farmers became engaged in the market economy.

Similar impacts were obtained from the employment of a different credit system called the *Shyl* system in Arbaat area. People used it in order to overcome some of the constraints they encounter when they apply for credits. The *Shyl* system played a major role in resolving constraints associated with issues of accessibility to credit. Some 48 percent of the respondents indicated that it was not always easy to gain access to credit from the Agricultural Bank due to complicated procedures set by the bank, for example, the necessity of availing collateral in order to make them eligible for obtaining credit. The *Shyl* system provided the required guarantees for those who didn't possess collateral assets. Sometimes the system used the harvested crop as collateral, in which case the system was used to provide the main source of credit to those practicing shifting cultivation. However, the different farmers' unions in the study area were able to establish a sound relationship with the Agricultural Bank, which further helped credit accessibility to the farmers, based on trust and social relations.

5.3 *Human capital*

The most important element of human capital across the three different sites was the success in making use of, and building on, existing traditional knowledge for the purpose of improving a community's livelihood. Similarly of great importance, is the creation of skilled labour among the household members through training and other capacity-building exercises. Special emphasis was given to the training of women, equipping them with knowledge and skills to play an active role in public life as well as in their households. Moreover, the availability and accessibility of basic services (extension, health, education and veterinary) to local people had also been identified as an essential success. Implementation of measures leading to the development of human capital was the responsibility of different actors, mainly CBOs, community elders, extension officers and school teachers. Major risks identified were the out-migration of skilled people, tribal conflicts and civil war.

5.4 Social capital

With regard to social capital, common characteristics included the building of the community's capacity to organise themselves and form organisational structures and the empowerment of communities to improve their participation in the decision-making process. Moreover, measures targeting women included training, building skills and the encouragement of their participation in public life. Another important measure identified was information exchange and networking. Agents for change who contributed to this capital are the CBOs (Farmers' Unions, Women's Groups), community leaders, teachers and extension officers. Traditional systems of group work were also considered, such as the *nafir*.

5.5 Physical capital

Common measures addressing physical capital included the installment and management of farming machinery (specially related to irrigation systems), establishment of big grain stores for storing surplus grains and the use of improved seeds and application of fertilisers (organic and inorganic). Other measures included energy conservation techniques. These techniques included the use of improved stoves and mud-walled houses to replace wooden huts. This helped conserve the tree cover. Regular maintenance of all the assets e.g. water pumps and the provision of spare parts was also part of the work. This required special skills that were provided by means of training and capacity-building to selected individuals from the local community (therefore developing human capital). Key players in the implementation process that addressed physical capital were the community workers, community organisations and committees in the form of supervision. Since most of the work needed some skill and as large funds could not be availed individually, the presence of committees and other social structures became vital for the continuity of such measures. However, some key uncertainties highlighted by respondents included the shortage in financial resources and the volatile government policies, for example, in the Bara area, where the government decided to take possession of some important physical assets (veterinary pharmacy) after the termination of the project.

5.6 Policy-relevant conclusions

- To ensure proper implementation of policies, work should focus on enhancing knowledge of rights and duties of community members. The study indicated that policies based on real knowledge by communities and a sense of responsibility leads to positive results and grant sustainability. Similarly, regulations or laws that involve changing human behaviour and attitudes towards the environment and natural resources will also yield positive results.
- Policy analysis conducted in the context of the SL framework can contribute to drawing attention to the possible ways in which policy impacts on different aspects of people's livelihoods; their livelihood assets, the vulnerability

context within which they operate and their capacity to choose effective livelihood strategies.

- Understanding the policy context and its impacts on livelihood assets available to people, as well as the institutional setup, will help to identify constraints and priority areas for interventions.
- Community level policies and institutions play a major role in the success of SL/environmental management strategies employed.
- Tradition, community values and religious affiliations can play a major role in the success of policy intervention. Care should be taken to build upon these and avoid policies that contradict them.

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Fodder-bank Establishment as a Means of Forage Supplement for Sedentary Livestock during the Dry Season in South Darfur State

Abdelrahman Mohmed Tahir and Ali Hassab Elkaream Siddig

Abstract

*This paper reports on the result of an experiment that was carried out inside an enclosure of one hectare within the Faculty of Veterinary Science, University of Nyala, at Mosay village eight kilometres south east of Nyala town, for two consecutive rainy seasons in 2004/2005. One objective of the study was to test the performance of five pasture legumes with regard to growth attributes, dry matter yield, and forage quality under rain-fed conditions. Another objective was to find the best pasture legume species to be grown and used as supplemental feeding for sedentary livestock during the dry season. The experiment consisted of five treatments: three perennials (*Cajanus cajan*, *Macroptilium atropurpureum* and *Clitoria ternatea*), and two annuals (*Vigna unguiculata* and *Lablab purpureus*). The treatments were arranged in a Complete Randomized Block Design (CRBD) with five replicates of twenty-five plots, each sized five metres by eight metres. The results showed that there were significant differences in plant density, plant ground cover (%) and dry matter yield between treatments, but no significant differences in plant survival rate or plant height. Additionally, a difference in forage quality among the tested plants was observed. Based on the production characteristics and forage quality, the tested species are ranked in a decreasing order of performance as follows: *Vigna unguiculata*, *Lablab purpureus*, *Macroptilium atropurpureum*, *Cajanus cajan*, *Clitoria ternatea*.*

1. Introduction

Traditional rain-fed shifting system cultivation and livestock rearing are considered the main human activities in the area. Livestock play an important role in South Darfur State by providing capital, food production, status, animal traction and manure. The total number of livestock in the state is estimated to be about 7.5 million animal units (12.5 million heads). This huge number of both transhumance and sedentary livestock has grazed the limited area of the rangeland (about 26,000 Km²) during the wet season for many years, resulting in poor quality and low quantity of forage in the study area. As a result, sedentary livestock have been suffering from acute forage shortage during the late dry season (Tahir, 2003). Due to the high cost and unavailability of animal feed concentrates, the most practical solution is to establish a fodder bank to limit the feed gap during the late dry season.

Early, heavy, free-grazing of the rangelands in the basement area around Nyala town as a wet season grazing area (*makharif*) results in overstocking and consequently progressive reduction in forage biomass production (Strang, 1980). Some of the

problems the rangelands in Sudan are facing are their existence on a fragile land which is susceptible to degradation due to the frequent drought periods, seasonal bush fires, and the increasing pressure on the range resources early in the season before seed setting and expanding cultivation (Darrag and Suliman, 1988).

In village communities throughout Africa and Asia all classes of livestock graze on communal land, by the roadside, on the edge of fields verges and on forest margins around villages, and forage under sedentary system is limited by uncontrolled grazing on communal grazing area (Whiteman, 1980).

In South Darfur State, transhumance and nomads migrate annually with their herds, early in the season, towards Northern areas of the state where they spend about two months grazing at the basement areas around Nyala town. This has been practiced for many years and as a result rangelands in the area have deteriorated and the sedentary livestock are suffering from acute forage shortage during the dry season (Tahir, 2003).

Fodder bank establishment is the planting of high quality fodder species with the goal of maintaining healthy productive animals. The fodder bank could be utilized all year round, but it is basically designed to provide fodder during scarcity periods within the dry season. A fodder bank does not provide the entire requirement, but supplements the dry season forage (Winrock, 2004). Winrock (2004) also stated that certain criteria have to be taken into account to ensure an excellent fodder bank, including the ease of establishment, rate of growth, resistance to weed competition, production of high quality fodder and the ability to remain productive during the dry season and survive on poor sites.

The method adapted for seedbed preparation varies considerably from locality to locality due to susceptibility to differences in climate, soil type and topography. In spite of these differences, the ultimate objective is the same everywhere, that is, the working of the soil to such a state that the sown seed will germinate readily and healthy so that plants will develop as rapidly as possible (Phillips, 1973). Seeding dates should be based on the first instance of dependable rainfall or when one expects that there will be enough moisture after planting (Winrock, 2004).

The fodder bank plant species' have to be thoroughly weeded every 2 to 4 weeks. This level of weed control is to be maintained until the fodder bank plants species' begin to suppress weed growth (Winrock, 2004). Legumes are an important source of protein for human beings and animals as they provide nutritionally rich crop residue for animal feed and play a key role in maintaining the productivity of soil, particularly through biological nitrogen fixation. They are therefore of immense value in rain-fed farming systems (International Centre for Agricultural Research in Dry Areas [ICARDA], 1988).

Climate change and land degradation (desertification), partly from overexploitation of natural resources are further compromising the grazing potentials of the grazing fields.

Specially, there is an acute forage shortage during the late dry season. This leads to adaptation works to the changing situation in the climate and pasture conditions. This paper, therefore, aims to evaluate the potential of five fodder species for fodder band establishment.

2. Material and methods

The study was conducted in Western Sudan, South Darfur State, which lies within the arid and semi-arid Saheilian zone, between latitude of 8.30 and 13.5 °N and longitude of 22.30 and 28.0 °E and covers an area of about 137,840 Km².

The climate is generally dry during summer (March–June), warm during autumn (July–October) and moderately cool during winter (November–February). The mean maximum and minimum temperatures are 36°C and 18°C, respectively (Bashir and Elwakeel, 1999).

The experiment was carried out at the Faculty of Veterinary Science inside a fenced area of one hectare, about eight kilometres south-east of Nyala town in South Darfur State, at an altitude of 650 metres above sea level.

The study area is located within the basement complex land system at the Northern part of South Darfur State, which covers an area of 35,800 km². It is a semi-arid zone, with mean annual precipitation of approximately 350mm, falling predominantly between June and September (Bashir and Elwakeel, 1999). The area is characterized by a normally levelled to gently undulating or rolling Pedi plain, with differences in percentage of slopes, sheet, and rill and gully erosion. The soil in the area is predominantly shallow, residual sandy clay loam with a pH of 6.0. The naturally predominant plants are mainly annual grasses such as *Aristida spp.*, *Schoenefieldia gracilis* and *Chloris virgata*; herbs such as *Zornia glochidiata* and *Alysicarpus ovalyvolus*; and shrubs and trees such as *Acacia mellifera*, *Acacia Senegal*, *Combretum aculateum*, *Cadaba frarinoso* and *Zizphus spin-christi* (Tahir, 2003).

A rain gauge was installed inside the experimental site before the commencement of the experiment. Soil samples from different depths between 0 and 60cm were randomly taken from the study site and chemical and physical properties were determined at the University of Khartoum.

The seeds of the perennial pasture legume species, namely *Clitoria ternatea*, *Macroptilium atropurpureum* and *Cajanus caja*, and the annual pasture legumes *Vigna unguiculata* and *Lablab purpureus* were obtained from Nyala Agricultural Research Station. Seed purity and germination tests were conducted according to procedures in Whiteman (1980). The seeding rate of each pasture legume species was determined following steps cited in Khair (1999).

The study site was fenced using local materials, cleared of bushes and ploughed using a donkey plough before the seedbeds were prepared. The pasture legume seeds under study were dressed with pesticides to avoid ants and rodents damage.

The experiment was carried out between July and December in the rainy seasons of 2004 and 2005, in a Complete Randomized Block Design with five replicates. The pasture legume species formed the main plots and the parameters measured formed the sub-plots. The experiment comprised of 25 plots sized 5m x 8m.

The pasture seeds were randomly distributed on the plots, sown using a hand broadcasting method and weeded at the seedling stage. The Gravimetric method was used to determine soil moisture content for each treatment at soil depths of 20cm, 40cm, and 60cm at the seedling, flowering, and maturity stages.

In each plot an area of 1x1m was randomly located and permanently fixed for measuring plant density, plant survival rate, and plant ground cover. These measurements were taken at plant seedling, flowering, and maturity stages, while plant height was measured at flowering and maturity stages only.

Another quadrat of 1x1m was randomly taken within each treatment at flowering and maturity stages for the measurement of dry matter yield. Dry matter yield was measured by cutting the forage plants at 5cm above the soil surface after which the forage was put inside paper bags, weighed while fresh and then put inside an oven at 72°C for 72 hours.

Forage quality determination was obtained by randomly taking five plants from each pasture legume under study at flowering and maturity stages. The plants were cut at 5cm above the soil surface and air dried before 500g of dry matter was ground and analyzed for dry matter (DM), Organic matter (OM), Crude fibre (CF), Crude protein (CP), Nitrogen (N), Potassium (K) and Phosphorus (P) using the AOAC method (Association of Official Analytical Chemists [AOAC], 1980).

3. Result and discussion

As can be discerned from Table 1, in both seasons and at all periods and depths, almost all treatments had no significant impact on soil moisture content, except for *Lablab purpureus* at a depth of 60cm and 40cm, in July and November respectively, in the wet season. The high soil moisture content recorded for *Lablab purpureus* might be attributed to its low requirement of soil moisture to establish compared with the other four tested pasture legumes.

In the wet season, *Cajanus cajan* at a depth of 20cm during September and 40cm and 60cm during November, scored the highest soil moisture content which could be due to the species' well established root system in September, therefore absorbing water from deeper depths. This leaves the available soil moisture above 20cm poorly

utilized. Similarly, in November the root system went deeper than the depths of 40cm and 60cm and, as a result, the soil moisture above 60cm is poorly utilized compared to the four other pasture legumes.

Regarding plant ground cover, in both seasons and at all periods the sown pasture legume plant species showed significant differences (refer to Table 2). However, during all stages of plant growth *Vigna unguiculata* scored the highest plant cover. This may be attributed to its rapid growth habit and its large leaves which provide good ground cover.

This protects the land surface against evaporation which leads to good utilization of soil moisture content compared to the other sown pasture legume plants species. *Clitoria ternatea* recorded the lowest percent plant ground cover (as can be seen in Table 2). This might be due to the fact that low plant density and small leaf area resulted in low plant ground cover percentage compared to the other four sown pasture plant species.

All the sown pasture legume plants had significant differences on forage yield, at both flowering and maturity stages in both seasons. *Vigna unguiculata* and *Lablab purpureus* recorded the highest dry matter yield followed by *Macroptilium atropurpureum* and *Cajanus cajan*, respectively (see Table 3). However, *Clitoria ternatea* scored the lowest dry matter yield. This might be attributed to that different pasture plant species have different growth habits, and they differ in their root system establishment and consequently resulted in different efficient use of soil moisture and nutrients for plant growth.

According to the chemical analysis of the five tested pasture legume species, *Vigna unguiculata* at the flowering stages recorded the highest crude protein content followed by *Lablab purpureus* and *Macroptilium atropurpureum*, while at the maturity stage *Lablab purpureus* scored the highest crude protein content and the lowest was scored by *Macroptilium atropurpureum*. However, *Clitoria ternatea*, at the flowering stage, scored the highest value of crude fibre and *Cajanus cajan* scored the lowest value, while at maturity stage *Vigna unguiculata* scored the highest value of crude fibre whilst *Cjanus cajan* scored the lowest (figures of these results can be found in Table 4).

The high and low values of crude protein and crude fibre content scored by the tested pasture legume species can be explained by their difference genetic characteristics and may also be due to the soil nutrient content in which the pasture legume plants were grown.

Table (1): Effect of treatment on percent soil moisture content during two seasons (2004/2005) and (2005/2006)

Season	Season 2004/05												Season 2005/06					
	July		September			November			July			September			November			
	20cm	40cm	60cm	20cm	40cm	60cm	20cm	40cm	60cm	20cm	40cm	60cm	20cm	40cm	60cm	20cm	40cm	60cm
<i>Vigna unguiculata</i>	4.85 ^a	4.85 ^a	3.50 ^{ab}	1.02 ^a	1.68 ^a	2.15 ^a	0.95 ^a	2.14 ^b	2.96 ^a	4.80 ^b	5.66 ^a	6.94 ^a	1.07 ^c	3.24 ^a	9.69 ^a	0.98 ^a	1.16 ^b	2.12 ^b
<i>Cajanus cajan</i>	4.82 ^a	4.46 ^a	5.76 ^{ab}	3.35 ^a	2.13 ^a	2.68 ^a	1.25 ^a	2.72 ^b	2.99 ^a	5.26 ^b	6.54 ^a	7.20 ^{ab}	2.67 ^a	3.45 ^a	4.14 ^a	1.79 ^a	2.49 ^a	2.98 ^a
<i>Lablab purpureus</i>	3.98 ^a	3.78 ^a	6.08 ^a	1.47 ^a	2.18 ^a	2.86 ^a	1.56 ^b	3.50 ^a	3.13 ^a	5.86 ^b	6.60 ^a	7.32 ^a	1.96 ^{ab}	3.90 ^a	4.06 ^b	1.01 ^a	1.69 ^b	2.35 ^{abc}
<i>Clitoria ternatea</i>	4.31 ^a	3.23 ^a	4.45 ^{ab}	0.94 ^a	1.61 ^a	2.04 ^a	1.09 ^a	2.27 ^b	3.06 ^a	5.76 ^c	5.92 ^a	6.85 ^a	2.19 ^{ab}	2.92 ^a	4.20 ^a	1.18 ^a	2.19 ^{ab}	2.63 ^{ab}
<i>Macroptilium atropurpureum</i>	2.96 ^a	3.32 ^a	2.84 ^b	1.01 ^a	1.48 ^a	2.04 ^a	1.10 ^a	2.22 ^b	3.35 ^a	5.64 ^a	6.52 ^a	6.46 ^a	1.57 ^{bc}	3.35 ^a	4.21 ^a	1.28 ^a	1.64 ^b	1.74 ^c
SE ±	0.4	0.44	0.446	0.42	0.14	0.18	0.18	0.18	0.28	0.19	0.21	0.61	0.17	0.18	1.28	0.13	0.12	0.13

Means followed by the same letter(s) in a given column are not significantly different at P = 0.05 according to Duncan's multiple range test.

Table (2): Effect of treatments on percent plant ground cover during two seasons (2004/2005) and (2005/2006).

Season Month Treatments	Season 2004/05			Season 2005/06		
	July Seedling	September Flowering	November Maturity	July Seedling	September Flowering	November Maturity
<i>Vigna unguiculata</i>	8.30 ^a	50.60 ^a	63.00 ^a	11.20 ^a	88.40 ^a	90.40 ^a
<i>Cajanus cajan</i>	2.14 ^b	13.82 ^c	27.88 ^b	4.00 ^c	16.20 ^b	47.60 ^{bc}
<i>Lablab purpureus</i>	4.26 ^{ab}	14.54 ^c	31.80 ^b	6.80 ^b	22.40 ^b	44.00 ^{bc}
<i>Clitoria ternatea</i>	0.25 ^b	3.28 ^c	11.20 ^b	2.80 ^c	12.80 ^b	22.20 ^c
<i>Macroptilium atropurpureum</i>	4.34 ^{ab}	31.20 ^b	54.60 ^a	4.00 ^c	24.80 ^b	59.60 ^b
SE ±	0.7691	4.1751	4.8917	0.7130	6.3479	6.1610

Means followed by the same letter(s) in a given column are not significantly different at P = 0.05 according to Duncan's multiple range test.

Table (3): Effect of treatments on dry matter yield (kg/ha) for seasons (2004/2005) and (2005/2006).

Season Treatments	Season 2004/05		Season 2005/06	
	Flowering	Maturity	Flowering	Maturity
<i>Vigna unguiculata</i>	953.8 ^a	1325.00 ^a	1795.06 ^a	2940.80 ^a
<i>Cajanus cajan</i>	398.6 ^{bc}	892.60 ^{ab}	761.20 ^b	2622.40 ^{ab}
<i>Lablab purpureus</i>	837.9 ^a	1475.60 ^a	1812.20 ^a	1830.20 ^{ab}
<i>Clitoria ternatea</i>	83.00 ^c	437.20 ^b	126.00 ^b	288.20 ^c
<i>Macroptilium atropurpureum</i>	633.56 ^{ab}	1010.82 ^{ab}	990.60 ^{ab}	1371.20 ^{bc}
SE ±	82.8547	111.5229	178.5766	276.6650

Means followed by the same letter(s) in a given column are not significantly different at P = 0.05 according to Duncan's multiple range test.

According to the chemical analysis of the five tested pasture legume species, *Vigna unguiculata* at the flowering stages recorded the highest crude protein content followed by *Lablab purpureus* and *Macroptilium atropurpureum*, while at the maturity stage *Lablab purpureus* scored the highest crude protein content and the lowest was scored by *Macroptilium atropurpureum*. However, *Clitoria ternatea*, at the flowering stage, scored the highest value of crude fibre and *Cajanus cajan* scored the lowest value, while at maturity stage *Vigna unguiculata* scored the highest value of crude fibre whilst *Cajanus cajan* scored the lowest (figures of these results can be found in Table 4).

The high and low values of crude protein and crude fibre content scored by the tested pasture legume species can be explained by their difference genetic characteristics and may also be due to the soil nutrient content in which the pasture legume plants were grown.

Table (4): Forage quality of five pasture legume plants during different stages of growth.

Treatments	Stage of growth	Chemical Composition			
		CP%	CF %	DM%	OM%
<i>Vigna unguiculata</i>	Flowering	21.93	28.30	94.54	86.17
	Maturity	9.62	37.00	94.76	89.70
<i>Cajanus cajan</i>	Flowering	9.81	26.02	94.34	88.65
	Maturity	10.56	27.74	94.94	89.22
<i>Lablab purpureus</i>	Flowering	21.12	26.85	95.69	83.72
	Maturity	17.87	34.41	95.27	86.84
<i>Clitoria ternatea</i>	Flowering	11.00	30.66	95.08	89.29
	Maturity	11.00	35.18	95.98	87.29
<i>Macroptilium atropurpureum</i>	Flowering	20.56	28.30	95.35	87.91
	Maturity	14.4	30.20	95.25	87.36

Where CP stands for crude protein, CF stands for Crude fibre, DM stands for Dry matter and OM stands for Organic matter.

4. Conclusion

Based on the results obtained, it was concluded that the performance of the tested pasture legumes, according to their dry matter production and forage quality, is ranked as follows:

1. *Vigna unguiculata* (cow pea)
2. *Lablab purprures* (lablab bean)
3. *Macroptilium atropurpureum* (siratro)
4. *Cajanus cajan* (pigeon pea)
5. *Clitoria ternatea* (kordofan bean)

5. Recommendations

1. To bridge the feed gap for the sedentary livestock in the study area during the dry season through an introduction of good quality and high yielding forage legume plants, *Vigna unguiculata*, *Lablab purprures* and *Macroptilium atropurpureum* could be distributed to farmers and sown. This could be done by including them in an extension package.
2. More investigations are needed in order to improve sedentary livestock feeding status in the study area during the dry season.

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Discussion

Participants claimed that there was hostility between pastoralists and farmers, in spite of efforts by international mediation groups to halt the fighting and maintain livelihoods. Robust security is needed in the region to maintain a symbiotic relationship between farmers and herders.

Many participants believed that pastoralists are more marginalised than other Darfurians, be it by the government, the international community or humanitarian assistance groups. They further argued that the lack of information regarding pastoralists has led to further marginalisation which, according to some participants, may well be the result of mal-adaptation. They noted that the government only enumerates the size and number of livestock, without taking account of the living situation of the pastoralists. Regarding the issue of camel rearing as an adaptive strategy, many cautioned that although camels are a source of livelihood for the pastoral community, rearing camels has become uneconomical in recent times due to climate change.

Some participants stressed that pastoralists should receive incentives commensurate with their contributions to the national economy, otherwise they may resort to violent means. Others noted that the state is reluctant to legally acknowledge the pastoralists, despite the fact that 23% of the total export revenue of the nation is generated from livestock. Consequently, it was mentioned that since the government benefits from existing livestock production, it is not concerned about the living situation of the pastoralists. Some participants further asserted that the Government of Sudan is not willing to integrate policies pertinent to Darfur into its macro level policy directions.

Regarding the issue of land, participants recommended that pastoralists must be entitled to land use rights, so as to allow sustainable development in the region. Some participants added that lands that have been taken away should be given back to the previous owners, stressing that the newly established Land Commission (as provided in the DPA) should play a significant role in this regard.

Overall, participants emphasised that the issues of the pastoralists must be part of any peace process. They further commented that involving communities in the peace process is crucial, but that there is a need to have enabling governance structures in place so as to ensure the voice of the community is effectively heard. Other participants also noted that there is a proposition from the Government of Sudan to divide Darfur into six autonomous regions, which would fragment the influence of Darfur in national politics even more.

The importance of livelihood was mentioned as a core issue in the Darfur conflict that should be addressed in order to bring about sustainable peace in the region. One participant commended the livelihood framework presented by Dr. Young, noting that

participants should analyse this framework which would be useful to ensure participation of local communities. He also emphasised the need for advocating such an approach to all stakeholders, including the Government of Sudan, so that effective responses can be planned and executed at all levels.

It was maintained in the discussion that conflict is used as a livelihood strategy by pastoralists. Noting that various conflicts had been traditional asset accumulation strategies, participants pointed out that understanding conflict as negative may result in an incomprehensive analysis. They emphasised that even though conflicts make livelihoods more vulnerable and less sustainable for most people, there are some groups of the population that have benefited from conflict.

Regarding Dr. Young's analysis and observations of IDPs, some participants noted the fact that IDPs are not only the visible consequences of the war but also essential to the immediate solution of the problem. It was further said that IDPs have both international and national constituencies. Participants also added that the issue of IDPs has been highly politicised, and that there is a need for a more thoughtful approach on how to resolve the problems, with the participation of the IDPs themselves.

There was agreement that some of the research presented during the conference should be taken into consideration in any upcoming peace talks. Various participants confirmed that the governance in IDP camps has changed. As opposed to traditionally appointed leadership, now there are elected leaders, dominated by the youth and linked to various movements, often leading the camps to suffer from erratic leadership. It was also added that there has been a change in the attitude of IDPs because of insufficient attention extended from the international community towards them. In the past, IDPs called for international intervention, from the West and even from NATO. However, the best that they received was from the African-conceived AMIS and the hybrid UNAMID, the primary function of these missions being protection of IDPs. Thus, it was mentioned that the IDPs have started warming up to UNAMID.

In addition, participants agreed that there is an increasing sense of anger amongst IDPs, who are now receiving fewer visitations from both the international community and the national authorities. A participant cited the example of a case in Kalma camp where, despite the death of 36 people, no external party came to assist. Participants pointed out that these and other factors have made the IDPs realise their limitations. They further stressed the need for a thoughtful approach on how to proceed with IDP issues. Some participants feared that if the government takes unilateral action, it may bring further negative repercussions for the IDPs, stressing the need for both the government and the UN to benefit from research and observations currently being undertaken on relevant issues in the region. It was also maintained that the demands of the IDPs are shifting, and that the shift has not been captured politically. Moreover, it was stressed that it is high time that further research should be carried out to help prepare a response to IDPs' legitimate needs.

As regards to the number of IDPs, Dr. Young stated that the official number has not changed, as there has not been an accurate count since 2005. Forty percent of IDPs are absorbed in urban centres.

In their discussion, participants also stated that it is important to look at adaptations to climate change and changes in livelihood strategies. They discussed the various uncoordinated strategies with regard to adaptation to climate change. Moreover, they raised the classic process of mal-adaptation, and probed possible ways of promoting alternative adaptation technologies.

Dr. Young was asked to elaborate on the idea of mal-adaptation and whether it is similar to bad adaptation. She replied that the term was introduced to simply convey the unsustainability of activities and their potential effects on other groups. As regards to the issue of sustainability, Dr. Young added that adaptation is all about creating alternative solutions that do not have an undesirable effect (mal-adaptation) on other groups in the society.

Participants further noted that most of the communities' strategies are not organised, and that sometimes they create mal-adaptation and conflict with other groups. Moreover, it was stated that farmers often expand the area of land under cultivation so as to get adequate production, which will, in turn, increase the likelihood of conflict with pastoralists. Noting the communities' ability to adapt to various livelihood challenges in the past, participants remarked on the need for communities to resolve conflicts through their own mechanisms.

Some participants highlighted the possible alignment of different agendas of the peace-process with the issue of adaptation to the changing ecological and social situation in Sudan. It was further noted that the research carried out by Dr. Abdelrahman Mohammed could exemplify possible adaptation strategies to climate change which could even be integrated into the ongoing peace process.

Responding to a question posed on the issue of nomads, Dr. Young defined their way of living as the most environmentally friendly. She further presented data depicting the decrease in the nomadic community by two-thirds between 1956 and 1993. Participants were asked if the figure implied that the nomadic people would disappear, and whether the decline was related to conflict. It was mentioned that the continuous urbanisation and sedenterisation, and the government's role in providing wage labour, might have contributed to the decrease in the nomadic population. Participants also noted that the actions currently being taken by the government have been to the disadvantage of nomadic groups. They argued that although nomads are significantly contributing to the economy, the various government policies have failed to address their problems or improve their living standards.

Participants mentioned that understanding the parameters whereby local people evaluate the introduction of a new fodder species, such as its medicinal value, is as

important as the use of the other yardsticks Dr. Abdelrahman Mohammed had used in his study (such as resistance to water stress, yield and quality). They also commented that the rating (which revealed a ranking as follows: cow pea, lablab bean, siratro, pigeon pea and, lastly, kordofan bean) might differ if parameters used by local people themselves were included in the study. Moreover, another participant noted that further investigation needs to be done, given that it has been five years since Dr. Abdelrahman Mohammed's study was conducted.

Dr. Abdelrahman Mohammed appreciated the comments and reflections presented by participants, and remarked that there is continuous change in the livelihood means of the local people. He further underlined that the people in the study areas have now started raising sheep and cows and have shifted towards cultivating short-rain crops such as sorghum and that fewer traditional terraces are being built.

Theme 5

Land, Land Use Policies and Conflict

Introductory Notes

Pervasive competition and conflict over land in sub-Saharan Africa often reveal processes of exclusion, deepening social divisions and class formation (Peters, 2004).

In countries like Uganda, the passage of the Land Act (1998) has failed to reduce the number of pending land conflicts, particularly those conflicts affecting female headed households and widows (Klaus & Raffaella, 2004). In Somalia, the strongest clans have taken over valuable agricultural land, expelling weaker clans and indigenous peoples from their traditional lands (IFAD, 2009).

Conflicts in the dry lands are mainly over natural resources such as water and pastures, and problems are often triggered by land tenure changes. Access to water and pasture was one reason that the Zaghawa became involved in the Darfur conflict, which consequently led to the formation of the first organised rebel groups in 2002 (Tubiana, 2006, p.75).

Land issues during the pre-colonial, colonial and post-independence periods characterise the power relations that often result in tension and conflict among dominant social groups in East Africa, such as in Rwanda, Burundi, and the DRC.

Changes introduced during the colonial period in most of East Africa tended to politicise and exacerbate conflicts over disputed access to land. On the one hand, colonialism institutionalised the link between ethnic identity and land access within the political structures of the state. On the other hand, it intensified local competition for land. In almost all cases, the ruling elites manipulated institutional arrangements and provisions, for instance, in accessing land and education, to mobilise and maintain power.

After independence, the dominant groups such as the Tutsi in Burundi, and the Hema in Eastern DRC, continued to govern with hierarchical administrative systems, and continued to control access to resources, particularly land. In fact, elites were against democratic practices, fearing these might result in their subjects losing power. Essentially, the replacement of one political 'ethnic' elite with another was observed as introducing a new dimension of political and social instability in relation to land.

Similar to the cases in Rwanda, Burundi and the DRC, colonial powers had also influenced the land tenure system in the Sudan. Undermining of traditional leaders also started with the 1925 Unrestricted Lands Act. During the post-independence period, this was followed by the abolition of the Native Administration Act in the 1970s and of the People's Local Government Act, which labelled the Native Administration as illegal. As the government rebuilt the traditional administration from 1996 onward, it also sought to weaken the leading chieftaincies by creating new leaders and favouring landless Arabs.

Land disputes related to the return of refugees continue to deteriorate both the political and security situation in these countries. There is a general fear of loss of land (redistribution), as well as a general loss of economic opportunities, if a new party takes control of political power.

Pasture Land

Range and pasture are the backbone of livestock production in the Sudan in general, and Darfur in particular. The growth of forage plants and grazing grasses undoubtedly depends on rainfall. Therefore, due to drought and the shortage of rains, the productivity of natural pasture has decreased (Fadul, 2004, p. 38).

The deterioration is not limited to grasses, but includes a decrease in the production of trees, and in particular their pods and leaves, which normally contribute over 30 percent to range carrying capacities. Regarding the decrease in pasture lands, while there have been substantial decreases in the *qoz* soils, losses in the clay and *wadi* lands are double those of the *qoz* soils (Ibid).

Livestock Production

Livestock production provides livelihoods for an estimated 20 percent of the population, and remains one of the major resource bases in Sudan. In 2002, the livestock population in Sudan was estimated at 39,479,000 head of cattle, 48,136,000 sheep, 41,485,000 goats and 3,342,000 camels. The cattle population increased from fewer than 7 million to 40 million, a nearly six-fold increase. The number of sheep and goats, together, increased from fewer than 14 million to 113 million – an eight-fold increase. No grasslands can survive such rapid continuous growth in livestock populations (Brown, 2009).

In contrast, as documented by the United Nations (UN), the International Committee of the Red Cross (ICRC), and others, livestock populations were steadily decreasing in Darfur by the end of 2003 and mid-2004; and by 2007 numbers had fallen steeply. Assessments in early 2006 indicated that displaced villagers in Darfur had lost between 60 and 90 percent of their animal herds. During September 2004, the ICRC reported that 18 of 20 villages visited during a three-week survey in North, West, and South Darfur claimed that 70-100 percent of their livestock had been looted. In October 2004, Emily Wax of the *Washington Post* reported that stolen animals worth millions of dollars had flooded markets in Nyala, the capital of South Darfur province. Some reports claimed that livestock had been sent to Chad, the Central African Republic, and the Gulf states (Schimmer, 2008).

Darfur and Greater Kordofan account for one-third of Sudan's total livestock resources. Livestock species in Darfur include camels, cattle, donkeys, goats, horses and sheep. According to the Ministry of Animal Resources (MoAR) (2001), Darfur accounts for 21 percent of cattle, 22 percent of sheep and goats, 24 percent of camels, 31 percent of donkeys and 63 percent of horses in Sudan.

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Historical Overview of Land Policy in Sudan

Mustafa Babiker

Abstract

Sudan has been wracked by civil war and regional strife for most of the past fifty years. This is often seen as being associated with disputes over land tenure. However, this was not necessarily the case during the pre-colonial and colonial times. Rather, the paper, by charting the historical evolution of Sudanese land tenure regimes over the centuries, aims to identify the objective conditions under which land tenure in the Sudan has been both a cause of conflict and a factor in ensuring peace and social stability. Thus, contrary to the general belief that land has always been a major factor in conflicts in the history of the Sudan, the paper shows that the rational land policies adopted during the pre-colonial and colonial times were designed with peace-building and social justice as their ultimate goals. The paper concludes by highlighting the important lessons from these earlier times that should inform any future attempt at land policy reform.

1. Pre-colonial land tenure

Although there are many factors that contribute to conflict in Sudan, the connection between conflict and land tenure in post-colonial Sudan is widely acknowledged (cf. El-Tayeb ed., 2006; Pantuliano, 2007; UNDP, 2006).

Prior to the establishment of Turkish colonial rule in Sudan (1821-1884), two main forms of land ownership prevailed in the country. In the relatively densely populated riverain regions of northern and central Sudan, individual landownership was taking root by the time the absolute title of the Nubian Christian monarchs was beginning to be challenged and undermined (Awad, 1971).

In the rainlands in general, the abundance of land, coupled with the largely nomadic pastoral activities of the inhabitants, did not encourage the emergence of individual landownership. Various forms of communal ownership vested in a 'tribe' or one of its sections were recognised by nomadic pastoralists. The pastoralists in the central rainlands during that early period legitimised access to the rangelands by membership of fluid structures of tribal groupings that were organised around power centres in control of strategic resources (Ahmed, 1976).

During the Funj period in particular (1405-1821), titles to land were regulated by a *wathiga* (charter) system whereby the kings granted land, as a gift, to tribal rulers and religious notables (O'Fahey & Spaulding, 1974; Spaulding 1979). An institution similar to the Funj *wathiga* also prevailed in Darfur, western Sudan, whereby the Keira kings granted *hakura*, but often for a specific period of time (O'Fahey & Spaulding, 1974; O'Fahey, 1980)

During the Turkish colonialism (1821-1884) and the brief Mahdist rule (1885-1898), no radical changes were introduced to the basic structure of the land tenure system. Nevertheless, the Mahdist government transferred the ownership of vast tracts of land from disloyal to loyal groups; a move that was soon to be reversed by the British colonial administration (Awad, 1971).

Among the sedentary communities of the rainlands, land use was legitimised through membership in a village community. In the various parts of southern Sudan, the inhabitants held land in common as a tribe or group; and an individual had no rights except as a member of such tribe or group, irrespective of whether the land was riverain or rainland.

2. Colonial land policy

One of the most important and daunting economic and administrative issues that confronted the early British colonial government was the question of land rights. Wars, droughts and famines during the Mahdist rule had resulted in tribal migrations, abandonment of cultivation, arrogation of rights and a general decline in agriculture. Thus, the immediate resumption of cultivation was essential both economically and politically, and was considered by the colonial authorities as the best guarantee for peace. To achieve this, cultivators had to be assured that the new authorities would not challenge their rights over land. In other words, it was made clear that insecurity of tenure would not only provoke countless time-consuming, and possibly violent, local disputes but would also hamper the revival of agriculture and the desired increase in government revenue. Thus, the future economic wellbeing of the country was seen to rest mainly on the settlement of agricultural land.

Following the re-conquest, the colonial authorities proclaimed that no land sales would be recognised without a valid title. This proclamation, envisaged as the best way to protect the 'native landowners' from foreign speculators, remained one of the guiding principles of the colonial land policy. Nevertheless, speculations continued and were intensified in 1905 by the opening of the Red Sea Railway. Thus, a 1905 Proclamation was issued to bring the transfer of land titles under more stringent control. The colonial authorities thereby forbade the selling of land without the written consent of the provincial governors, and declared that all sales for which such consent was not given would be regarded as null and void (Government of Sudan [GoS], 1947, p. 42). In the same year, the colonial government promulgated an ordinance for the settlement of rights over forest and unoccupied lands. According to that ordinance, the government was deemed the legal owner of all land and forests which were "...entirely free from private rights or that the rights existing...do not amount to full ownership" (Warburg, 1971, p. 156). Thus, the provincial governors were instructed not to consider any transaction involving land that had not been settled and registered. Such lands included those dependent for their cultivation on high floods or rains, as well as forest and waste lands, which amounted to practically 99% of the total area of the Sudan (Awad, 1971, p. 218). In 1911, the government, aiming to provide yet

another safeguard against the alienation of lands, declared that all land in the Sudan was *khirajiyā* (owned by the state) in the sense that ‘absolute freehold’ was not only unrecognised, but also considered undesirable. This policy was subsequently justified on both practical and moral grounds.

On the practical side, it was argued that, “...no system of land tenure in Africa should permit the natives to sell land to foreigners or any native not subject to the local native jurisdiction.”¹ In other words, it was stressed, “...the sphere of native administration is the sphere of local government, and all the native rights in the land should belong only to those individuals who are subject to the authority of local administration.”² Four desirable implications were seen to emanate from the enforcement of this principle:

- “(i) It will simplify the work of the native administration (e.g. in cases of inheritance, only heirs who are subject to the local administration will be able to claim rights to land)
- (ii) It will emphasise the rights of the state and of the native administration
- (iii) It will tend to keep the people on the land, and discourage mass congregation in towns, which is politically and economically undesirable
- (iv) It will tend to keep at low premium the market value of all rights to land”³

Moreover, ‘absolute freehold’ was seen as undesirable from the point of view of administrative ‘efficiency’ since it “...involves all the objections to, and difficulties of, land settlement, registration, alteration, and *Shari’a* inheritance”⁴.

On the moral side, the colonial authorities considered that any recognition of individual ownership would be contrary to government policy, “...alien to native custom”⁵, and harmful “...to hitherto native usage and the general interest of communal life (a feature of Mohamedan tribalism)”⁶. However, the ‘potent danger’ was seen to rest not on the system of individual ownership *per se* but on what had been described as the ‘native mentality’. According to this conception, the native, “...be he Arab or animist, is essentially a fatalist, taking little or no thought of tomorrow. Thrift and foresight are meaningless words to him, and on the spur of the moment, he will gladly sacrifice the future to the present.”⁷ Consequently, it is argued that, “...once the system of freehold in land is allowed to emerge, land speculation and unrestricted landlordism will spread with sudden and startling rapidity”⁸. Thus, “...to safeguard the ignorant and improvident peasant from selling his whole heritage” (GoS,

¹ D. Hawkesworth, ‘Suggested policy for the administration of unregistered land’, Rufa’a, En Nahud (W.K./1.F.11)

² Ibid.

³ Ibid

⁴ L.M. Buchanan, RL, ‘Land tenure memorandum’, Khartoum, May 15, 1935; En Nahud (W.K./1.f.11)

⁵ Hawkesworth, op. cit.

⁶ Buchanan, op. cit.

⁷ Hawkesworth, op. cit.

⁸ Ibid

1947, p. 42), the argument goes, “it is no small part of our responsibilities as acting trustees of the rights of the people in Sudan to ensure that the lands required for the needs of the community as a whole, is not exploited by the rapacious few.”⁹ However, the fact that the colonial government did not recognise individual ownership in land which depended for its cultivation on rains; forest or waste land, was made very clear in all its legislation from the Land Settlement Ordinance of 1905 to the Land Settlement and Registration Ordinance of 1925 (cf. El Mahdi, 1971, p. 3-8).

In the rainlands, tribal ownership required some attention. Among the nomadic groups, the chiefs continued to possess theoretical rights to dispose of their tribal lands, with members of the ‘tribe’ enjoying the land’s *use* but not its *ownership*. As the term tribe was also taken to mean a village, or some smaller communal unit, the same principles were applied in the case of sedentary groups. Accordingly, village lands were recognised, though not registered, as belonging (subject to government ownership) to the village in common without specific portions being appropriated to specific individuals. Moreover, the only recognised individual right was the right to use the land in accordance with tribal custom or as the tribal authority directed. Thus, it was repeatedly stressed that the question of individual ownership of particular tribal lands could not arise.

One of the principal justifications for the establishment of a system of “communal” land rights was that it would empower the native authorities, i.e. it represented the delegation of the control and allocation of land (the central resource in Sudan’s predominantly agrarian economy) to those who would govern the rural population on behalf of the colonial authorities, in what came to be known as ‘indirect rule’. The link between indirect rule and communal land rights has been tellingly articulated by Meek (1946, p. 10): “The authority of chiefs, and sub-chiefs and heads of clans and families is bound up with the land. The grant, therefore, to individuals of absolute rights of ownership would tend to disrupt the native policy, and so, too, would the indiscriminate sale of tribal lands by chiefs.” Thus, the success of indirect rule depended on a system in which political allegiance to local authorities was a condition for access to land. Equally important was the careful supervision of the delegation of authority to guard against any possible misuse. To that end, the colonial authorities insisted that each native land unit be regarded as an “estate of the community” whereby each occupier of land was to be a “tenant of the tribe” (Babiker, 1998, p. 199).

Thus, the internal administration of land was vested in the tribal authorities, but subject to the ultimate direction of provincial governors. Moreover, the tribal authorities, subject to tribal custom, were granted the right to let out portions of the surplus communal land to strangers – charging them rent in cash or in kind. The phrase, “subject to tribal custom” refers to the ruling that no tribal authority is allowed to let out any portion of tribal land before the needs of all its members are satisfied.

⁹ Ibid

However, taking “rent” through letting out of tribal land was considered as “...a reward...of the tribal authority for looking after the tribe’s interest.”¹⁰

To bring this section to a close, one might say that the underlying motive of the colonial land policy was to expand cultivation while at the same time safeguarding the cultivators’ rights by excluding foreign speculators and native absentee landlords from acquiring land. The British Foreign Secretary described the success of this policy when he told his Parliament in 1924 that, in the Sudan, “...it may be said that not only have foreign speculators been kept out, but also the wealthy native absentee landlords, and the whole of the land, remains in the ownership (*sic*) of the actual cultivators that work upon it” (Awad, 1971, p. 224). Moreover, some commentators went further to describe the colonial land policy as a true “land reform” that had taken place half a century earlier than the late 1950’s and early 1960’s land reform policies of the “radical” regimes in the Third World (Awad, 1971, p. 212). Furthermore, the land policy pursued by the colonial government was considered as atypical of the land policy followed by the British in other colonies, where Europeans were allowed to acquire large tracts of land and where grants were given to influential tribal chiefs – as in the case of Buganda in Uganda (cf. Meek, 1946, p. 79).

Whilst some contributors attributed the unorthodoxy of the colonial land policy in the Sudan to the non-conformism of Lord Kitchner and the special interest he took in the welfare of the country and its people (Gaitskell, 1959, p. 61); others attributed it to the unsuitable climatic conditions of the Sudan for European habitation, together with a pressing concern about the possible mass expropriation of the unsophisticated natives and the formation of a large, discontented, landless class – easy prey for an agitator (Miskin, 1950, p. 283). Nevertheless, the important question, as far as the present paper is concerned, is: What are the implications of the colonial land policy for the post-colonial patterns of land acquisition and distribution?

Thus, for a variety of political and economic goals, the main objective of the colonial government was to restore what was understood to be the nineteenth century system of land tenure. To that end, it was ruled that the regulation and administration of land rights, “should be based on indigenous and inherited traditions.”¹¹ Thus, usufruct rights were accorded to an individual if, and only if, that individual was a member of a village community. In other words, village community membership was a *sufficient* condition for rights to land; no member (adult resident householder) could go without land. Village membership was also a *necessary* condition for rights to land, and land could not be alienated outside the village community. Finally, the village community held “reversionary rights” to land (cf. Gluckman, 1977). That is, when individuals no longer used the land, rights to it reverted to the village in common and could then be allocated to other community users.

¹⁰ The foregoing account was based on Mr. B.H. Bell’s “Note on tribal lands”, August 10, 1930, enclosed with a letter from D. Newbold, Kordofan Governor, addressed to all District Commissioners, May 28, 1933; El Obied (Kn.P./1/f.1/34)

¹¹ Hawkesworth, *Suggested Policy...*, 1935

3. Post-colonial land policy

In the fifty years since independence, land tenure policy in the Sudan has gradually drifted away from the tradition established by the British administration. The institutional structures for land administration are now extremely weak, suffering problems of poor recognition and compartmentalisation between the various government institutions, with an apparent ambiguity concerning the roles and mandates of the various actors; including local councils, native administration, land dispossession committees, ministry of agriculture, etc. There is also ambiguity and confusion regarding the division of power between the federal and state governments, which has resulted in conflicting decisions over land use and the continuous encroachment of the federal government on land in the states.

The significant difference for the small-scale farmers and the pastoralists in the rainlands between colonial and national land policy is that the latter has displayed a stark lack of sensitivity to their rights and interests compared to the former. In the name of “development for the public good”, the national governments have tended to withdraw usufruct rights from increasing numbers of usufruct landholders. “Development” was primarily sought through agricultural expansion, which either replicated the model of the Gezira irrigation scheme or promoted large-scale rainfed farming in a search for enhanced national food security. In the clay plains of eastern, central and western Sudan, however, the major rainfed mechanized farming in particular has expanded considerably since the late 1960s. It currently covers an estimated area of over 25 million acres, most of which was not actually allocated by government. Invariably, this expansion was at the expense of pastureland. Pastoralists thus contend that their fortunes in colonial times were far better than their lot under national rule.

One important observation is that except for the recognisable and socially legitimated “tribal usufruct rights” to government land; both colonial and post-colonial land policies and legislation were largely silent on to the tenure rights of the pastoralists. Nevertheless, pastoral entitlements were catered for by other means, notably through local level legislation in the form of Local Orders, strict enforcement of ‘grazing lines’, manipulation of water policy and administrative measures including the creation of Native Administration. Colonial legislation on Native Administration, moreover, instituted mechanisms for the enforcement of pastoral resource tenure. However, these arrangements later on proved weak and ineffective in guaranteeing the rights of pastoralists to natural resources particularly land.

The categorical classification of the rainlands as “government owned”, although “subject to usufruct rights”, has endowed the state with the legal weapon to withdraw usufruct rights in order to introduce other forms of land use, mostly at the expense of pastoral dry season grazing grounds. In the postcolonial period, the central rainlands witnessed a dramatic expansion of large-scale mechanised, irrigated and rainfed farming. This has induced disputes between farmers and pastoralists, particularly over

land covered by unauthorised agricultural expansion. As the rangelands in the Sudan are considered the property of the state, with the pastoralists only enjoying usufruct rights, the settlement of disputes has consistently been detrimental to the interest of pastoralists. The bias against pastoralism in the settlement of disputes was institutionalised by the British colonial administration. The 1944 Report of the Soil Conservation Committee recommended that, "...where nomadic pastoralists were in direct competition for land with settled cultivators, it should be the policy that the rights of the cultivator be considered as paramount, because his crop yield a bigger return per unit area" (El-Tayeb, 1985, p. 35). This attitude towards pastoralism has persistently refused to die away, and continues even today.

The failure of the pastoralists to defend their land tenure rights may be explained by their political marginalisation and the hijacking of their representative institutions by livestock traders. This is evident in the recent attempts in many parts of the Sudan to reform land tenure in favour of the pastoralists. For example, proposals to establish grazing lines for the northern limits of mechanised farming, the demarcation of pastoral migration routes, and the allocation of exclusive dry season grazing grounds were aborted by the more powerful commercial farming interest that dominates the legislative institutions at both the state and federal levels (cf. Shazali & Abdel-Ghaffar, 1999, p. 9). It is therefore not particularly surprising that pastoralists all over the country are carrying arms to defend their rights.

Land tenure legislation since independence gradually started to shift away from its colonial legacy. Up to 1970, the national governments kept colonial legislation on natural resource tenure virtually intact, with only minor amendments to wording dictated by the changed politico-administrative context. Moreover, the land law of the Sudan until 1970 was uncertain in regards to the ownership of waste, forest, occupied and unoccupied unregistered land. However, local authorities in some occasions, *inter alia* tribal fighting over pasturelands and watering wells, have made pronouncements to the effect that ownership of the land belongs to the government, while the people enjoy the rights of pasture, woodcutting and cultivation. These rights, it must be remembered, are less than full ownership. The government has consistently discouraged landlordism and acquiring ownership of land by prescription in tribal areas, where individual ownership of immovable property is not very well known, e.g. in western and southern Sudan where communal tribal ownership of land prevails.

Unregistered lands in the Sudan are either occupied or unoccupied. If they are occupied, then acts of possession are exercised over them such as cultivation, pasture, woodcutting, erection of buildings and other acts of similar nature. Persons occupying such lands have been enjoying their rights of possession for decades. There are also others who use these lands at irregular intervals and it must be noticed here that some occupants have enjoyed possession for very short periods, or have entered into possession recently. Cultivation in many parts of Sudan is on unregistered land. The Prescription and Limitation Ordinance, 1928, provides that a person in use or enjoyment of waste, forest or unregistered land, with or without the express

permission of the Government, shall deem to be usufructuary until the contrary is proved. The contrary is established upon settlement under the provisions of the Land Settlement and Registration Ordinance, 1925.

It is to be repeated that most of the land all over the Sudan is unregistered. In rural areas, for example, some wealthy traders started millet, sesame and groundnut plantations without licences from the Government. Persons enjoying and using unregistered lands for a long time became the reputed owners of these lands. Disputes over unregistered lands were raised before the civil courts, before land settlement was effected. In many cases, the courts declared the title of one party or the other to the land or its use and enjoyment.

Against this background of uncertainty in relation to the ownership of unregistered land, the Unregistered Land Act was passed on 6 April 1970. Although this act has been repealed, it still reflects the present official philosophy concerning land. The Act has brought about a drastic change in the concept of "ownership" of unregistered land. According to this Act, all land that is not registered before its enactment becomes the property of the government. The Act cuts heavily into rural communities' land rights and challenges communal and tribal ownership. It provides the government with a tool to facilitate the acquisition of large tracts of land for agricultural schemes, at the expense of rural communities, especially the pastoralists. Finally, the ten-article act is devoid of practical guidelines on the modalities for its implementation.

The Civil Transaction Act, 1984, is the latest legislation concerning land that abolished a number of scattered land laws like the Prescription and Limitation Ordinance, 1928. The Act states that registered usufruct rights are equal to registered ownership. The Act also legalizes elements of *shari'a* law and legally confirms the role of the state as a land owner and land manager. The Act also repeals the 1970 Unregistered Land Act, but is more comprehensive, providing some guidelines and details for its practical implementation. It identifies different forms of land and property rights such as: land held in undivided shares, family ownership, possession of unclaimed property, ownership of usufruct rights over land and property, grants of usufruct rights, easement rights; and acquisition of ownership by accession, possession and succession. This Act considers the following issues pertinent to securing land tenure: transfer and inheritance of rights; compensation requirements for land appropriated by the state; granting of land leases to cooperative bodies; conditions for obtaining usufruct rights and possibility of registering easement rights (rights of way). However, the Act is a hurriedly compiled mixture of different 'Islamic' laws from Pakistan and Jordan, and is not always clear and harmonised. For example, the Act grants a usufruct title to "whoever utilises wasteland (*muwat*) far from urban areas whether by cultivation, building or irrigation", although the term "wasteland" has never been defined, even in former legislation. The 1991 Amendment of the Act excludes any consideration of a legal or other suit or procedure in respect of any subject to do with proprietorship of land owned by the state.

The Comprehensive Peace Agreement signed between the GoS and the SPLM/A in 2005 and the 2005 Interim National Constitution provide general guidelines for legal reform with respect to land tenure. Chapter III of the Constitution, Article 186 (1) of the Section on Land Regulation states, "All levels of government shall institute a process to progressively develop and amend the relevant laws to incorporate customary laws, practices, local heritage and international trends and practices." Article 187 (1) of the 2005 Interim Constitution also provides for the establishment of a National Land Commission to arbitrate between willing contending parties on claims over land; entertain claims, at its discretion, in respect of land, be they against the relevant government or other parties interested in the land; assess appropriate land compensation for applicants in the course of arbitration; make recommendations to the appropriate level of government concerning land reform policies and recognition of customary rights or customary land law; and advise different levels of government on how to coordinate policies on national projects affecting land or land rights. It is clear that the provisions of the Interim Constitution have paved the grounds for massive reforms to redress the imbalances in existing laws, policies, and practices regarding the regulation of land rights. However, the willingness and the moral commitment to implement such reforms remain to be seen in practice.

To sum up, the development of the present legal framework spans a period of almost 100 years, with some pieces of enacted land law dating back to 1899. The following characteristics typify the legal "land" framework: fragmented and scattered legislation with a strong colonial inheritance; repeated revision with legislation far outrunning implementation; overlaps and contradictions; major emphasis on the creation and regulation of individual new rights and not on the recognition of existing communal rights; devised-to-implement government policies that do not reflect rural reality and are not necessarily in the interest of the ordinary people; very urban biased; gives little or no attention to traditional land use systems, especially grazing rights; little reflection and discussion (including amongst academics); an absence of awareness creation; poor dissemination, little knowledge and poor understanding; no translation into local languages; and a lack of practical regulations and other technical tools to implement laws.

4. Concluding remarks

Land alienation has been a common phenomenon in Sudan for more than a century. The random and unlawful expansion of commercial production into these tribal homelands has resulted in reduction of land available to traditional farmers and pastoralists. Often, farmers and pastoralists have become tenants on these commercial farms as a means of ensuring their food security, or workers for daily wages. Moreover, the commercial farms tend to limit access to livestock grazing areas and often interfere with pastoral migration routes. These factors result in reduced animal production and exacerbate conflicts. Accordingly, it is high time to address this serious cause of conflict over land, among other causes, through a revision and amendments of the policies, laws and institutions governing the acquisition,

development and utilisation of leasehold lands. There are cases in many parts of the country where rainfed mechanised schemes have been established without the approval (or consent) of the relevant authorities, or which have been extended beyond the boundaries demarcated for the licensed scheme. Such dealings in land have to be immediately abolished.

There is a clear need for legal reform to allow for the registration of usufruct land rights. Customary rights in communal tribal (unregistered) lands, where rights of cultivation, pasture and woodcutting, etc. have been exercised for centuries, should be secured by law; and government appropriation of such rights without compensation should be regulated. Of course, there might be sound objections against the registration of such land rights in the name of individuals, since the exercise may prove to be costly and time consuming. However, there should be no objection to the registration of usufruct rights in the name of collectives (tribes, villages, etc.) holding the land as such. Likewise, it should not be permissible to register lands that were traditionally used as pasture and livestock routes.

If any uncultivated (unoccupied) lands are to be allocated for commercial purposes, then the usufruct rights of pastoralists and cultivators have to be given due consideration and secured, subject to payment of compensation in cash or in kind (land). The National Land Commission, to be established according to the provisions of the 2005 Interim Constitution, is expected to deal with this issue. Civil society organizations (CSOs), local NGOs, etc., can play a positive role in this regard by conducting awareness campaigns on, “land settlement and deeds registration legislation”, and by assisting all landholding collectives in safeguarding their interests through settlements and registration.

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Land, Law and Administration in Darfur

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Abstract

Darfur was annexed in 1916 by the British to the Nilotic Sudan. Land issues in Darfur include questions of ownership, tenure and use. The basic thesis of this paper is that land ownership and land use are inseparable from local administration; one will not function without the other. There is an intimate relationship between local administration and land use, which, in turn, is fundamental to any understanding, past and present, of the latter. The paper attempts to explain issues of land and the local administrative system in an historical context, particularly under the rules of the Darfur Sultanate and later the British. It also discusses how local administration has become less and less effective since independence. By and large, the important project for the future is the recording or mapping of customary law and practice with regard to land ownership and use, grazing and water rights and migratory routes (marahil) etc. This should be undertaken by historians and lawyers working with local chiefs and elders.

1. Some general issues

1.1 Where is Darfur?

Darfur is a region of central Sudanic Africa (the Western Sudan, Chad and Northern Nigeria) that was annexed in 1916 by the British to the Nilotic Sudan. It is *not* an extension eastwards of the Nilotic Sudan since ecologically, ethnically and historically it has much more in common with central Sudanic Africa - especially the eastern Chad region (formerly the Wadai Sultanate [c. 1600-1912]).

1.2 Land

Issues here include questions of “ownership” (*milk*), tenure and use. Also relevant are differing conceptions of land ownership and tenure between the nomad and sedentary communities, although there is considerable overlap in regard to grazing rights, migratory routes and interactions along and across the sedentary/nomad frontier. Comparative study of land tenure and land use systems in the Wadai/Darfur region has scarcely begun and it is wise to be careful about premature generalizations.

1.3 Law

Generally in the region there are three ‘sources’ (*masdar*) of law: — Sharia, customary and sultanic. The latter two are often confused in the sense that what is often now described as customary law has its origins in sultanic law (both in Wadai and Darfur).

Generally speaking, Sharia has little to say on landownership or tenure relevant to the savannas. There is, however, one important exception, namely “making the dead alive” (*ihya al-mawat*), which refers to the “opening up” of virgin land (*kharub, bur*). Doing so and possessing (*milk*) and using the land (*hawz*) for seven years (according to the Maliki School of Law) generally is/was regarded as giving ownership rights.

1.4 Administration

In this paper, “administration” refers to the local chiefly administration of nomad and sedentary ethnic groups. Both groups make use of a number of titles that predominantly originate in the time of the sultans. Characteristic titles used among sedentary groups include *shartay, malik, 'umda* (a colonial importation from the Nilotic Sudan), *dimlij, firsha, eling wakil* (village head; Fur) and other local variants. Among nomads, *nazir* (also a colonial import) is used for the head of an Arab tribe, and under the sultans *malik/shayk al-'urban* was used.

An underlying principle behind the present paper is that there has always been an intimate relationship between chiefly administration and land use. The principal responsibilities of a chief – at whatever level – were taxation, law and order and the assigning of land, hence the widespread distinction between the chief of a district and the “chief of people” (*shaykh al-rijal*). The intimate relationship between local authority administration and land issues is fundamental to any understanding, past or present, of the latter.

A further underlying point is that nowhere in Darfur have there ever been mono-ethnic tribal areas, i.e. no so-called tribal territory which contained only one ethnic group. This continues to be true of even the densely populated Fur *shartayas* of Jebel Marra and Zalingei, or south-western Darfur District. There appears to be a consensus in Darfur today that mono-ethnic tribal homelands are a “good thing” but that they have no precedent in Darfur’s past. Moreover, the current demand for such homelands may simply reflect the generalised insecurity in the region.

2. Land and history

2.1 Periodisation

The history of land tenure and chiefly administration in Darfur goes back some three to four hundred years and is rooted in the administrative system of the Darfur Sultanate (c.1600 to 1874; restored 1898 to 1916). This system was more or less maintained and continued during the brief period of British rule (1916 to 1956) and continued during the first years of independence until approximately 1971, when it began to unravel both as a result of administrative decisions made by Khartoum and of ecological change within Darfur itself. It is this latter period since 1971, and its consequences for the future, that is the least researched and understood.

2.2 The Darfur Sultanate

The Darfur Sultanate, established in approximately 1600 by the Keira lineage of the Fur people, was the heir to an older state tradition associated with the Tunjur people (c. 1500 to 1600) and, even earlier, the Daju. A contemporary description from about 1570 (Tunjur period) confirms the multiethnic nature of the state (O’Fahey, 2008, p 30-31).

The Keira sultanate expanded by a largely peaceful process of incorporation, centred on the Fur people of Jebel Marra and central Darfur and which came to include most of the Zaghawa, Arabs (*abbala*), Berti and Meidoub of the north; the Bergid, Ziadiya and others in the east; and the Gimr, Tama, Masaleet and others of the west. Of the southern Arabic-speaking cattle nomads (*baggara*), the Misieriya, Bani Halba and Habbaniya were most strongly bound to the state, with the Ta’aisha and Rizaygat the most loosely. Of the peoples who comprised the state, some two-thirds were “African” and one-third “Arab”, although these categories were very fluid. All are Muslim of the Maliki School of Law.

The sultanate was run by a literate, bureaucratic administration under the sultan, who was the sole source of authority in the state and who was regarded as the owner of the state and all within it. The details of the administrative system can be found in O’Fahey (2008).

Within this bureaucratic system ruled by the sultan was a hierarchy of title-holders; some titles that survive include the *maqdam* of Nyala, the *diimanqawi* of Zalingei and the *daadingqawi* of al-Fashir. Ethnic groups had their own territories (*dars*) under their own chiefs who could grant newcomers rights to use land within their territory, in return for paying taxes to the territorial chief. Such land, however, could never be alienated from the tribal territory.

Overriding this land administration system, the sultans granted “estates” (colloquially, *hakura*, pl. *hawakir*; in written Arabic, *iqta*) or “assignments” to members of the ruling lineage, title-holders and members of religious families (*fugara*). These grants were often recorded in written charters, the earliest so far discovered dating from about 1700 (see O’Fahey & Abu Salim, 2001 for further reading). However, these grants were not absolute and their owners took care to have them renewed when a new sultan came to the throne. Generally, landed estates were granted with the boundaries carefully described in the charters, or the recipients were given tax-exempt status and some form of ownership rights (*jah*) over an area that had been previously opened up (*ihya al-mawat*).

Finally, only certain areas of the sultanate – mainly south-western Darfur, by reason of the area’s above-average fertility, and the central regions around the capital, al-Fashir, due to their proximity to the court – were so divided. The *hakura* system never covered the entire state and only to a limited degree encroached on the tribal

administrative system. Under this system, *hakura* never meant “tribal land ownership rights” (as it is stated in paragraph 158 of the Darfur Peace Agreement [DPA]).

2.3 *Under the British*

The British conquered Darfur in 1916, killing the last sultan, 'Ali Dinar (sultan, 1891-1916). Aside from this act they left the sultanate and tribal system unchanged during their brief rule, only occasionally making minor adjustments to the boundaries. Like the sultans they arrogated to themselves the rights to impose the death penalty, taxation and the appointment and dismissal of chiefs, but used the latter as sparingly as had the sultans. There was no development in Darfur, whilst large numbers of Darfurian men migrated eastwards in search of work.

The British did attempt to re-introduce some elements of a supra-tribal administration based on sultanic principles, for example unsuccessfully with the Emirate of Zalingei (1931-36) and, more successfully, with the Nyala *maqdummyate* in the lineage of Adam Rijal.

The British made no attempt to introduce land registration or any of the land legislation they had introduced along the Nile or in the Gezira into Darfur, and *hakura*-owners were left on their lands with their charters recognised as valid in the courts. It is worth noting that when Darfurians today talk of the traditional landownership, they mean their understanding of the system as it was practised under the British (On the British period, see O'Fahey, 2009 (forthcoming)).

2.4 *Since independence*

In the early years of independence there were few changes in Darfur, where a cadre of Northern Sudanese officials simply took over from the British and the province governor continued to live in Sultan 'Ali Dinar's palace.

Substantial change came in 1971 under the Nimeyri regime, with the abolition of Native Administration and, importantly, of the chiefs and their courts. President al-Nimeyri regarded both to be retrograde and un-modern and sought their replacement by young graduates from the University of Khartoum's School of Public Administration alongside a more “modern” town-council style of administration in urban areas. Attempts were also made to consolidate government control over public lands. However, the problem with these reforms was the lack of trained manpower and, with the abolition of native courts, the disappearance of the expertise needed to deal with the “traditional” systems of both nomad and sedentary land tenure.

Various decrees were enacted to consolidate government control over land and landownership, but the relationship between these and traditional landownership systems remained un-clarified. It is far from clear how operative this state legislation is in practice (for further reading see Rüniger, 1987).

Dominating these developments was the return of drought and famine from the mid-1980's (the last major famine previously had been in 1912-3). These have served to speed up the movement, for example, of the Zaghawa southwards (at least from the 1930's onwards and, possibly, much earlier).

3. Some final generalisations

Since the 1970's local administration (*idara ahliyya*) has become less and less effective and, more recently, there have been two developments that have weakened it even further. The first is the proliferation of new administrative units (emirships and new *shartayas* in the southwest) and the second is the continuous government interference in the appointment of chiefs. Although the system varies from community to community, it usually has a democratic consensual aspect with the new chief emerging from the chiefly lineage by consent, rather than imposed from above as seems to be the practice today.

The breakdown of local administration has been exacerbated by the division of Darfur into three states (*wilaya*), whose boundaries make little sense historically or ethnographically. There seems to be widespread consensus that Darfur (*Darfur kabira*) should return to its original boundaries.

Since the 1990's these insecurities have been compounded by the injection of certain racist conceptions. An example was the attempt in the early 1990's to de-legitimise the Masaleet Sultanate by the creation of "Arab" emirships, which had the effect of making the Masaleet, theoretically, a minority in their own land. Unsurprisingly, the Masaleet reacted bitterly and effectively.

The basic thesis of this paper is that land ownership and land use are inseparable from local administration; the one will not function without the other. In this context, an important project for the future is the recording or mapping of so-called customary law and practice in regard to land ownership and use, grazing and water rights and migratory routes (*marahil*) etc. This should be undertaken by historians and lawyers working with local chiefs and elders (as has been undertaken in parts of the Southern Sudan).

A question mark remains over how reversible the IDP/urbanization process is and how it will play into the issues of local administration and land use described here. There are also other issues to be considered, such as land use and ownership in households headed by women. My own feeling is that within the context of a Darfur-Darfur Dialogue and Consultation (DDDC) it should be possible, despite population and ecological changes and general insecurity, to reach a consensus on these issues acceptable to the people of Darfur.

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Pastoralists, Land Rights and Migration Routes The Case of West Darfur State

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Abstract

This paper is an attempt to identify and examine the livelihoods of pastoral groups in West Darfur state that are linked to the customs and laws tied to land rights and usage. In addition, the paper highlights the major animal migration routes that exist in the State and how these routes contributed to the violent conflict between the sedentary farmers and pastoralists in past and present conflicts. Additionally, it discusses the violent conflict that occurred within the pastoralist groups and explains the 2005 conflict in Zalingei between the camel herders (Nawaiba tribe) and the cattle herders (Hutiya tribes).

This paper has five parts. The first part explores the historical background of West Darfur State, including a population profile, major economic activities in the region, major pastoral groups and breeds of cattle. The second part examines the evolution of the land tenure system, individual land rights and the customs and traditions that bond the relationship between the hakura owners and non-hakura owners. In so doing, this paper aims to show that conflicts erupted due to contradictory interpretation of land rights and moral misbehaviour. The third part is about the major animal migration routes in West Darfur State and how these migration routes are regarded as a cause of conflict between the pastoral and sedentary groups. The fourth part describes the conflict amongst ethnic groups of Arabic ancestry, showing that fights are not necessarily along ethnic lines. Finally, the paper ends with a detailed conclusion and recommendations drawn from the discussions.

1. Background

Conflicts are inherent in human societies because people are different. There are bound to be differences in interests, needs and ambitions regardless of ethnic background, religion and colour. As natural resources are limited relative to the needs and ambitions of people, differences of views on how to use them are inescapable. Another point of contention is on the question of whether those resources should be utilized and if so, how and by what means (Mohiddin, 2002, p. 2).

West Darfur State witnessed brutal ethnic clashes during the last decades of the 20th century, particularly the conflicts between the Fur and Arab tribes in 1987-1989; between Arab and Masaleet tribes in 1996-1998 and between the Hutiya and Nawaiba in 2005-2006. Most of these conflicts arose due to different factors such as competition over land use, natural resources like water and pasture and moral misbehaviour. However, the current conflict is different in its nature and consequences because it is political. Many of the armed movements that raised insurgency against

the government of Khartoum in April 2003 claimed against the marginalization of the region. The rebel groups also sought power and wealth sharing arrangements, following the precedent of the agreement that the government signed with SPLA/M.

As many scholars identified, the root cause of the current conflict in Darfur is a political one. Others concentrate on the role of environmental factors as being the cause of the current conflict. Authors sharing this view particularly focus on the effect of drought and desertification, which has brought mass destruction to the livelihoods of both farmers and pastoralists. This has led to an increase in frequency of disputes and local-level conflicts in an otherwise relatively peaceful area, along ethnic lines. It is worth noting that these ethnic groups used to live together for centuries without any major disputes or conflicts along such ethnic lines (Arab and non-Arab).

The pastoral economy in the State is based on a combination of animal herding, crop cultivation and petty trading. Animal herding has been traditionally recognized, and is still regarded, as the major economic income provider for the pastoralists and State's economy.

In West Darfur, movements of animals in search of grazing land and water takes two directions. One is from the southern to northern part of the State during the rainy season and the other is from the northern to the southern during the dry season. During these movements, the pastoralists enter into conflicts with the sedentary farmers, as the farmers block the animal migration routes and at times set the pasture on fire. Moreover, the pastoralists - particularly the new migrants from Chad and Central African Republic - do not respect and obey the customs and traditions that govern the land tenure system on which individual rights for using land were based. This paper will discuss the land tenure system, individual land use rights and migration routes that exist in the region. Additionally, this paper mentions the conflict amongst the pastoral groups to show that not all conflicts in the region are between farmers and pastoralists. Conflicts can occur among the same ethnic groups so long as people differ in interests, aspirations and needs.

1.1 Location of the State

West Darfur is located in the north-western part of the Sudan, between 10.38°-14.58° N latitude and 21.48° - 22.42 ° E longitudes and covers an area of about 75,000 kilometres square. The region is adjacent to North Darfur State in the north, South Darfur State towards the east and south, and Chad to the west with a north-south borderline of 750 kilometres. West Darfur can be divided into three zones according to the weather. The first is the Northern Zone, a low rain zone, which is located north of 14° N. It is semi-desert composed of a large number of hills and rocks. The second is the Central Zone, the poor savannah, which is located between 12°-14°N. Jebel Marra, with its fertile land is found in this zone. The rich savannah marks the third Southern Zone, which is a rainy zone, located south of 12°N. Water and fertile soil concentrate in the *wadis* (valleys) and Jebel Marra, where plant growth is abundant and forests are dense. The most important *wadis* in the region are Bari, Kajah, Azum and Aribo, which flow down from Jebel Marra during the rainy season (from June to September).

The average rainfall ranges between 200mm in the North and 1200mm in the South (Mohammed, 2009, p. 3).

1.2 Resources of the state

West Darfur State has many potential resources but unfortunately there is a lack of full utilization of these resources. Among the resources found in the state are:

The agricultural resource: West Darfur State possesses large volcanic lands with high fertility, which is useful for producing crops such as millet, dura, sesame, groundnuts, wheat and others.

The forestry resource: There are different types of forests in the state including *Khaya senegalensis*, *Cordia abyssinica* and *Pinus* species. Such forestries are found mainly in the Jebel Marra area and near *wadis*. *Cordia abyssinica* is especially useful in carpentry works.

The water resource: The state has a huge storage of groundwater known as the Deesa seasonal underground basin, which lies in the El Geneina province. Additionally, there are valleys with shallow water surfaces.

The animal resource: The animal resource of the state is approximated to be 17,156,383 heads of cows, camel, sheep and goats (El Amin, 2009). Animal productivity in the state is low, as dependence is still on traditional animal husbandry and pastoral activities of transhumance and nomadism. Despite keeping large stock, these groups lack aspiration due to cultural and social factors. Lack of proper marketing practice - the weakest aspect in animal trade - contributes negatively to pastoralists' income. The future of animal resource and its best utilisation is very promising and bright if proper policies and strategies are adopted. These must include capacity building, privatization, free market organization and provision of veterinary services by the government (Satti, 2004, p. 17).

1.3 Ethnic divisions of the state

The ethnic divides within Western Darfur State, as is the case for Sudan in general, are not that clear cut. Following the two main sub-divisions, the population of the State can be divided into those with Arab ancestry and local non-Arab, indigenous inhabitants. The indigenous tribes consist mainly of settled farmers and small-scale traditional cultivators generally referred to as Fur, Masaleet, Tama, Mararit, Dagu, Gemr and Zaghawa. On the other hand, the Arab tribes are pastoralists who consist of Beni Hussien, Rizaygat, Misieriya, and Bani Halaba (Suliman, 1999, p. 20).

Inter-tribal marriage between those of Arab and indigenous origin contributed to peaceful coexistence in the early days of the Fur sultanate. It has helped in avoiding conflict until the beginning of the 1980s. The policy adopted by the governors of the Fur sultanate of motivating migrants to settle in the sultanate's *dar*, with the purpose

of rehabilitating uncultivated lands, encouraged inter-tribal marriage. For example, the *dar* of the Fitigoro tribe was separate from that of the Kobbra until 1938, but when Shertyi Abdul Mawala Jabur died, the *dar* of the Fitigoro was added to Shartawia of *dar* Kobbra resulting in the intermixing of the Fitigoro tribe with the Fur (Takana, 1997, p. 10).

1.4 The economy of the state

The production base of West Darfur State's economy revolves mainly around traditional rainfed agriculture and livestock rearing. Those who practice subsistence millet and sorghum cultivation are the indigenous tribes and those who rear animals are Arab tribes. This doesn't mean that every group practices one activity exclusively; the settlers also rear animals but not as much as the pastoralists. The pastoral and peasant subsistence economies - though separate - are complementary and linked by exchanges in which each is influenced by the other (El Amin, 1999, p.19). The pastoralists, for instance, sell a portion of their animals to obtain money to buy grain surpluses brought into the market by peasant farmers.

There is also a proliferation of irrigated agriculture with the use of pumps for water lifting that is concentrated in *wadi* areas. In recent years, this activity has played an essential role in providing cash crops, such as potato, to the local markets in towns like Zalingei, El Geneina, and Wadi Salih.

The service sector in the State is of limited economic impact and includes only the very basic services of government administration. The inadequacy of the transport sector and other infrastructure is particularly responsible for the current state of economic fragility of West Darfur States (Suliman, 1999, p. 27).

2. Evolution of land tenure system in Darfur

Land tenure arrangements in Darfur have evolved over centuries and are largely based on an original system in which communal families are given usufruct rights to farm land based on their needs, providing it is regularly cultivated. If a family stops cultivating the land for any reason, the land is reverted back to the community and can be reallocated and utilised by another family. According to this system, the community leader (normally the village head-man) is responsible for land allocation and for recognising new occupants.

During the Keira dynasty of Sultan Musa Ibn Suliman (1680-1700), a new system of granting land titles called *hakura* was introduced. It ranged from limited rights of taxation of people occupying a certain territory to full rights to collect taxes and religious dues. Administrative *hakuras* were usually granted to tribal leaders and came to be known as *dar*. This confirmed communal ownership of land for a given group of people who usually made up a tribe or sub-tribe under a recognised leader (World Bank [WB], 2007, p. 19).

Historically, the *hakura* system was inclusive, in that everyone - if the rules and institutions were respected - could have access to land or other natural resources. *Hakura* represented a full system with a clearly defined hierarchy of rights and corresponding obligations: including provisions for outsiders passing by. Amenities ranged from the allocation of a specific plot for cultivation, to access to common territory. Secondary rights were also frequently attached to primary rights so as to grant access to water and trees. Animal movements, and the expansive land on which they graze, have made this type of communal land ownership the most suitable form of land use. This form of land use also allows access to pasture and water by all members of the tribe. Seasonal movement, dictated by the environment over vast areas of land, has led to the development of an accepted regulatory custom. This allows for inter-penetration between different tribes according to which land use is exchanged without any tribe losing its *dar* or claiming others' (El Amin, 1999, p. 18).

The *hakura* system effectively managed the allocation of land among tribes and regulated access, and use, of natural resources in a harmonious way during times of plenty and maintained a complementary economy based on the exchange of water and access to pasture land for meat and dairy. However, in times of scarcity, the system came under great stress. Increased demand for access to grazing land and water from nomadic tribes, combined with the allocation of fertile land for large-scale agricultural production by the government, has further put the system in a precarious position. While not all land was officially awarded as *hakura* by the Sultan, as far as tribal groups were concerned, the land they occupied effectively became synonymous with an administrative *hakura*, whether recognized by an official charter or not.

To distinguish the territories in the absence of charters, tribal homelands were frequently named after the associated tribe, Dar Zaghawa to mean land of the Zaghawa people and Dar Rizaygat to mean land of the Rizaygat people. In addition to identifying land ownership, this branding of territory based on tribal affiliation meant that over time, the land became a symbol of group identity in addition to being an economic asset (Ibid, 2007, p. 10). The British Administration gave some legitimacy to the already existing tribal boundaries recognising that this form of land ownership and use corresponded to the mode of living prevalent among the pastoralist tribes.

2.1 Individual land use rights

Individual use of communal land is restricted to members of the community, be it a tribe, clan or village. Individual land rights are regulated by custom among the settled farming communities. Land tenure differs, depending on whether the individual beneficiary is a member of the tribe or is a member of the village community, whether the land in question is subjected to cultivation or grazing and whether it is a *wadi*, *goz* land¹² or mud land¹³.

¹² Goz land or sandy land is used by the farmers during the autumn season and by the pastoralists during the summer.

However, tenure rights can be granted to strangers or others who are not members of the same tribe or community. Such rights are limited by some conditions that strangers have to abide by. A member of the tribe, clan or village has the right to use the land that he clears and brings under cultivation, and reserves that right as long as he continues to maintain it under cultivation. The individual has the right to the crops and other products the land yields. With regard to *wadi* land, the right to land transfer by inheritance is recognised alongside leasing the land for cash or getting a share of the crop.

The right of an individual of a pastoral tribe to community-owned land extends to having his livestock graze on communal land. Tribes can freely access water, forage or rangeland. Water, foraging areas and rangeland could be freely accessed by tribes. Pastoralist community leaders reach agreement with other tribal leaders to provide migration routes - because of the need for corridors of passage - as these routes might pass through several cultivated fields (Ibid, 1999, p. 19).

There are three types of pastoral groups in West Darfur if classified according to their direction of migration. One group is called camel herders and this group consists of the Mahameed, Aulad Sheiygrat, Aulad Zaid, Aulad Mansoor and Miheirya. The camel herders' direction of movement during the rainy season is concentrated on the northern parts of the state and in the western parts of Darfur/eastern Chad, where pasture and grazing land is available.

The livelihood of the camel herders depends on their camels as a source of income. Lately, however, due to conflict and the desertion of the villages, they have started farming on Fur and Masaleet land. This is not necessarily a land-grabbing exercise, as some might have been driven to do so due to their need for crops for survival and given that the cities where they could otherwise get crops and other basic needs, such as sugar, sorghum, millet and food oil, were far away. If this situation is not solved early, people living in IDP camps will be less inclined to go back to their villages and those farming their land will be less willing to leave it which might result in further conflicts.

The other type of pastoralists, the *baggara* tribes, including the Misieriya, Bani Halaba, Salamat, Tarjam and Eituria, predominantly rear cattle and goats. These tribes are concentrated in the southern parts of the State and their livelihood is based on animal rearing, petty trading and farming small pieces of land. Currently, their livestock are facing chronic disease problems such as Hemorrhagic Septicemia and Black Quarter. In some instances, these diseases are reported as causing death in as much as 10% of their cattle. In addition to the death of animals, productivity is reduced and cost of treatment is also very high (Sultan Saad Abdel Rahman, 2009).

¹³ Clay land is a type of land used only by the farmers along the *wadis*. According to the customs and traditions, when a farmer digs a well for planting a garden or water irrigation, this constitutes a continuous right, not a seasonal right as is the case in *goz* land.

The third group, who are mainly settlers, including Zaghawa, Bargo and Fur tribes, rear goats and sheep.

3. Migration routes in West Darfur State

Migration routes are animal passages or tracks used by the pastoralists during their seasonal movements from north to south and vice versa. Camel herders concentrate in the northern part of the State, as camels do not bear the heavy rain in the south. During the dry season they move via the *marahal* (migration routes) to the southern part of the state where there is plenty of water and pasture from the previous rains. Currently, as the rebels block the migration routes, most of pastoralists have concentrated in the south since the eruption of the current conflict. This has led to the impoverishment of the environment by overgrazing and cutting down of trees for animal feed (as grass is becoming very scarce).

Migration routes in West Darfur state can broadly be conceived in the following ways; migration routes in the western localities (El Geneina, Beida, Kulubus, Kirienik and Sirba) and migration routes in the eastern localities (Zalingei, Jebel Marra, Wadi Salih, Mukjar, Bendisi, Azum and UmDokhon) (see Table 1 and 2).

Previously, before the pastoralists started moving, they used to send a delegation to the Native Administration leaders of the villages announcing, informing and asking permission for their cattle to pass through their territories. This helped to avoid the potential friction between the peasant farmers and pastoralists. In other words, the delegations' task was to facilitate the movement of the pastoralists' cattle. For instance, if a field near a migration route was cultivated, they made sure that it was harvested before their livestock got there.

This understanding has strengthened the social fabric among the farmers and pastoralists. This is a traditional early warning system that was used before the abolition of the Native Administration. Now the situation is very different. Neither the pastoralists nor the farmers respect customary laws and traditions, or social values agreed upon in the past. New pastoralist migrants, who come from Chad and Central African Republic, do not respect the local customs and traditions. Moreover, some of the farmers do not respect the customs that forbid the plantation and cultivation of crops near the migration routes. The cumulative effect of these changes in peoples' attitude has resulted in persistent friction between the farmers and pastoralists. Finally, this has led to violent conflict and dispute over the rights of land use (Ali Dawood Hussien, 2009).

Table 1: Migration routes in Western Localities of West Darfur State.

No	Location of the migration route	Direction of the migration route	Length of the Migration route (Km)
1	Rigel El Kuburi to Rahad Burjoo	West of El Genina to north of El Geneina	80
2	Arara to Gargira	South of El Genina to north of El Genina	222
3	Habeela to Abu Aardaib	South of El Genina to north of El Genina	275
4	Furabarganga to El wakhayem	South of El Genina to north of El Genina	215
5	Garsila to El wakhayem	South of El Genina to north of El Genina	118
6	Um Dafoog to El wakhayem	South of El Genina to north of El Genina	225

Source: Ministry of Agriculture and Natural Resources –West Darfur State 2009.

Since the 1980s, there have been numerous tribal conflicts between the pastoralists and settled farmers in West Darfur. The brutal tribal conflict between the Fur and some Arab tribes during the 1987-1989 period, due to the competition over natural resources, is a typical example. Another example is the tribal conflict between the Arabs and Masaleet due to the fragmentation of the Masaleet Sultanate into a sub-Emirate by the *Wali* Governor of West Darfur State in 1996. Although some figures conceive the conflict in Darfur as a conflict between Arab and Black Africans over land occupation and land use, other issues, like identity, marginalisation, and the question of power have a role. Evidence shows that some of the conflicts in West Darfur are not purely ethnicity-based conflicts. An illustrative example of this is that the pastoralists enter into conflicts amongst themselves, such as the conflict between the Hutiya (cattle herders) and the Nawaiba, Aulad Janoub (camel herders) in Zalingei locality in 2005-2006.

4. The 2005-2006 conflict between the Hutiya and Nawaiba in Zalingei

Each individual or family in Zalingei has right of access to land for settlement, grazing and cultivation, wood-cutting for building, and fuel by virtue of community membership. If a person has occupied a plot of land on which to build a house or cultivate, that land continues to be recognised as his property as long as it is not left unattended for a significant period of time. Even strangers are able to obtain usufruct rights to land through occupancy and the observance of good neighbourly relations with members of the indigenous tribe in the area.

Table 2: Migration routes in Eastern Localities of West Darfur State

No	Location of the migration route	Direction of the migration route
1	West of Jebel Marra	Begin from Dar Zaghawa passes by Kabkabia- Saga – Gargoor -Senja – Khood ramlla – Koorli- Dar Kutei – Kobong- Center African Republic
2	East of Jebel Marra	Begins from wadi Hawar- west Kabkabia-Garrash-East Zalingei-west of Terage- East of Arwala – East of Mukjar –Eid del Fursan – Center African Republic
3	East of Beni Hussein dar	Coming from Dar Zaghawa – East Saraf Umara- and passes through the second <i>marahal</i> in Yanga Dolo- Murdo-Dangeal – Dodo- wadi Goghan-West Galabat mountain –East Bendisi –Dar Kobra- Eid El Fursan- Central African Republic

Source: Interview with Mohammed Suwar, *Sherati* of Dar Kerni, Zalingei (2008).

The Native Administration in the area distributes land to the members through a process. If a person clears a virgin land, after taking permission from the Omda or Sheikh of the area, he can keep it as his property as long as it is cultivated regularly. If a dispute arises relating to the land, the Omda or Sheikh is the witness of the land-owner in the native courts.

Pastoralist groups, who temporarily settle in Zalingei, have the right to practice their activities according to local rules and customs. Strangers and nomadic groups who arrive at the area regularly with their animals, and benefit from the residues of the farms after harvesting the crops, are granted rights to stay and graze during the dry season. The local customs in Zalingei, however, do not grant the nomads ownership rights. As a principle, there are communal rights that herders enjoy as individuals and groups in the area. The most common of such rights include access to drinking water for human beings and animals and access to animal routes and grazing areas (El Nur, 2009, p. 16-17).

The conflict between the Hutिया and Nawaiba erupted in Zalingei locality as the result of dual exchange of moral accusations between the conflicting parties. It started when the Nawaiba accused one of the Hutिया members of raping a girl of their tribe. The customary law of conflict resolution between the two tribes obligated the culprit to pay fourteen million pounds for one case. The Hutिया paid the fine three times; but in

the end, one of the leaders from Hutiya insulted the Nawaiba during a conflict resolution process. In the end, conflict between the two groups broke out.

The eruption of the conflict led to mass displacement, killing and insecurity amongst the two tribes. The casualties from both parties was estimated at around 249 dead and 300 injured, besides damaged livelihoods of both groups. Worth mentioning, the real reason for the conflict between the Hutiya and Nawaiba was competition for natural resources.

The Hutiya have adopted settled farming alongside cattle rearing. Both of these economic activities have led to the expansion of farm size and an increase in the number of animals. On the other hand, the environmental degradation and decreased rainfall has reduced the carrying capacity of the grazing lands. The issue of land ownership was another factor in the dispute, as the land didn't belong to either of the groups; it was the land of the Fur who fled to IDP camps. Dispute about who had the right to use and manage these resources in the absence of original owners of the land occurred. The Nawaiba argued that they were denied access to pastures and resources in Zalingei by the Hutiya and the gap of mistrust increased between the two parties as a result of this competition. The Nawaiba were convinced they had the same right as the Hutiya to use the pasture and water resources. The movement of the Nawaiba during the rainy season and their pattern of life didn't help them to settle like the Hutiya did. All these factors indicate that the fight was not due to moral issues and pride keeping, but over natural resources (Ibid, 2009, p. 24).

5. Conclusion and recommendations

Darfurian pastoralists have common characteristics with pastoralists in other regions of Sudan, and neighbouring countries such as Chad, Central African Republic and Niger. Farmers in the region also have common factors that form their livelihood strategies, which is characterised by a traditional agriculture system and a mainly subsistence economy. Farmers and pastoralists are tied to each other although there are differences in their ethnic background. They share common values, for example, Islamic values and norms that forbid killing others without any reason and justification, and forbid looting properties of other people through force. Notwithstanding these strong values and norms of Islam, many conflicts erupt in the region due to the disregard and disobedience of the people.

Therefore, the communities of pastoralist groups of West Darfur have to change their mode of life in such a way to cope with the environmental and climatic changes. The State should also play a vital role in enforcing the pastoralists to obey the customs and the traditions they have. They should also create mass agricultural production by establishing new agriculture schemes and by building dams and wells in the north part of the region to keep pastoralists safe for a long duration in the dry season. This will enable the farmers in the south to cultivate their crops safely without them being trampled on, or eaten by, the livestock coming from the north.

Disagreements regarding the meaning of the *hakura* system are evident and it is commonly regarded as one of the main factors in the current conflict. Nevertheless, it can be conceived as a source of peaceful co-existence between the pastoralists and the farmers. This will be true, if and only if, the two groups respect each other and respect the existing norms and customs used in arbitration of disputes over land and other related issues, without using force to solve the dispute. This can hold sustainably only if local people are educated via the opening of more schools, especially targeting the youth who are regarded as the main fighters.

Use of pasture and agricultural land and other natural resources should be regulated. Laws passed relating to these issues should be enforced so that every group will feel secure. Lastly, the Ministry of Agriculture should redraw existing migration routes, because some of the migration routes have disappeared as a result of the expansion of vegetable cultivation. This has in turn limited the access to pasture of pastoralist groups and has further led to conflict over natural resources and land use.

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Intertribal Conflicts in Darfur: Scarcity of Resources or Crises of Governance?

Musa Adam Abdul-Jalil

Abstract

This paper attempts to explain the correlation between environmental degradation and the rise in incidents and intensity of conflict in Darfur. Competition over natural resources has been considered, by many as the most important contributor to the ongoing conflict in the region. Although the current crisis is produced as a result of a multitude of factors, the debate over natural resources still remains of paramount importance simply because Darfur's economy is heavily dependent on its natural resources. Thus, any approach towards settlement of the current crises should seriously address the issue of sustainable management of natural resources. In line with this, the paper aims to identify the reason why environmental change has caused a disaster in the region as never seen before. It also attempts to provide an explanation of intertribal conflicts in terms of scarcity of resources, and the contemporary factors affecting resource competition. It becomes evident that scarcity of natural resources is a relative matter and may not per se instigate violence. Instead, it entails conditionalities, such as underdevelopment and failure of governance institutions, to culminate in a full-fledged crisis. Hence, the present scale of intertribal conflicts in Darfur can be better explained as an outcome of a crisis of governance, rather than as a result of competition over scarce resources.

1. Introduction

Competition over natural resources has been considered by almost every analyst trying to understand the Darfur crisis as the most important contributor to the ongoing conflict in the region (Kuznar & Sedlmeyer, 2005; Suliman, 1999). While the dynamics of the inter-tribal conflicts point to a multitude of factors interacting to produce the current crisis, the debate over natural resources remains of prime importance, simply because Darfur's traditional economy is solely dependent on its natural resources.

Any observer of the Darfur situation can notice the obvious correlation between environmental degradation and the rise in incidents and intensity of conflict in Darfur. One may therefore safely assume that for any settlement of the current crisis to be sustainable, it must seriously address the issue of natural resources. However, an important question to be asked in this context is whether the problematic aspect of natural resources lies in its scarcity or in its bad management.

It is noticeable that despite past experiences of harsh environmental conditions in the region (droughts and hunger), some degree of stability always existed and the situation was never as dire as it is today. Therefore, one may ask: why has environmental

change caused such a disaster that it never produced before? Could it be that the critical mass in producing the current crisis lies in the changing structure of resource governance?

2. Tribes as territorial groups and resource managers

Anthropologists and other researchers have considered territoriality as an important aspect that made tribes formidable political units in many African societies. Tribal identity and solidarity depends first and foremost on some aspect of association between the history and geography of the group. In Darfur, land has played an important role both in the formation and progress of the state itself (see O'Fahey, 1980).

Historically, tribes in Darfur continued to function as territorial groups whose solidarity depended on the successful management of the natural resources contained within their homelands, known as *dar*. Land did not only refer to the natural resources it contained, but most importantly, it symbolised the identity and solidarity of a tribe/ethnic group. Relations between the various ethnic groups of Darfur could invariably be considered as expressions of their relationships with land, because land symbolised the natural resources it contained in addition to the people using it.

Since the early days of the sultanate, ethnic groups continued to operate as territorial groups whose solidarity depended on the successful management of the natural resources contained within their homelands, known as *dar*, through mechanisms contained in the *hakura* system. However, population mobility never ceased to exist despite the known pattern of territorial distribution of ethnic groups. Groups originally associated with a given territory (old-timers) had a political advantage that they expected to continue into the future.

In the past, mobility was managed by allowing newcomers to join established territories under the political leadership of an indigenous group. Newcomers to such a territory were invariably subjected to the political authority of the original group, who had a monopoly on the right to manage that territory, meaning that population mobility has always existed.

The heterogeneous distribution of groups, with regard to territorial units, attests to population mobility. People who move out of their territory face the risk of losing some of their political rights. A sizable minority may be allowed to establish a lower native administrative unit, like the village headship or *omodiya* (chieftainship). The political elite of the indigenous group fiercely resists any ambition for a higher position of leadership. It can be safely stated that many local conflicts are, in fact, generated by a mixture of competition over natural resources and political office.

3. Features of environmental degradation and resource scarcity

Scarcity of natural resources is a relative phenomenon that can only be adequately appreciated by comparing the situation in the same territory at different periods. A vertical comparison is more fruitful in this case, compared to a horizontal comparison. Environmental factors are numerous and operate in a complex manner, i.e. interchangeably. On the other hand, scarcity is produced through increased competition over natural resources (Mohammad, 2004).

Some of the features related to environmental degradation and resource scarcity are briefly mentioned below:

- 1) The expansion of millet cultivation beyond the agronomic dry-boundary limit: Millet is the staple food crop in Darfur. Farmers are obliged to put more land under cultivation for two main reasons. The first one relates to decreased productivity, which means that a farmer cannot expect the same amount of grain from the same area. The second one relates to an increased number of new families that need their own farms, hence new land has to be cleared even if it is marginal and unproductive. Extended families cannot secure the needs of their members from the same plots as before.
- 2) A decreased rate of land rotation becomes unavoidable, since more land is put under permanent cultivation. Farmers no longer give up any piece of their land because, according to customary practice, unused land reverts back to communal ownership and will become subject to redistribution through established customary channels. At the level of farm administration itself, the decreased practice of fallowing has been previously observed.
- 3) The expansion of fruit and vegetable (also tobacco) cultivation in clay and alluvial soils around *wadi* beds (watercourses): This can take one of three forms of irrigation: flood, water-harvesting or well-digging. Many farmers have taken to cultivation of fruits and vegetables where possible, by drawing water from shallow wells dug around dry watercourses, either by using buckets made of goat skin (*dalo*) or by operating a diesel pump (in the case of well-to-do peasants). Essentially, such activities grow out of the need to adapt to new conditions. Drought and consumer markets provide the most important incentives for such adaptations.
- 4) The blocking of animal migration routes (*marahil*) became more frequent. Many researchers pointed to the fact that nomads often complained about such practices, which is against customary land tenure arrangements (Fadul, 2004). On the other hand, the better areas around watercourses were utilised by farmers to grow millet and vegetables. Blocking of routes became a permanent item in the agenda of tribal reconciliation conferences, convened

for the last two decades to solve inter-ethnic disputes in Darfur. It is one of the common causes of grass-root conflicts.

- 5) The decreased access to water sources for animals, as a result of expansion of agricultural land: Nomads usually required that land near water sources remained uncultivated, otherwise animals may have damaged crops and their owners may have been fined for trespassing. This is another usual cause of grass-root conflicts. Many water sources dried up because of drought, or became inaccessible because of decreased pasture quality around them.
- 6) Land degradation and desertification, combined with drought and the human factors (in the form of tree-felling, excessive cultivation and overgrazing), contributed greatly to the speeding up of the desertification process - to the extent that vast areas lost the capacity to sustain traditional livelihoods for their inhabitants. Some experts assert that millet cultivation in the semi-arid zone had dangerous implications for the environment and have advocated the prohibition of millet cultivation beyond certain boundaries (see Ibrahim, 1984).
- 7) Overgrazing and deterioration of rangeland resulted from the fact that much of the land in the semi-desert and *goz* zones lost its capacity to grow grazing grass, forage, and trees. For example, the carrying capacity of pasture in the 1970s was 40-50 animal units per square kilometre in the eastern sandy soils. A survey conducted by Range and Pasture Department in 2002, determined that the carrying capacity for the same area was now only nine animal units per square kilometre (Fadul, 2004).

4. New factors affecting resource competition

Factors that are directly associated with the environment, and related economic activities pertaining to livelihood requirements, have been referred to in the preceding section. A number of other factors of a different nature, but of equal impact on the resource question, are also easily observed:

- The abolition of native administration and native courts (1970)
- The promulgation of the Unregistered Land Act (1970)
- The formal decentralisation (regional and federal) of the government under populist regimes (SSU & NCP)
- A weakened and politicised native administration, since the 1970s
- Government intervention to organise tribal affairs, specifically from the 1990s onwards
- The redrawing and alteration of administrative boundaries, both at the level of states and local administrative units
- Tribal affiliation rather than citizenship became the basis for access to public services

- The diminishing of rule-of-law institutions, especially in rural areas
- The instigation of mass long-term famine migrations from within and outside Darfur. The main trend for internal migration in recent decades was instigated by famine-causing drought that pushed people from north to south and west (Abdul-Jalil, 1988).
- The open borders with neighbouring Chad led to a constant flow of immigrants (mostly pastoralists) from outside Sudan into Darfur, which made things even worse (Mohammad, 2005).

5. Inter-tribal conflicts and failed governance institutions

The above list of factors can roughly be classified as “governance institutions”. They used to keep social order and peaceful coexistence within and between neighbouring communities/ethnic groups. It is true that environment as a factor has always caused population mobility in the region. Nevertheless, Darfurian communities have in the past coped reasonably well with population mobility through various institutional means.

What is new in the current context is that cumulative and new political conditions have rendered old “governance” institutions incapable to function as expected. The result is a disrupted relationship between old-timers (*dar* or *hakura* owners) and newcomers. Inter-tribal fighting has thus become endemic. Unfortunately, there is no effective handling to date of these conflicts in the last two decades. This inability to resolve fighting actually amounts to a failure of governance institutions.

6. Concluding remarks

The following remarks summarise the main argument of the paper:

- Darfur has witnessed worse environmental conditions in the past, but none of them have become associated with a crisis of this scale
- Scarcity of natural resources is a relative matter and may not in itself instigate violence
- Under conditions of underdevelopment and failing governance institutions, the probability of outbreak of violence increases sharply
- One would like to question the conventional wisdom regarding the explanation of intertribal conflicts in terms of scarcity of resources
- The present scale of intertribal conflicts is better explained as an outcome of a crisis of governance, rather than of competition over scarce resources
- Resources are always scarce - not because of lack of abundance - but because people are so anxious to acquire them, hence the permanent need for the management of competing demands. That is precisely what governments are supposed to be doing!!

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Discussion

Several conference participants asked Dr. Musa Abdul-Jalil to clarify the concept of *hakura*. He explained that there is a misunderstanding in interpreting this concept, as people often confuse it with ownership. Instead, he said, *hakura* is a system that enables access to land rights. Another participant commented further on the definition of *hakura*, stating that it is a land management system rather than simple land ownership. He clarified some of the rules of the *hakura* system, noting that if one owns a piece of land by *hakura*, then he has the right to own, sell or transfer the land to his children as long as he follows the three rules that an owner should fulfil. These rules include: the owner makes an annual payment i.e. tax (*ushur*) to the local administrator; the owner should not abandon the land for more than three consecutive years while others around are farming; and the owner should not be involved in any problems with neighbours.

It was furthermore discussed that new-comers to Darfur who are in need of farm land can go to the local *hakura* administrator, where they will be given land, provided that they abide by the rules. In addition, it was mentioned that the proceeds of cultivation paid for the *hakura* are normally divided into three equal portions. The first portion is reserved for the community as insurance for times of hardships, the next one-third is allocated to the person entitled to work on the land in the *hakura* system and his family, and the last third is given to the *nazir* or *shartay* (paramount tribal chief).

Dr. Musa Abdul Jalil was also asked to comment on the degree of acceptance of the *hakura* system. He replied that the acceptance and rejection of the *hakura* system by the various communities was usually related to competition between two groups—those who were traditionally *hakura* owners and those who were not traditionally associated with it. The former groups were pro and the latter were against it. Dr. Musa Abdul Jalil continued by noting that new dimensions have been added to the disagreement, such as the indigenous claims by the old-timers and the religious claims by the newcomers. The newcomers' argument entails the religious claim that according to Islam it is taken as a given that every Muslim has access to every resource. In contrast, the 1970 Unregistered Lands Act proved more repressive than colonial laws, entitling the government to use force in safeguarding 'its' land and encouraging the accumulation of land by a minority of rich investors (both local and foreign).

Participants suggested that it would be useful to explore the possibilities of incorporating the issue of *hakura* into the next round of mediation talks, provided that experts on such issues are available and that there is consent from all parties to include them.

Prof. O'Fahey was asked how the pastoral routes of the *baggara* came about and whether *hakura* was an invention of the British colonial rule or a type of livelihood practice that predated it. Concerning the migration routes, Prof. O'Fahey mentioned a

book that includes information about their migration history with detailed maps. According to him, the *baggara* came into Darfur from West Africa quite recently compared to other tribes of *Falata*. He went on to explain that the documents pertaining to *hakura* are legal documents written by scholars in Islamic law, often scholars and graduates of the Al-Azhar University in Cairo.

Prof. O'Fahey further explained that Sudan was not a colony, and that it was never run by the British Empire. He stated that Sudan's political service and the British administration were completely separated. With regard to the lack of recorded data and documentation concerning land rights, participants explained that the reason was that many documents have been destroyed. However, it was stressed that there is a need for prompt action from the side of historians and lawyers to collect information which addresses the gap. Another issue raised concerned the reliance on old maps and its implication in terms of boundaries.

Regarding the 'tribal conflicts' in Darfur, it was argued that the government is to be blamed, since it was the main architect behind labelling tribal conflicts as major causes for the current crisis in the region. Some participants asserted that the nature of the present conflict is different, and that formerly it was mostly intra-tribal conflict, for example amongst the Arab groups.

In their discussion, participants mentioned that the mischaracterization of the causes and nature of the conflict in Darfur has wasted a lot of time and delayed the international response, whilst contributing to the escalation of the conflict.

Pertaining to the contemporary issue of making land available to foreigners, it was remarked that Sudan has the largest amount of leased land in Africa. It was mentioned that lease agreements reached with foreign governments to cultivate huge areas of agricultural land at low cost took place a year after the rise in prices of staple food stuffs worldwide. It was also noted that many countries in the Gulf have limited arable land and lack water—due to which they find it difficult to provide adequate food supplies for their populations in the future—they may seek to lease more land in Sudan.

However, it was also argued that, currently, many of the Gulf countries are hesitant to invest in Sudan, predominantly due to a fear that any government that may come to power following the present government will repeal the agreement in question. The other reason mentioned was that the investment system in Sudan is not very clear regarding ownership of joint ventures. In addition, it was mentioned that previous investments, such as the huge *Kanaan* projects to grow and refine sugar contracted between Egypt and Sudan, have not materialized despite the agreement reached between the two states to cultivate almost 200,000 *feddan*. Finally, it was stressed that Sudan could be the food basket not only for the Arab world, but also for the whole of Africa, although huge investments would be needed to make this a reality.

Participants commented that the last thirty years had been extremely crucial to the Sudan, since a lot of changes have come into play, particularly during the last five years. As the best land has already been given out, the land that is given to the newly arrived groups is always less fertile and marginal. In addition, the systems of cultivation and farming have changed, particularly towards fixed cultivation (band placement of fertilizers and row crops). Similarly, use of agricultural inputs has increased allowing farms to expand and increase yield.

Participants also discussed the comparisons between the traditional and new administrations. They started with the experience of IDPs from Darfur around Khartoum, noting that the IDPs had elected new chiefs when they arrived. The chiefs were elected based on their ambition, ability to lead and ability to articulate ideas whilst dealing with donors. Thus, the IDPs have brought a new form of traditional leadership.

Participants, however, expressed concern that the current chiefs of the camps might not be in a position to maintain leadership when IDPs return to their villages. They noted that, in the camps, their legitimacy is based on the articulation of a few English words, which enable them to communicate with donors. Participants assumed that the traditional laws and cultures will eventually pull the people back to the traditional leadership upon their return.

Questions were also raised concerning the Native Administration since its abolition in 1971, and its reconstitution in 1986. In 1995, without consultation with the native administrators, the government of West Darfur State divided Dar Massaleit into emirates for the Arab tribes, giving the Massaleit thirteen of the sultanate's nineteen districts. As the title of Emir is given in Darfur only to the sultan's son, this was seen as an attempt by the government to equate the newer 'Arab' groups with the ancient Massaleit landowners.

A clarification was also asked about the difference in terms of the Native Administration during the reconstitution and at present. Dr. Mustafa Babiker replied that the British had no uniform policy in the colonies, but rather had policies that were tailored to fit the local conditions. He mentioned the cases of Kenya and Zimbabwe as examples of the British taking land from the native people and giving it to the settlers. This, however, was not the case in Sudan. Since the country is very large and was very expensive to administer, it was not attractive for European settlement and the British instead focused on the administration of the economy and the local population. Dr. Mustafa Babiker added that the British were clever enough to maintain policies of Native Administration which had been inherited from the Turkish, in accordance with the local conditions.

Dr. Mustafa Babiker said that for fifteen years in the pre-colonial period, the *mahadia* (clan-based communities) were in chaos and as a result, some tribes were fragmented. As part of the efforts to reunite the tribes, the British carried out a study so as to

identify the leaders amongst the various communities. He also underscored that the British played an important role in documenting the local history of Sudan. As a recommendation, he highlighted that the policy makers in Sudan should learn from the British policy making *vis-à-vis* the local history and traditions of Sudan.

Additionally, Dr. Yasir Sattii was asked to give further clarification on the migration routes. In response, he defined the various terminologies as follows: *masarat* is a very small and narrow track used by livestock; *manzala* is a settlement for the nomadic people for a very short period; *murhal* is a passage between the corridors of the farms; *marahil* is a very big track which the nomads use during their movement to the north or the south; and *masarif* is a place where they will stay during the rainy seasons. In addition, he noted that *siniah*, between two to three kilometres in diameter, is the place where the nomads stay for a week to practice some of their social events and even to create relationships with the farmers living in that area.

Theme 6

Social and Environmental Consequences of the Darfur Conflict

Introductory Notes

Violent conflict has direct and indirect consequences on the environment. The conflict in Darfur is no exception. The Darfur conflict has claimed a significant number of civilian deaths, resulted in widespread destruction of villages, as well as deforestation, and the displacement of victims into camps for protection, food and water' (UNEP, 2007, p. 75). In Darfur, environmental degradation is often cited as a cause of the crisis, while little is written about its impact.

Although the consequences of war on the environment can be seen at various levels, the major ones include targeted natural resource destruction, looting of natural resources and the displacement of civilians. While the first two have only negative impacts, displacement can also have positive effects by relieving the original settlement site of population and livestock pressures, thus creating an opportunity for the regeneration of fallow areas.

The congestion of IDPs in camp settlements, often located in the peripheries of cities in the three Darfur states, resulted in unsustainable demands on the environment. Considerable deforestation surrounding these camps and decreasing ground water tables has been reported. Demands on the environment are also exacerbated by the increasing relief activities of UN and other international humanitarian organizations that need bricks to house their offices and staff, and causing shortages and more damage on the environment (UNEP, 2007, p. 113).

Of all Darfur markets, it is probably the timber market that has seen the biggest growth in the number of traders. The construction boom that has triggered the huge increase in brick-making has likewise triggered an increase in demand for timber (UNEP, 2008). The demand for charcoal and fuel wood in the main towns has also increased (UNEP, 2008).

Bromwich (2008) lists four major forms of environmental degradation in Darfur, in addition to displacement. The first one is uncontrolled deforestation, largely driven by the role of timber and fuel wood in the crisis economy. Second is the destruction of natural and physical assets as a feature of the war – farmers' crops are grazed by pastoralists' livestock, rangeland is burnt to prevent grazing and hand-pumps are destroyed. Third is the shortening of livelihood strategies which undermines the natural resource base. Fourth is the blocking of migration routes, which leads to overgrazing in areas where there is concentration of livestock.

In Darfur, the deliberate targeting of vital natural resource-related infrastructure, such as rural water pumps, has been well documented by NGOs and inspection reports from the African Union Mission in Sudan (UNEP, 2007, p. 91).

Population change

Sudan's population is one of the fastest growing in the world. According to the estimates of the Central Bureau of Statistics (CBS), the population of Sudan is growing at a rate of 2.6% and will reach 43.1 million in 2013 and 48.1 million by the year 2018. Although this a decrease compared to the rate of 3.1% at which population grew in 1990, it exceeds the average for developing countries of 2.1 percent per annum, and makes Sudan's population one of the fastest growing in the world (Fadlalla, 2004, p.63).

Darfur is no exception to the rest of Sudan. Darfur has registered significant growth in population over recent decades from over 1 million in the mid-1950s to around 6.5 million in 2003 (University for Peace, 2004, P.35). The rapid population growth stresses the limited resource base with shortages of land, food, and water occurring.

Sudan conducted its fifth Population and Housing Census, a milestone in the implementation of the 2005 Comprehensive Peace Agreement (CPA), from April 22 to May 6, 2008. According to the Sudan Tribune (May 21, 2009 edition), the total of Sudan's population is now 39,154,490, with 8,260,490 (21 percent of the national population) living in the south. While this figure is lower than expected, there was a more substantial increase in the population of Darfur since the 1993 census figure of 5,600,000.

According to the fifth Population and Housing Census 2008 results, the population figures for Northern Darfur, Western Darfur, and Southern Darfur are 2,113,626, 1,308,225, and 4,093,594, respectively (Central Bureau of Statistics, 2008), yielding a total in excess of 7.5 million, which is more than one-third above the census that took 15 years earlier, in spite of substantial emigration having occurred during that period.

Population growth is increasingly understood as a factor of civil unrest. Countries in which young adults comprise more than 40 percent of the adult population are more than twice as likely as countries with lower proportions of young adults to experience an outbreak of civil conflict, with sub-Saharan Africa and the Middle East identified as the most vulnerable regions (Cincotta, Robert and Daniel, 2003). Of course conflict is the product of a complicated and interrelated set of factors, in which demographics only plays a part. However, youth will continue to constitute a major portion of the population in the population pyramid for Sudan and as such the country will remain vulnerable to civil strife.

While poverty is usually a constant underlying factor, there are other links that have been established between population pressures and civil instability, in addition to a disproportionately large youth generation. These include reduced supplies of farmland per capita, rapid urban population growth, and a change in ethnic or religious composition which can threaten the social and economic balance.

Since the early 1970s, due to drastic environmental changes, Darfur society equally experienced drought stricken large-scale human and animal migration from the north to other areas that are relatively rich in resources.

Due to the influx of refugees from Southern Sudan, the population in Darfur has become more heterogeneous than before. Newcomers began to compete with the old settled groups for fertile land (Boudreaux, 1994, p.70).

The scarcity of life-supporting resources that comes with population growth threatens the living standards of people below survival level, leading to potentially unmanageable social tensions (Brown, 2009).

Women in the Darfur conflict

In Patriarchal customs, the existence of women is dependent on men, with awful consequences for their access to economic benefits. This is likely to worsen where the men they live with are considered “outsiders” or a political minority by a ruling government (Ssali, 2008, pp.94).

The inequality that women experience during and after armed conflict in all societies derives from dominant understandings of gender roles. Women are not only victims of conflict, but pressurize men to enter into conflict and thus act as catalysts of conflict (Vlachova and Biason, 2004, p.18).

Women in their traditional and conventional capacity as wives and mothers continue to experience discrimination due to unequal power structures that govern their relationships with men. Recent reports suggest that the population affected by conflict in Darfur is estimated at 2.74 million; of that, over 60 percent are women and children (UNICEF, 2008).

Gender inequalities are exacerbated during periods of armed conflict and continue during post-conflict reconstruction. Specific impacts of armed conflict on women are gender-based violence and forced displacement (El Jack, 2003).

The horrific levels of sexual violence in Darfur, particularly against women and girls in and around refugee and IDP camps, and outside the camps at times when scarce fuel and water is being collected, provide a stark example of the gendered effects of climate-change related conflicts (Brody, et al., 2008). The United Nations Darfur Task Force has noted that over 90 percent of people forced to leave villages in Darfur have been women and children.

In a major report that Medecins San Frontieres issued in 2005, it was stated that 80 percent of rapes (at least those committed in 2005) were perpetrated while women were engaged in “daily activities”, versus only 4 percent during the frontal attacks on villages by Government of Sudan troops and the Janjaweid. While women have not

been the primary targets of violence in the Darfur conflict, women have been the targets of a deeper, structural violence. The raping of Darfur women is inevitably linked to the systematic destruction of their communities.

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Identity, Population Change and Gender Issues Relating to the Darfur Conflict, Including the Situation of IDPs and Refugees

Abulebasha Abdelrahman Yousif

Abstract

Since ancient times, the Darfur Region has been known for its cohesiveness, racial mix and religiosity. However, since the mid 1970s, the region has become known for its intertribal disputes which, among other reasons, are caused by the deterioration of natural resources. Hence, the paper attempts to provide an overview of conflicts in Darfur, particularly over the last two decades. In so doing, it identifies various factors that led to these conflicts, and explains the impact the conflicts have had on the social and economic aspects of Darfur. It also clarifies not only the role social disintegration has played in the conflicts, but also the part the great number of tribes and ethnicities has played in complicating the conflict. In particular, the paper aims at enlightening the gender specific effects of the conflict, giving details on the impact of the conflict on the environment around IDP camps, exploring the role played by the social integration in the conflict, explaining why it is the government's role to establish unity and fraternity in all Sudan, and finally indicating the complexity that comes from the great number of tribes and ethnicities in Darfur. Accordingly, the paper shares some background information about Darfur by linking its history to some of the prevailing situations in the region. It also explains how environmental degradation led to armed clashes, particularly between farmers and nomads. In addition, it goes on to discuss issues with regard to the introduction of land systems and rights and how they became tribal property, apart from their linkages to the current conflict in Darfur. Issues pertaining to livelihood, environment, education, and identity and its relation to the crisis are also raised in the paper. As a recommendation, the paper came up with the following points: recognition of the Darfurian cultural, social and historical identity as one unified whole; support for the Educational Institutes' roles in addressing and dealing with the social structure and denouncing tribal fanaticism; and encouragement to local societies and leaders in participating in reconciliation, solving disputes and enlivening their customs and traditions so as to create a good atmosphere for coexistence.

1. Introduction

Since ancient times, the Darfur Region has been known for its cohesiveness, racial mix and religiosity. However, since the mid 1970s, the region has come to be known for intertribal disputes, which, among other reasons, are caused by the deterioration of national resources. The rate of disputes has escalated over the last two decades. In early 2003, two rebel groups, namely the Sudan Liberation Movement (SLM) and the Justice and Equality Movement (JEM), launched attacks against Sudanese army

garrisons in Darfur. The rebel groups declared that their struggle was for the creation of a democratic, united Sudan based on equity and justice (Eltigani, 2007, p. 5). The problem has since developed into a humanitarian crisis with national, regional, and international dimensions. It has resulted in big human and material losses that have attracted the attention of the world.

Since 2003, thousands of people have been killed, hundreds of villages have been burned down, around 200,000 people have taken refuge in neighbouring Chad and many more have left their homes and moved to more secure areas in the region. The situation in Darfur constitutes the most horrible humanitarian catastrophe that has become a topic of mass media, parliaments, governments and NGOs all over the world.

In late 2005, the seventh round of the Inter-Sudanese Peace Talks on the Conflict in Darfur commenced in Abuja, Nigeria, under the auspices of the African Union (AU). The purpose of the talks was to broker a comprehensive peace agreement between the Government of Sudan and the main rebel movements in Darfur – the Sudan Liberation Movement Army (SLM) and the Justice and Equality Movement (JEM). On the 5th of May 2006, the Darfur Peace Agreement (DPA) was signed by the Government and by Minni Minawi, the leader of one of the SLM factions. However, the agreement was rejected by the leader of the other SLM faction, Abdel Wahid Al Nur, and JEM (de Waal, 2006, p .7).

This paper aims to:

1. Explain the gender specific effects of the conflict
2. Detail the impact of the conflict on the environment around IDP camps as a result of firewood collection and concerted natural resource utilisation for livelihood.
3. Explore the role played by social integration in the conflict
4. Explain why it is the government's role to establish unity and fraternity in all Sudan
5. Indicate the complexity that comes from the great number of tribes and ethnicities in Darfur

2. Background on Darfur¹

Darfur, three of Sudan's western most states, is the largest region of the country with an estimated population of 7.5 million and an area of approximately 510,000 square kilometres. It is bordered to the West by Chad, to the North by Libya and the Northern Region, to the South by the Central African Republic and Bahr el-Ghazal region and to the East by Kordofan (Al Tunisi & Mohammed, 1965: p 11). Darfur in the 16th

¹ 'Darfur' in this paper refers to the Greater Darfur Region before it was divided into three states.

Century was an independent Muslim Sultanate headed by Sultan Suliman Solong at the top of Jebel Marra (Marra Mountains). The Sultanate rapidly expanded in all directions, incorporating further territories and ethnic groups. Towards the end of the 18th Century, Sultan Teirab invaded areas of central Sudan and was able to reach the Nile, thereby annexing some parts of the Nile Valley, in addition to Kordofan region (Hassan, 2003, p. 83).

The Fur Sultanate attracted a constant flow of migrants, particularly from West Africa. The Arab religious scholars (*fugara*), in particular, were encouraged by the Sultans of Darfur to immigrate to the Sultanate after Islam was made a state religion towards the end of the 16th Century. Large-scale immigration of 'Arab' tribes, however, took place in the 17th and 18th Centuries. The granting of tribal homelands by sultans was initially associated with the settlement of religious scholars in Darfur and as recognition of the services of the merchants from the Nile Valley, who promoted trade with Egypt and riverain Sudan (Theobald, 1965, p. 16).

The expansion of the Sultanate was enhanced by its strategic location on the following three major commercial routes:

- The Western Route, from the Kingdom of Kanim through Bornu, Weddai, Darfur and the Funj Kingdom in central Sudan
- Darb Elarbaein to Egypt through the Sahara desert
- The North Westerly Route to Tripoli and Tunisia on the Mediterranean coast via Fezzan (Walz, 1920, p. 32).

These caravan routes brought economic prosperity, cultural influences and human immigration, all of which affected the history of the area around the Jebel Marra Mountain – the cradle of the Fur Sultanate. The early history of the Fur sultanate is obscure, owing to the scarcity of written accounts, particularly for the period immediately preceding its rise. However, according to oral accounts, the Fur Sultanate was preceded by two native dynasties: the Daju and Tunjur.

Darfur is considered to be unique in terms of its ethnicity and geographical spread of the population. The Darfurian community is complex, consisting of about 80 tribes that speak fourteen distinct languages (O'Fahey, 1972, p. 79).

The Fur Sultanate owes its name to the Fur, an 'African' tribe that lived around Jebel Marra, the central mountain range in the area. Today, the Fur constitute the largest non-'Arab' tribe in the province and practice farming with traditional techniques (Yousif, 2001, p. 13).

After the destruction of the Sultanate in 1874 by Al Zubayr Pasha, a series of Sultanic pretenders attempted to keep the cause of Darfur alive. This period (1874-1898), called *Umm Kwakiyya* (the "killing period"), was very much like the present situation.

The Fur Sultanate continued as a thriving independent state until 1916, when it was invaded by the British troops, before finally being annexed to the Sudan in 1918. Since independence of the Sudan, however, Darfur has become one of the most underdeveloped regions in the country and, over the last three decades, has witnessed episodes of instability in the form of tribal conflicts and armed robbery (Theobald, 1965, p. 72). Since 2003, the region has been gripped by human tragedy as a result of a civil war between the government and two rebellion movements.

Geographically, Darfur can be divided into three major areas: the Northern, middle and Southern areas. Northern Darfur, where non-‘Arab’ tribes such as the Bidayat, Zaghawa, Meidoub and Berti dwell, is ecologically fragile, as it is an extension to the Libyan Desert. There are, in addition, some ‘Arab’ tribes in the area, including the Rizaygat, Mahamid and Bani Hussien. Most of the tribes that live in the area are pastoralist. The fragility of the environment has been regarded as one of the elements that increases the risk of conflict over natural resources.

The middle area includes Jebel Marra and its surroundings. It is a fertile area, where there is much rain and groundwater, and a variety of natural resources. This area is a place of competition between most of the Darfurian tribes and is inhabited by Fur, Masaleet, Algimir, Tunjor, Dagu, and others.

The Southern area is occupied by cattle pastoralists from amongst the ‘Arab’ nomads. To some extent, this area is stable in comparison with the Northern area. The tribes that live here are the Rizaygat, Habbaniya, Bani Halaba, Ta'aisha and Mesira. Despite the stability of this area, some tribes have emigrated to the middle and urban areas, which has created friction between the emigrants and the original dwellers, resulting in difference and conflicts (Nachtigal, 1971, p. 377).

3. Degradation and population movement

Darfur has been affected by drought and desertification since the 1970s. These crises have made the tribal groups that live in the north migrate south, where there is better water and pasture, in search of shelter. ‘African’ tribes were concentrated in these fertile places which led to clashes between the farmers and the nomads.

The drought of 1967 caused wide societal movement among the herders and the traditional farmers. Some critics argue that there was great correlation between drought and the start of conflicts. As is well known, Darfur was affected by four phases of acute drought in the years 1972, 1974, 1982 and 1984. These phases of drought were accompanied by different armed conflicts, of which the worst were, in the 1980s, between the Fur and ‘Arab’ tribes; and in 1990s, between ‘Arab’ tribes and the Masaleet. That period was accompanied by land degradation and the loss of great numbers of livestock, which led to the widespread prevalence of poverty, epidemics and starvation (Ministry of Agriculture, 1982).

The intensity of the conflict has increased with the movement of some tribes from the areas affected by drought to those where they can find fertile lands and water. Sometimes, tribes move in from outside the region or across the international borders², due to the intertribal relations. The deterioration of natural resources coupled with poor development projects and services in addition to the spread of unemployment and proliferation of small arms, all led to the emergence of the phenomenon of armed-robbery, as a means for survival. The ensuing instability forced many tribes to relocate to other areas. However, others resorted to organizing tribal militia to protect their lives and properties (Fadul, 2004, p. 58).

4. Conflict and demographic changes

During the 17th Century, the Sultanate of Darfur introduced a system of granting land titles (estates), called *hakura* (Abdul-Jalil, 2006, p. 23). *Hakura* was either granted to the tribal chiefs by the Sultan, or acquired through occupation from the pre-sultanate period; as a result, land in Darfur became tribal property. When Darfur was annexed to the Sudan, the colonial authorities adopted a system based on the one inherited from the Fur Sultanate. Accordingly, many of the large tribes had tribal homelands in their names, while some of the smaller ones found themselves under the administration of the larger tribes³ (Mohammed, 2005, p 45). For a tribe to have an independent administration it needs to have its own homeland, and as the entire area of Darfur was allocated since the days of the Sultanate, the claims of many small tribes for a homeland triggered many tribal conflicts.

One of the most disturbing consequences of the current conflict in Darfur is the disarray in property relations that resulted from the forcible displacement of about 3 million Darfurians. Their lands have effectively been occupied by other tribes, especially those who have tribal extensions in Chad, Niger and other West African states. Adding to that, the tribes that had recently immigrated from Chad and West Africa found themselves outside the *hakura* system and therefore resorted to violence against the indigenous population so as to ascertain their claims for a tribal homeland.

The people of Darfur have their own traditional and inherited means of conflict resolution. If the scale of a conflict is wide, they form a broad reconciliatory conference, under the supervision of high-ranking leaders of Civil Administration or government officials. Since the late 1980s, however, these conferences have lost their capacity to achieve the desired reconciliation because of the increase in the frequency

² The ethnic boundaries in Darfur are fluid and flexible for three main reasons:

- The people of Darfur share a strong feeling of identity, of being from Darfur.
- There is a long history of political, economic and social cooperation.
- Smaller groups sometimes assimilate into larger ones and throughout the history of the Fur Sultanate newcomers have continued to assimilate into the dominant groups.

³ In Dar Dima, which comprises the areas of Kass, Jebel Marra, Zalingi and Wadi Saleh, a number of Arab and non-Arab tribes are under the administration of Demingawi. The same is true of Dar Rizaygat where the chief of the Maalia tribe is under the administration of *nazir* of Dar Rizaygat.

and intensity of conflicts, the changes in social conditions and the complexity of the problems. Increased requirements for a peace deal and the failure of the government to follow-up on the implementation of the resolutions also contributed to the failure of the traditional system.

Over the past few years, the armed conflict has turned into a political confrontation against the central government and its institutions in the region. It was led by armed movements which accused the government of marginalising Darfur, and blamed it for its bias toward one side of the tribal conflict. They complained about the lack of development, the poor services, and the spread of unemployment (Malk Rahmat Allah Mahmoud, 2006).

The Darfur crisis of 2003 was affected by a number of regional and local factors related to the lack of development and democracy; competition over natural resources (as mentioned above); and, largely, the establishment of ethnic and political colour. The rebel movements relied on a base made of 'Africans', whereas the government had established forces that were from 'Arab' origins. Therefore, the most recent crisis of Darfur has witnessed the appearance of two new factors: politicised ethnicity and the raise of arms against the country (Ibrahim, 2004).

5. Identity and the crisis of Darfur

Identity is related to an ethnically, locally, religiously or nationally harmonious group. It also concerns self-awareness, individuality, uniqueness, distinctiveness, self, character and personality. Based on this understanding, the Darfur crisis can be identified as resulting from the merging of Darfur with Modern Sudan in 1916; especially if we put into consideration that Darfur was previously celebrated for its different and various tribes and cultures, as well as its stability, social unity and ethnic intermixture (Albeid, 2004, p. 16).

Darfur has a very long cultural and ethnic history which, in the past, formed its political strength, social and economic development. The Fur were the original inhabitants and kings of the area, giving it the name Darfur (home of the Fur). They succeeded in establishing a great Kingdom that was older than the Funj Kingdom in the East and the Wadai Kingdom in the West. The Fur are the indigenous dwellers in the region. Despite their interaction and mixture with other Nubian and 'Arab' tribes, they preserve the purity of their culture and blood. That made other groups adopt Fur sovereign culture yet never miss their identity.

The identity of the Fur was linked to two factors that made them dominant in Darfur: land possession and animal properties. In the advent of Arab immigration, Islam and the Arabic language dominated the area and Afro-Arab identity spread through the whole region. The Fur, no doubt, absorbed the Islamic religion and the new Arab culture.

The current Darfurian crisis was affected by the lack of identification. That is to say, each ethnic group tries to find itself within a certain political party for political profiting. Reliance on ethnicity in political and military fields has a negative effect on Darfurian society. The best example is the acute division and fights between the armed movements due to their ethnicity; a cause that impedes them from coming together in one political group.

Disruption of the social structure in Darfur is felt in the whole of the Sudan. Therefore, the identity crisis created, and the failure of state-building exercises, can be added to the list of effects of the war; the remedy of which comes from the absence of social oppression (Dyab, 2007, p 25).

What happened in Darfur resulted in various social consequences:

- Deepening alienation of the country: Some critics argue that the numerous mistakes committed by the government of Sudan in dealing with the Darfur crisis, including forcing citizens to join the ruling party and abolition of political parties in light of the comprehensive rule, has reinforced feelings of tribalism, ethnicity, and chauvinism.
- Migration of educated youth: More students are graduating from Higher Education Institutes than the economy can absorb. Employment is often also along ethnic lines and/or following political alignment. As a result, many graduates emigrate to towns and cities, while others go to the Arab world and European countries; from where they denounce the ruling party.
- Demographic impacts on the region: One of the main effects of the conflicts in Darfur is the destruction of the social structure, which, in itself, leads to tribal and social imbalance. This is especially true when people take refuge in Chad and Central African Republic, as they are expected to take on a new identity.
- The increase in the rate of crime: Another effect of the Darfurian conflict is the increase in the rate of crimes such as murder, theft, adultery, raping and violence against women. That is in addition to vagabondage, drug selling/use and money-laundering.

6. Gender issues related to Darfur conflict

Gender refers to the different roles women and men play in society, and to the relative power they wield. Gender shapes the lives of all people in all societies. It influences all aspects of our lives – the schooling we receive, the social roles we play and the power and authority we command. While gender is expressed differently in different societies, in no society do men and women perform equal roles or hold equal positions of power. The impact of this inequality on women's lives varies tremendously. For instance, in Sudan many factors keep most women from advancing to top levels of management, and women are still not appropriately represented in the decision/policy making positions.

In the wake of the 2003 attacks, Darfurian women have often found themselves alone and left to care for their children, relatives, friends, and even strangers. In several of the refugee and internally displaced person (IDP) camps, women make up the lion's share of the adult population.

The ongoing conflict in Darfur, even after the signing of the DPA in 2006, poses serious obstacles to the advancement of women rights. Insecurity is one of the biggest issues that prevent men and women from full participation in political, economic and social development at different levels. Women in Darfur are still often mentioned as victims rather than active partners and contributors to prevention of conflict, negotiation of peace agreements and building of democratic and prosperous states. Initiatives on peace and security are ineffective if women are viewed as victims and not as active agents of change in their society (Nansy, 1997, p. 97).

6.1 Women's health and conflict

Sexual violence and HIV infection: Women and girls in the Darfur region, as in any other conflict context, have experienced sexual violence, among other types of Gender Based Violence (GBV).

- Women are deliberately exposed to HIV through rape. Women who are demoralised and injured by an act of GBV may turn to other high risk behaviours, such as drug and alcohol abuse or promiscuity. This greatly increases the risk of contracting HIV. It is also highly probable that raped women engage in prostitution for the sake of survival, especially with military personnel, and as a result lose control over their sexual safety and are at dangerous risk of HIV infection (GOAL, 2003, p. 20).
- Reproductive health: There are three socioeconomic aspects of the definition of gender that are particularly relevant to population change:
 - (1) Gender is a social institution.
 - (2) Gender is central to the way a society is organised; like family, religion, race and other social institutions.
 - (3) Gender affects the roles played by women and men in a society

Communities in the IDP camps receive training and awareness-raising sessions on their rights to reproductive health services. In the IDP camps, women have access to health services including both antenatal and postnatal care, safe delivery and health education activities. People in the IDP camps now are different from the pre-conflict years in their villages. Most are now aware of, and have access to, family planning programmes.

7. Livelihood and environment

In the past, women in rural areas in Darfur cultivated their land to secure food during the rainy season (July to October). Most families living on fertile land grew different kinds of grain and vegetables, such as okra, tomatoes, sorghum, and millet. Women also processed dairy products. In the dry season, women usually worked on traditional crafts such as pottery, leatherwork, and basket-weaving.

The involvement of women in developing countries is indispensable in achieving food security, as defined by the Food and Agriculture Organization as "access for all people at all times to enough food for an active, healthy life." Women produce more than half of the food grown worldwide. In sub-Saharan Africa, they contribute as much as 80 percent of the labour in agricultural production. Not only do rural women in developing countries, Sudan included and in Darfur particularly, work in the fields hoeing, planting, weeding, watering, harvesting, etc., they also undertake the everyday household management task of gathering firewood. In a region where sources of water are scarce, women were and continue to be responsible for the water supply; in some occasions travelling long distances to bring water and firewood, then preparing and cooking food, cleaning, caring for children and livestock, and engaging in marketing and business activities as mentioned above (Young et al, 2005, p. 37). Even in the best conditions, poor women struggle to keep their families safe, fed, and healthy; when a crisis such as that seen in Darfur hits, the burden to provide food can become overwhelming.

In the short term, refugees and IDPs in camps in Darfur and Chad will continue to be dependent on food aid supplied by the UN and other international NGOs. In the longer term, conflict-resolution mechanisms will have to be put in place, and peace realised, before there is any significant alleviation of the mass suffering now occurring in the region (Young et al, 2005, p. 42).

7.1 Education

Improving women's access to education and health services is especially crucial for maintaining secured livelihood means. Better education and improved health contribute in helping women to become better decision-makers and more productive community members. Furthermore, when women, and particularly rural women, secure property rights and access to finance and capital, they have a better chance of ensuring their own food and not only day to day, but future life security.

8. Conclusion

The conflict in Darfur instantly brought the region to the forefront of regional and international attention because of the severity of the human rights violations committed in the region. The war has seen wide-scale mobilisation of the tribal militia that committed colossal atrocities against the civilian population of the region. Despite the signing of a peace agreement and a strong involvement of the regional and

international community, the intensity of the conflict escalated resulting in worsening of the humanitarian situation.

The Darfur crisis has reached its limits in the past few years, but is considered an anomaly when judged against the peaceful coexistence that the region has known for centuries. Hence, it should be a solvable problem, especially if the people of Darfur realise that there is no better option for them than to live together in that part of the country. If the determination of the wise men and influential leaders in the region is put to work, and the efforts are gathered, they can definitely solve the roots of the problems according to the observed traditions and emerging concepts, laws, and social situations. The government should lead an active effort to rectify the social disintegration and rebuild trust, in addition to its role in maintaining security and realising stability and development in the region.

9. Recommendations for a way forward

1. Recognition of the Darfurian cultural, social and historical identity as one unified whole.
2. Support of the Educational Institutes' roles in addressing and dealing with the social structure and denouncing tribal fanaticism.
3. Encouragement to local societies and leaders to participate in reconciliation, solving disputes and enlivening their customs and traditions to create a good atmosphere for coexistence.

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Environmental Consequences of Conflict in Darfur

Nagla Mohamed Bashir

Abstract

This paper aims to assess the impact of conflict on the environment in the Darfur area and to determine how conflict is related to the physical and human environment. The paper first discusses the situation in Darfur, before discussing the impact of conflict on society and agricultural production. Conflicts have a significant impact on creating tensions in the relationships between tribes, and the community as whole. The impact of the Darfur conflicts, both directly and indirectly, on the local physical and human environment, is substantial, and examples from southern and western Darfur are discussed. The paper concludes that training programs on environment conservation and how they can enrich the environment again (compensate the land) are essential.

1. Introduction

Darfur is one of the Great States of Sudan, and is rich in natural resources. Due to many of the features that characterize it, and its contribution to the estimated national income before the exploitation of oil, it is seen as one of the most important states of the Sudan.

The area of Darfur is 510,000 square kilometres and is composed of five ecosystem sectors. According to Swift and Gray (1989), cited in Tearfund (2007), the five sections of the rural production system in Darfur are:

1. The Algayzan belt: The cultivation of the valleys in the north and east of Darfur; home to 31.6% of Darfur's farmers and where pastoralism is as an essential part of the system. Millet is the main crop and is grown in large areas of the Algayzan sand. The cultivated areas in the clay are on the banks of the wadis, where watermelons are grown as a cash crop.
2. The Agayzan belt: The cultivation of the valleys in south Darfur, where shifting cultivation dominates; home to 34.5% of Darfur's farmers. The primary crop is millet, alongside maize, while gum arabic and groundnuts are grown as cash crops; and some sheep and cows. Provided the rate of rainfall is stable, production in this area is also somewhat stable. A good proportion of the population migrates from north Darfur to south Darfur, leading to an increase of the total number of local residents and, consequently, the cultivation of large areas.
3. Mixed Mount Plateau: This is located in the Jebel Marra area which is shared between the three states of Darfur, although most of the mountains lie in the west. On the western side of the Jebel Marra area, the farmers practice mixed traditional

farming cultivation. Given that the area is more than 3,000 feet above sea level (reaching as high as 3,088 meters at its highest point), the rate of rainfall is higher. The mountain range extends north to south for about 200 kilometres and east to west for about 25 kilometres, representing a dividing line between the surface water of the Nile basin and Lake Chad. The region creates surplus production, with farmers planting maize and millet in times of minimal rainfall, in addition to citrus fruits, groundnuts and wheat. On the banks of the valleys they plant vegetables (such as onions, okra and peppers), and many practice cattle rearing, which prevails in many areas where excavated ponds (*hafirs*) exist to store water for planting.

4. Camel and sheep herders: Based in North Darfur in different regions, and belong to a number of tribes.

5. Cattle herders (*Baggara*): This group breeds cattle and sometimes sheep in southern Darfur, where average rainfall is between 300 and 800 mm per year. There are many tribes in different parts of the pastoral areas stretching from the east of South Darfur state through to the west and south of the state. Many of the nomadic tribes practice cultivation, as no group practices one system exclusively.

This system was in operation long before 2003. After the conflict, however, the environmental system (both physical and human) was completely damaged and the examples below highlight the high degree of destruction. Peoples' livelihood was affected by the conflict in Darfur and caused a complete breakdown in infrastructure and livelihood strategies, in turn leading to loss of different assets.

2. Background

The current Darfur conflict started in 2003 as a consequence of numerous factors. Some of the most important, according to several parties including a discussion group held in the Nyala University Peace Centre, include:

1. A crisis of power and politics; and a lack of management policy and interested stakeholders.
2. Lack of development and ignorance regarding the demands for development and justice in the division of the country's resources.
3. Political polarization resulting from actions of tribal leaders.
4. Sharp deterioration in the quality and quantity of natural resources.

Conflict between different tribal groups in Darfur has been known to exist since at least seventy years ago. Main reasons for conflict have included overgrazing, water rights and local politics. The environmental degradation which started in the 1970s and became acute in the 1980s has increased the severity of this conflict. "Drought and environmental degradation at this time caused migration and livelihood changes,

creating the actual and latent disputes that later became the focus of armed conflict. In all cases, significant violent conflict erupted because of political factors, particularly the propensity of the Sudanese government to respond to local problems by supporting the militia groups as proxies to suppress any signs of resistance. Drought, famine and the social disruptions made it easier for the government to pursue this strategy. In summary, Ban Ki Moon's linking of climate change to the Darfur crisis is simplistic: Climate change causes livelihood change, which in turn causes disputes. Social institutions can handle these conflicts and settle them in a non-violent manner, but mismanagement and militarization in these situations cause war and massacre." (de Waal, 2007).

A study by Sheik Aldeen (1990) aimed to investigate the occurrence of environmental change and its effects on the livelihood system of the inhabitants of *Sharia* rural council in South Darfur by identifying the traditional adaptation strategies to such changes over two decades (1970s and 1980s). The study revealed that the changes in the environmental situation were first observed in the fluctuation of annual rainfall, which developed into a devastating drought and famine that had adverse effects on the physical and human environment. Both peasant farmers and pastoral nomads adopted different adjustments to their traditional strategies to cope with the quick change in the environment.

A study by Tearfund (2007) on environment and livelihood, with Darfur as a case study, revealed that the impact of the current conflict on the environment includes annual destruction of crops, major deforestation in the context of a collapse of traditional livelihoods, loss of traditional management practices, blocked migration routes, destruction of trees on farm land and the introduction of a short term perspective on livelihoods. They recommend that, for the future, the reconstruction of villages would require 30 to 40 trees per family (2 million people need 12-16 million trees); fencing could double this number, restoration of equitable environmental governance and be robust enough for future droughts and adaptation to climate change, population growth and drought cycle management.

3. The impact of the Darfur conflict on the environment

The Darfur conflict directly or indirectly affects the environment through:

1. Deforestation
2. The physical effects on habitat
3. Natural resource use by farmers
4. Soil deterioration
5. Water resource deterioration
6. Influence on local community

3.1 Physical environmental changes

Environmental degradation and climate change, in addition to a decrease in rainfall, soil erosion and inefficient management of water resources, all lead to displaced persons living in terrible situations. The forest and grazing lands are both exposed to fire and over-cutting which lead to empty areas (deforestation) that are difficult to control. The destruction of vegetation areas, and deforestation, are very obvious on the way from Kass to Zalengi.

3.2 Human environmental changes

- The impact of conflict on society: The conflict has a big impact in creating tension in relations between the tribes and within the community as a whole, through:
 1. An increase in the number of displaced persons. The movement of displaced people from one area to another, searching for security, affects the Darfurian people psychologically and economically. They have been prevented from cultivating their land and been crowded into camps with minimal resources.
 2. Destruction of social structures and the traditional mechanisms that supported them.
 3. Weakening or undermining of traditional authorities and other conflict solving mechanisms.
 4. The deterioration of already impoverished social services.
 5. The loss of life.
 6. Deterioration of the economic and social fabric of communities involved in the dispute.
 7. The collapse of rural basic life and needs, leading to tribal tensions in the absence of government institutions
 8. An increase in psychological problems. The conflict affected the psychology of women and children in particular, in addition to the bad memories created by the loss of family members. Despite living in IDP camps for up to five years, the Darfurian people received little consultation on this issue.
 9. The spread of small arms all around Darfur region. In rural areas, the average number of weapons per person is estimated at about 3, given that the weapons are cheap and it is easy to get them. The spread of arms leads to more criminals, rape and murder.

10. Negative effects on education and health. Many rural schools and hospitals have been closed or destroyed (up to 40% of schools) in addition to over-sized classes in big towns such as Nyala, Kass, Zalingei, El Geneina and El Fashir. In big towns like Nyala, the spread of some diseases like malaria, dysentery, typhoid and hepatitis A were common. Approximately 12% of all patients at Nyala Hospital in 2005, were IDPs (Nyala Hospital administration, 2006).

11. The demand for water also increased as a result of the increase in IDPs and many wells dried out, with this summer (2009) the worst due to the delay of the rainy season.

3.2.2 The impact of conflict on production systems

1. Damage to all agricultural activities and reductions in personal income as a result of the high insecurity.

2. Effects on production methods. Most of the displaced persons grow food through the cultivation of a very small area of land and receive some income through working on projects nearby. Decreases in cultivated land led to a decrease in production. Availability of food aid, however, led to lower prices and less interest in the agricultural sector.

The burden of conflict is always hardest felt by the poor, particularly women and children. The break in production of agricultural, pastoral and social services during conflict periods leads to a paucity of food in war-affected areas in addition to the suspension of educational and health services due to the closure of schools and roads, preventing the transportation of medications.

4. Case studies

4.1 Case one: Kalma camp (South West of Nyala town, South Darfur):

The Kalma camp is situated outside of Nyala town. The camp was established five years ago as a result of the conflict, when people were forced to leave their homes in the villages. It is the biggest camp in South Darfur and is divided into eight centres. The camp is located near a forest known as Koundwa, which was about 3193 *feddans* but which is now simply empty space, with the forest having been badly damaged due to the need by IDPs for wood for firewood, furniture and to build shelters. A Nyala forest report from 2006 reveals that about 3100 *feddans* (97% of the forest area), have been destroyed. The damage to Koundwa forest is great and will take many years to rehabilitate.

Several layers of leadership exist in the camp, and there is a market in centre four. Community groups within the camp, including a women's group and a youth group, suffer badly from insecurity, despite the fact that the soldiers from UNAMID are responsible for security both within and outside the camp. Several UN agencies, national and international NGOs provide services in the camp. People collecting natural resources or working in the town are common targets of attacks, especially women.

Brick-making outside the camp was common which lead to soil erosion. Some IDPs build their houses inside the camp from mud and unburned mud brick, in addition to making burnt bricks for sale. The holes made, when the top soil is dug out for brick-making, made a suitable location for breeding of mosquitoes and even became more polluted.

4.2 Case two: Adila locality (East of South Darfur)

Adila locality is in the eastern part of South Darfur. The effect of the conflict was made very clear here in the increase in commodity prices. Moreover, two secondary schools, eight basic primary schools and the health centre were closed; and the shortage of water services with only 12 water yards working out of 75, led to pollution, and consequently the spread of diseases.

4.3 Case three: North area of South Darfur

This area is located north of Nyala town, east of Jebel Marra. The area was famous for the planting of vegetables in addition to the production of citruses, and produces were supplied to Nyala town and even El Fasher in North Darfur. Most of these areas were completely destroyed in the conflict and the farmers stopped growing vegetables, after the area was occupied by a nomad group (*abbala*). At present the farmers try to live in peace with the nomads.

4.4 Case Four: Jebel Marra forests (West Darfur):

In 1998 data was collected about the economic importance of the forest in Jebel Marra area, stating that it was characterized by excellent forest raw materials. Some trees had grown naturally and some had been grown by the local inhabitants. Jebel Marra area lies halfway between the River Nile and Lake Chad. Rainfall is highest between April and October, with temperature on average not more than 30°C. The area is characterized by the presence of bushes and trees such as *Acacia albida*, *Acacia nilotica* and *Acacia sayal*, which are used as animal feed. Some parts have been cultivated as community forest in areas around Nertati, Martaglo, Baldong Kibeli and Trutonga. Trees commonly cultivated are those that bring high revenue like *Eucalyptus spp.* in Nertati and Martaglo; and *Cuoress spp.* in Baldong, Galol Kebli and Trutongs. *Boswellia papyrifera* grows naturally in the forest. Table 1 below shows the number of trees per *feddan*.

Table 1: Number of trees per *feddan* before the conflict

	Number of trees per <i>feddan</i>	%
1	Less than 200	11.1
2	200-400	16
3	400-600	22.2
4	600-800	11.1
5	800-1000	22.2
6	More than 1000	16.7

Source: Nagla Bashir, 1998 survey

From the table above, it can be seen that there existed a high density of trees per *feddan*. However there has been a huge destruction of the forest as a result of the conflict. In 2004, observations by this researcher in the area stated that most of area was empty of trees and the northern areas were occupied by rebel forces while southern parts were under the government control, making it difficult to collect data for accurate comparisons.

4.5 Case Five: Nyala locality in South Darfur

Nyala Market receives annually more than 500,000 head of livestock. Comparing the years from 2000 to 2007, there was a decrease in cattle, sheep and camel numbers in the market, with the exception of 2006 (see Table 2). The increase in the number of animals on sale in 2006 can show the return of stability in that year, which was to be reversed in the coming year.

Table (2): Number of cattle, sheep and camel (heads) in Nyala Market

Year	Cattle number(heads)	%	Sheep number(heads)	%	Camel number (heads)	%
2000	47155	-	7696	-	2362	-
2001	-	-	-	-	-	-
2002	-	-	-	-	-	-
2003	49849	-	30955	-	4907	-
2004	49267	-1.2	23883	-2.3	4476	-8.9
2005	36642	-25.6	17235	-2.9	1408	-6.9
2006	39253	+7.2	27730	+6.1	2533	+8
2007	37496	-4.5	24405	-12%	1850	-2.7

(-) not available, Source: Ministry of Finance and Economic Development, Auction Department (2008), with some modification

Many pastoralists lost their animals, as a result of disease. The blockage of migratory routes led to significant spread of diseases and many animal herders left the country, stayed near the Sudanese border or changed from cattle and sheep rearing to goat rearing, increasing the quantity of goats.

5. Conclusion

All community sectors of Darfur have been affected by the deterioration of the environment. For the IDPs, this includes deforestation (for which they are themselves, partially responsible), depletion of groundwater, pollution and declining water quality. The farmers are also affected by deforestation and water resource depletion, as well as soil depletion. The pastoralists are again affected by deforestation, plus additionally grassland destruction and the shift in grazing patterns, which affect pastoral migration and mobility.

6. Recommendations

- 1) Most of the IDP camps are empty spaces, with fragile ecosystem devoid of trees and bushes. There are no programs for growing trees inside the camps, but in terms of environmental conservation, one is needed. I hope that such a program will be run by one of the UN-habitat projects.
- 2) Training programs on environmental conservation and how the environment can be enriched, and the land compensated again, are needed.
- 3) An environmental equilibrium can be achieved by increasing the vegetation area, which can be executed through increasing environmental consciousness.
- 4) The international and national NGOs currently have little impact on environmental conservation. Their role in this area must be increased and improved so as to create environmentally sound and friendly packages with regards to agriculture and livestock activities in both urban and rural areas.
- 5) Big efforts in reforesting the Darfur area are needed.
- 6) Land use in Darfur is communal, and everybody has the right to use all land, regardless of its condition. More control of land use is needed, either through customary or statutory law.
- 7) From personal observation, I found that some narrow areas within the IDP camps have been prepared for planting in July, 2009. This reflects the interest and willingness of the IDPs to go back to practicing their normal activities.

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Environmental Impacts of Conflict: The Loss of Governance and Routes to Recovery

Brendan Bromwich

Abstract

This paper identifies four critical processes of negative environmental impact of the crisis in Darfur: 1) the collapse of environmental governance; 2) the increased vulnerability to drought; 3) the widespread adoption of “maladaptive” crisis livelihood strategies; and 4) the major transition of the Darfur economy. The paper then focuses on the first of these - the loss of environmental governance – and asks what can be done in order to reverse this process.

A dialogue within Darfur is needed in order to support the development of a vision for how environmental governance can be rebuilt and what form it will take. Post conflict governance will need to reflect the huge social and environmental transition Darfur has experienced during the crisis. A central question will be the respective roles of statutory and customary law.

Numerous sources are needed to inform this dialogue. These would include consideration of models of environmental governance, both historical and contemporary, and from inside Sudan and elsewhere (particularly elsewhere in the Sahel). The role of customary law has been changing significantly since the early 1970s and so provides a range of models that worked more or less well in any given situation. A local and contemporary contribution to the debate would be a review of the many forms of community management developed for humanitarian programming. Whilst clearly only reflecting part of the scope of governance to be rebuilt, these institutions provide models of collective decision making in which communities have adapted to new situations, constraints and opportunities. They merit exploration and evaluation along-side wider efforts to support Darfur’s search to re-establish sustainable and equitable environmental governance.

1. Four critical environmental impacts of conflict

The natural environment in Darfur, often cited as a driver for conflict, is also a victim of the conflict. This paper reviews four aspects of the environmental impact of the conflict before focusing on the loss of environmental governance and approaches that can be made to promote rebuilding of environmental governance. The four most critical themes of environmental impact of the conflict are the:

- Collapse of environmental governance
- Increase in vulnerability to drought
- Maladaptive crisis livelihood strategies

- Major transition of the Darfur economy

The collapse of environmental governance under the conflict exacerbates a long-term trend of the decline of environmental governance that began with the abolition of the native administration in 1971. The absence of adequate institutions to replace the native administration during a period of rapid population growth and increasing frequency of drought has contributed to the creation of conditions conducive to conflict over access and control of natural resources. Intermittent conflict since the 1970s has weakened relations between groups in Darfur, who practiced different livelihood strategies and had competing demands for natural resources. However, the extreme violence and the unprecedented displacement that has occurred as part of the current conflict has mostly broken down the capacity of different groups to enable peaceable collective management of the natural environment. The breakdown of governance has affected the enforcement of both customary law and statutory law, because neither traditional leadership nor the government has unrestricted access to rural areas (UNEP, 2008a).

Darfur faces unprecedented vulnerability to drought as a consequence of both the greatly increased concentrations of population and the collapse of rural governance. There is evidence of groundwater depletion affecting Darfur's largest cities, which are dependent on annual recharge of the aquifers. If this recharge were to reduce due to a year of low rains, then significant water shortages could result. Migration is an important coping strategy for drought in Darfur; however, the current context of conflict makes migration a more complex process and risks triggering further conflict. Whilst the impact of drought on food security is mitigated by the presence of an existing food aid operation, the impacts of water shortages are likely to have a direct impact on the populations in Darfur.

Many traditional livelihoods and trading practices have collapsed during the conflict, as a result of displacement and insecurity. Large numbers of people have lost access to land – a process that has undermined both farming and pastoral livelihoods (Young et al., 2005). Transport has been severely disrupted as a result of both banditry and the proliferation of checkpoints, levies and taxes. In response to the demise of so many livelihoods, people have turned to 'maladaptive' alternatives, which are often environmentally or socially detrimental (Young et al., 2009). Environmentally maladaptive coping strategies include extensive brick making and the use of borrow-pits on agricultural land or land within IDP camps (Tearfund, 2007; UNEP, 2008a). This has undermined agricultural production in camps and created lakes in the pits, which harbour mosquitoes during the wet season. Socially maladaptive strategies include the illegal extraction of rent for access to land or joining the militia.

Darfur's economy underwent a major transition during the crisis as a result of the growth in the urban economy, which was associated with the relief and peacekeeping personnel presence (i.e. at a time when the traditional areas of Darfur's economy had declined). One result of this transition was the remarkable property boom in Darfur's

major towns and cities, which further resulted in the considerable acceleration of deforestation. According to UNEP's study of the timber and woodfuel trade "Destitution, Distortion and Deforestation" house rents in 2008 were between four and sixteen times the rent in 2003 (UNEP, 2008a). The Forestry National Corporation reported that the numbers of bricks made rose from 9 million per year before the conflict, to a peak of 83 million in 2007 (UNEP, 2008a). Across Darfur, a major increase in timber trade was reported, with timber for firing brick kilns and for construction being the two major sources of demand. It is interesting to note that whilst green wood is increasingly being used for these demands, it is not used for domestic firewood. IDP's collecting firewood should therefore not be seen as a driver of deforestation (UNEP, 2008a).

The four above-mentioned processes of harmful environmental impacts exacerbate one another. The contraction of livelihoods such as cattle raising means more people are turning to trade in timber or are investing in property. The displacement of foresters means that reserves are not being managed and replanted. The loss of governance compounds all of these processes, as both traditional and statutory rules of environmental protection are disregarded.

These processes of environmental decline in the conflict are major accelerations of long-term processes evident in Darfur. This applies to the loss of governance, acceleration of deforestation and the increasing water stress in Darfur's growing urban centres. These impacts must be looked at in terms of the future effects of climate change, in addition to the historic processes of environmental degradation. The Stern Report lists categories of activity for adaptation to climate change in terms of human, physical, social and natural capitals and technology transfer, which have a close overlap with livelihoods capital in Humanitarian Livelihoods model widely used in Darfur (Stern, 2006; Young et al., 2007). The impacts of the conflict undermine these forms of capital. The rebuilding of these forms of livelihood assets, and the institutions that govern them, can be categorised as adaptation to the impacts of conflict, long-term environmental degradation, urbanisation and, in addition, climate change (Bromwich, 2008). This develops a clear agenda in Darfur, based on the need to adapt livelihoods to the prevailing conditions that are arising from the multiple transformations being experienced in the region.

2. Environmental governance and its potential reconstitution

In order to adapt to the environmental impacts of the conflict and the growth in population and climate change, the development of an equitable and sustainable form of environmental governance emerges as an urgent priority. This should not be seen simply as a process of reproducing what previously existed, although much of the progress will be reversing recent impacts of conflict, but also of building a new system adapted to the four critical environmental impacts described above. Darfur has undergone a considerable transition since both the abolition of the Native Administration and the commencement of the conflict, thus environmental governance requires a transition fit for the new challenges. The population is now approximately

seven times the size that it was in 1971 before the abolition of the Native Administration. Motor transport and telecommunications have also become widespread since that time. Therefore, whilst acknowledging that much is to be learnt from the Native Administration, the conditions have changed in ways that cannot be reversed. Similarly, the impacts of the conflict have radically changed the means by which different groups in Darfur interact, not least through the impact of urbanisation and the increasing diversification of Darfur's livelihoods. Policy and institutions need to reflect these changes in order to support the rebuilding of Darfur's economy. The development of sustainable and equitable governance should therefore be seen as the foundation to Darfur's recovery.

One of the most critical questions that Darfurians must address, now and in the future, is the respective roles of customary law and statutory law and, similarly, the roles of the Native Administration and of the government at any given level of administration. Forms of land tenure will be a central component of this debate.

Given the extent of Darfur's transition since it last experienced rural peace for a sustained period, a major amount of work is needed for Darfur to develop a new vision for sustainable and equitable environmental governance. Whatever form of governance emerges must be inclusive and robust enough to manage the reconciliation process and the rebuilding of environmental management processes that require collaboration between groups separated by the violence perpetrated during the conflict. It must also be resilient enough to manage future shocks, such as the inevitable droughts and changes in livelihood patterns associated with climate change.

If the development of a shared vision of environmental governance is to be made a priority for the Darfurian social discourse, what are the sources with which this discourse is to be informed? Earlier forms of governance formed important material including customary law and from the Native Administration, and in some cases these may need to be recorded, particularly to preserve the insights provided by Native Administration prior to its abolition in 1971. The role of customary law, and the various forms in which Native Administration has been reintroduced, have changed regularly since 1971 and so they provide a range of models for that worked more or less well in any given situation rather than an entire system to be accepted or rejected. Statutory law – the constitution and the CPA – are clearly foundational to the process, and this material must also include policies of the past that may be worth revisiting. One example of a policy currently being reinvestigated is the short-lived water user board for Wadi Nyala, established in 1994.

Earlier peace agreements and peace conferences need to inform the dialogue, such as the resolution of the Arab Fur war in 1989. Relevant conferences within Darfur also include: the El Fasher 1989 Transhumance Routes Agreement, the El Fasher 1989 Conference, the Kutum Conference in 1994, the El Geneina Conference in 1996 and the Ed Dain Conference in 1997 (Young, et al., 2009). Takana (2008) cites a list of 32 tribal reconciliation conferences in South Darfur during 2005 and 2006. The

development of a shared vision can also be usefully informed by experiences from outside of Sudan, such as successful governance initiatives from elsewhere in the Sahel or from other marginal environments. The successful water user committees that managed drought in Zimbabwe would be one example. International environmental principles such as Agenda 21, the Dublin principles, and others have significant contributions to make.

In addition to reviewing the existing and former processes of governance, there are new approaches to community management that are being developed in the humanitarian response. The aim will be to inform the development of a vision of environmental governance that is adapted to the new conditions in Darfur. These are reviewed below.

3. What contribution can the humanitarian and development community management make?

Community management is regularly included as a component of humanitarian and development programming. This has provided a precedent for establishing new forms of management and governance for new challenges. Examples include Village Health Committees, Village Development Committees, Committees for hand pumps and food distribution.

By way of caution, these systems also have limited jurisdiction and so only serve to inform part of the debate relating to rebuilding the governance in Darfur. They clearly do not cover the same scope as the Native Administration in areas such as land tenure, conflict resolution, family and marriage. Areas that these new forms of management have addressed include: water management, food distribution, livelihoods, recovery and development programming. Therefore, there are some areas where the humanitarian forms of community governance provide models to rebuild or fill gaps in activities where customary law has been set aside or has been overtaken by new circumstances.

One weakness in humanitarian programming in terms of building governance is that – for a variety of reasons – it has had relatively little direct engagement with government line ministries. This is clearly a complex issue in the context of ongoing conflict; however, opportunities exist for capacity building with government departments that need to be met in order to facilitate both effective humanitarian and recovery programming, and to support the development of informed perspectives on adaptation of environmental governance and livelihoods in response to the challenges Darfur faces.

Two examples of humanitarian community environmental management are considered. Firstly, CARE's programme of peace-building through the formation of Village Development Committees (VDCs) in the Kass area and secondly, a review of a number of efforts made in water programming by NGOs, government and UN agencies.

3.1 Village development committees in Kass

CARE developed an approach to rural programming in villages around Kass with an emphasis on peace-building that demonstrated significant signs of success at the time of a UNEP field mission in February 2008 (UNEP, 2008b). The VDCs were established with membership from different communities to deliver assistance in a participatory manner. Given the context of conflict and mistrust between stakeholders, CARE found that it took up to 14 months to establish the VDCs before diverse groups would work together on project implementation. This lead time should be seen as substantive peace-building rather than lost time. However, once established, the VDCs provided an oversight of successful programme implementation and the coordination of the activities of several technical committees.

The VDCs worked alongside the Peace Committees (PCs), which were pre-existing organisations that had been set up by Darfur's traditional leadership to address intertribal governance issues at the local level. CARE found that by establishing functional VDCs, they restored interpersonal relationships that enabled the same people to cooperate on the PCs, thereby reinvigorating the activities of numerous peace committees in the area.

The PCs typically manage issues such as:

- Tribal conflict
- Road security clearance – patrols with guards to prevent looting
- Management of migration routes – provision of guards
- Blood compensation
- Disputes between farmers and cattle herders
- Illegal tree felling
- Adherence to limits on grazing

CARE staff that worked on the project stressed the importance of sufficient time allocation in establishing the committees rather than the rushed delivery of the programme. An important process was the selection of independent and trustworthy committee members, and the assessment of risks of politicisation in the committee.

In addition to the benefits of the delivery of assistance through the VDC, members of the VDC and the PC were keen to stress the peace-building benefits of the programme. At the time of UNEP's visit, there were proposals for a wider conference of PCs from four areas around Kass, in order for the processes of peace-building to coalesce. The committee members described how seeing people and expressing problems was a means of getting rid of a sense of injustice. The group gave examples of activities from the list above and of the work of the PCs, including an ongoing process of conflict resolution following violence in which 23 people died. The group reported collaboration with the Forestry National Corporation (FNC) in working to reduce the illegal tree felling, noting that since the FNC were not able to visit the area, someone local was required to work with them.

The representatives interviewed from the committees generally held the view that traditional rules for management of the environment had been lost during the conflict, but could be made to work again. They gave examples of where they had to work around the impact of the conflict, such as the provision of escorts for passing nomadic groups on detours to avoid areas where farmland had blocked migration routes.

The PC and VDC members expressed the view that in their villages CARE held a unique position to undertake the brokering of the VDCs, and provide the support to peace-building in their area because of the sound relationship and trust that they had developed through the established track record they had developed in delivering assistance in the area - "we know them".

This example shows a form of adaptation of local governance, because the PCs undertake activities previously undertaken by more traditional systems, that have often been discarded, but they do so with some adaptation and modernisation, including a greater level of inclusivity (Auzimor Just and Kleinman, 2008).

3.2 Management of water programmes

Significant emphasis is put on community management in water programming. The government Water and Environmental Sanitation Project (WES), is the focal point for collaboration with UNICEF, and has developed processes for committees to manage maintenance of hand pumps. These committees comprise 10 people, of whom two must be women. The committees are trained in hand pump repair and provide liaison between the community and the government department.

In some cases, the work of water committees has been developed further. One example is the committees established by Oxfam in Abu Shouk and Al Salaam IDP camps, which are areas under significant water stress. The committees have been trained to record water levels in the aquifer and these are then communicated to the community by markings on posts near the water points. Work by CARE in water programming in camps has been delivered to a high degree through community committees, which have then developed a high degree of self reliance. The committees, known as 'umbrella committees' manage the water supplies for IDPs, which is particularly important when security is poor and CARE does not have access to the camps. In both cases, these committees worked in collaboration with WES.

UNEP and UNICEF are collaborating on a project to promote drought preparedness in IDP camps. The work will require community engagement in a detailed water use survey in camps, so that a water allocation plan for the event of drought may be established as the basis of a drought contingency strategy. This project has corresponding components of capacity building with the government and a programme with civil society to promote an inclusive approach to the development of drought preparedness plans in towns and rural areas. The work is built on integrated water resource management (IWRM) principles.

In rural areas of North Darfur, Practical Action developed community management for larger schemes such as dams or diversion works for spate irrigation. One example included agreements brokered for downstream communities, who were set to lose water from the construction of a dam, to have access to land for cultivation in the area flooded by the scheme.

3.3 Other examples of action providing support for environmental governance

Other examples of community management that can contribute to the development of environmental governance include Community Environmental Action Plans, which are widely used to manage access to natural resources around refugee camps in Eastern Sudan (Norwegian Refugee Council [NRC], 2008; United Nations High Commission for Refugees [UNHCR], 2001). These community-owned approaches are integrated with government planning through collaboration with the Forestry National Corporation. Plans are underway for these approaches to be introduced to Darfur through projects by UNEP, UNHCR and IOM.

In 2008, the UN Resident Coordinator's Office hosted a series of four workshops, each over two days, in different locations across Darfur. They worked with livelihood professionals from NGOs, the government and the UN. The aim was to analyse livelihood and conflict constraints and to develop a set of recommendations for livelihood programming (Young et al., 2007). These workshops provided a shared understanding of livelihoods amongst Darfurian livelihood professionals and built an agenda for livelihoods programming, including environmental action. This work has provided an important model of what can be achieved in inclusive consultation processes for programme and policy development.

Tufts University produced seminal research on links between livelihoods and conflict in the Darfur crisis, much of which has been highly relevant to environmental management and governance. They maintained a dialogue with the Council for the Development of Nomads through their work on pastoralism of the camel herding Northern Rizaygat between 2008 and 2009 (Young et al., 2009). In addition to the benefits of the production of the report itself, the Council of Nomads followed up the work with their own assessment of livelihoods for the cattle herding pastoralist tribes of South Darfur, which complemented the Tufts report and developed a broader governance agenda relating to livelihoods and the environment.

3.4 Discussion

These examples show that work can be undertaken in the current context, either as an approach to humanitarian programming, or as a bespoke project, to develop practices that contribute to the rebuilding of environmental governance in Darfur. As the CARE example shows, organisations that have built a trust with conflicting communities have an opportunity to work towards brokering collaboration between such communities. There are examples where collaboration and support of the government has been achieved, but there is more that could be done in this area.

The implementation of programming with a strong element of community-based management allows models of management and governance to be developed that contribute toward Darfur's internal dialogue concerning rebuilding its rural and environmental governance. In some cases, there will be models of institutions that can be developed and rebuilt in areas of return but, in other cases, the experience of participating in these institutions may change attitudes in positive ways, such as the consultation of women and youth in committees.

Good Humanitarian Donorship (GHD) principles require that humanitarian programming promote capacity of host countries, including both the government and communities (Principle 8), and that work is supportive of longer-term recovery and development (Principle 9) (Good Humanitarian Donorship, 2003). Given that donors have opportunities to promote collaboration with government through the projects they fund, it is appropriate to develop strategic approaches to capacity building that lay foundations for rebuilding capacity for governance, such as the strengthening of technical capacity of line ministries and government departments. Implicit in the identification of these activities under GHD, is their implementation by organisations in the field.

Building the capacity of individuals and organisations through training and experience sharing should be seen as an important activity in humanitarian programming. It is striking for anyone who has worked in Darfur to see the contribution to the UN, NGO and government programming by individuals who have been trained by some of the long-term aid projects in Darfur from the 1980s and 1990s. Similarly, the support given to community based organisations prior to the conflict provide an important capacity for local programming during the current crisis, although this is an area where more work is currently needed.

4. Conclusions: support for emerging environmental governance

This paper has discussed four critical impacts of the conflict on the environment in Darfur and has highlighted the overarching importance of the loss of environmental governance. Given the changes in livelihoods, environment and society in Darfur, since both the abolition of the Native Administration and the start of the current conflict, there is a need for the development of a vision within Darfur of how environmental governance will be rebuilt to adapt to these changes. An important question within the reconstitution of environmental governance will be the form of integration between customary and statutory law.

In order to support development in Darfur, a shared vision for environmental governance and a number of sources of information are required, including the recording of customary law, the review of statutory law and government policy and that of lessons learnt from history and from outside Sudan.

Opportunities to explore, evaluate and develop best practice in community management, government capacity building and support to civil society within the

humanitarian and early recovery programme should be made. Lessons learnt in these contexts should be fed into the dialogue on restoring good governance in Darfur.

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Satellite Evidence of Large Scale Environmental Change Caused by Violence in Darfur Since 2003

Russell Schimmer

Abstract

Beginning in 2003, the outbreak of violence in Darfur has caused profound changes to the environment. Rapid population displacement has disrupted normal land use practices, specifically pastoral activities. Satellite imagery has documented these changes and shown that, in spite of continuing annual decreases in rainfall, vegetation coverage and vigour have increased significantly between 2004 and 2008 in western Darfur and along the border with eastern Chad. These changes are likely caused by the documented relocation of displaced local populations, the disruption of the annual north-south grazing migrations and a decrease in overall herd populations. Satellite findings also corroborate eyewitness reports of on-ground activities and nodes of human resettlement. This paper will describe time-series examples of changes in biomass and plant species distribution, as well as climate fluctuations in the region across western Darfur from 2000 to 2008.

1. Introduction

1.1 Remote sensing

Remote sensing simply refers to the observation of an object, group of objects, or process from a distance. The sensors for capturing these images digitally can be divided into two main technologies: airborne and space-borne. Most airborne sensors are carried on airplanes, while space-borne sensors are fixed to satellites. Data products are categorised by their spatial resolution (pixel size), temporal resolution (the return time to a location on earth), spectral resolution (the measured portions of the electromagnetic spectrum divided into band groups), and radiometric resolution (the reflective intensity of those spectral band groups).

The technology of remote sensing is not new. As with many research tools, however, the development of more efficient computers and advancements in sensor technology continues to make remote sensing a robust research tool in a variety of scientific and social applications. A growing number of government and commercial remote sensing platforms offer a contiguous temporal and spatial body of data. These images can be used to show large- and small-scale changes to the environment at multiple spatial resolutions in many portions of the light spectrum, as well as by active radar.

In documenting systematic violence, I ask specific questions about the events, and attempt to corroborate these events as recorded by satellite images. The object is not to ask what remote sensing can *do*, but how can it be *used* to address a problem. I often state four general research questions: How do prolonged violent events and activities degrade an environment and disrupt people's ability to extract resources that support local and national economies? How can the environment be deliberately and

systematically used as a mechanism or tool to commit acts of violence? What does climate contribute, if anything at all, to the initial conflict or in sustaining it? And, simply, how does conflict affect the environment?

The nature of the violence determines the remote sensing applications used, but the availability of suitable satellite imagery sometimes limits the extent of analysis. At times, the research becomes rather like the assembly of related clues and observations as a means to reconstruct an event, or course of events, and distinguish their causalities. A fundamental component of this approach is to assemble and examine eyewitness documentation, news reports, academic research papers, international court testimonies, and other visual materials in order to assist in the interpretation of remote sensing data. In addition, I often try to establish a pre-conflict norm of environmental conditions and cycles against which to measure the abrupt changes associated with the violence.

1.2 Climate change

During the past ten to twelve thousand years since the Younger Dryus, development of agriculture, and the establishment of sedentary human civilization, Earth has experienced at least four well documented dramatic climatic events that have challenged humans' abilities to survive; the 8.3, 5.2, 4.2 Kt BP events, and the Little Ice Age. Paleoclimatic records from glacial ice cores in Bolivia (Thompson et al., 1998), Tibet (Thompson et al., 2000), and Kenya (Thompson et al., 2002), GISP2 ice core records and other dating metrics, *e.g.*, speleothems, marine sediments, and pollen analysis (Bradley, 1999), have confirmed the global magnitude of these events, but not necessarily homogenous global ecological reactions.

If the paleoclimatic record is a reliable indicator, global environmental change will not be homogenous. Solutions will develop *ad hoc* as regional trends become apparent. Accurately predicting those changes will be advantageous. However, prediction models are complex; the causal energies—actions and reactions—that contribute to the dynamism of environmental change are not static, or easy to qualify and quantify.

1.3 Rainfall and environmental stress

A multitude of causalities can cause environmental stress. Drought is but one type and degree of these stresses. Drought itself can be caused by either climate change or anthropologic activity, but more often a confluence of both. The ways in which humans react and adapt to environmental stress are numerous. However, social collapse, a 'run for your lives' type of event, is entirely different. Like varying levels and types of stress, the causalities of social collapse are numerous. But rarely does one abrupt and dramatic super-event qualify as the sole causality, *e.g.*, a volcano or tsunami. The violence in Darfur and its political collapse since 2003 cannot be from such a climate event because none of this magnitude occurred.

Environmental stress can precipitate and facilitate conflict. It can also testify to the effects. Remote sensing applications can measure the health and vigour of vegetation

and availability of water, as well as the speed of environmental recovery, while distinguishing the stress humans and their activities place on the environment. Agriculture and livestock grazing are historically important economic and subsistence activities in Darfur. Disruptions to these normal patterns of land use should be evident in changes to land cover. Although fluctuating rainfall can influence long-term changes and adaptations to land use, violence that abruptly alters these systems of land use are observable by remote sensing.

2. Darfur and East Chad

From 1990 to 2003, Darfur and East Chad experienced similar climatic and anthropogenic conditions, including substantial decreases in annual rainfall and steady increases in numbers of livestock. These factors established a normative confluence determining land cover change that has been dramatically disrupted since the regional violence began in mid-2003. The economy of Darfur is largely agrarian. The majority of livestock in Darfur—camels, sheep, goats, cattle, donkeys, and horses—are raised in traditional pastoral systems, on community rangelands. Darfur's main consumption crops are millet, followed by sorghum (International Committee of the Red Cross [ICRC], 2004).

In May 2004, the U.N. High Commissioner for Human Rights issued the report *Situation of Human Rights in the Darfur Region of the Sudan* (United Nations Commission on Human Rights, 2004). Among its findings, the report described repeated attacks on civilians by the military forces of the Government of the Sudan and its proxy militia, the Janjaweid. The pattern of attacks on civilians includes killing, rape, pillage, looting of livestock, and destruction of property; and much of the population of Darfur has now been forcibly displaced to locations in Darfur and Chad. Three factors stated as precipitating the genocide in Darfur are race and religion, climate change, and competition among ethnic groups for declining available resources such as water and livestock-grazing ranges (Flint & de Waal, 2005).

In 2003, the majority of the Sudanese population depended on subsistence agriculture which employed over 80 percent of the workforce and contributed 35 percent of the nation's GDP (United Nations Commission on Human Rights, 2004). Its main consumption crops are millet and sorghum. Groundnuts, tobacco, vegetables, and watermelons are the main cash crops (ICRC, 2004). An explosive growth in livestock numbers – from 28.6 million in 1961 to 134.6 million in 2004 – resulted in widespread degradation of the rangelands (United Nations Environment Programme [UNEP], 2005). Sheep- and goat-rearing has increased because these herbivores can acclimate better to dry environments, and have relatively lower water needs than cattle (Food and Agricultural Organisation of the United Nations & North Darfur Veterinary Department [FAO], 2005). Increasing international demand for these resources has likely also contributed to the expanding livestock industry in Darfur.

3. Tracking conflict in Darfur using remote sensing

My remote sensing research in Darfur and East Chad required a large volume of satellite data to cover the spatial and temporal requirements of the ongoing violence since 2003 (Schimmer, 2008). The research area of approximately 308,000 km² covers those regions of North, West, and South Darfur experiencing the highest impact of reported violence since the violence began, as well as the border regions with East Chad (Figure 1). I examined satellite data beginning in 1998 in order to establish a pre-genocide understanding of the observable stresses to the environment as influenced by climatic and anthropogenic factors.

I used two satellite imagery products to document change in land cover-vegetation coverage, NASA's MODIS Terra and CNES's SPOT Vegetation, and one to measure annual rainfall, NASA's Tropical Rainfall Measuring Mission (TRMM). To measure annual and inter-annual change in vegetation coverage and vigor as detected by the Normalized Difference Vegetation Index (NDVI), I used a Fourier Classification method (Geerken, 2009) that also

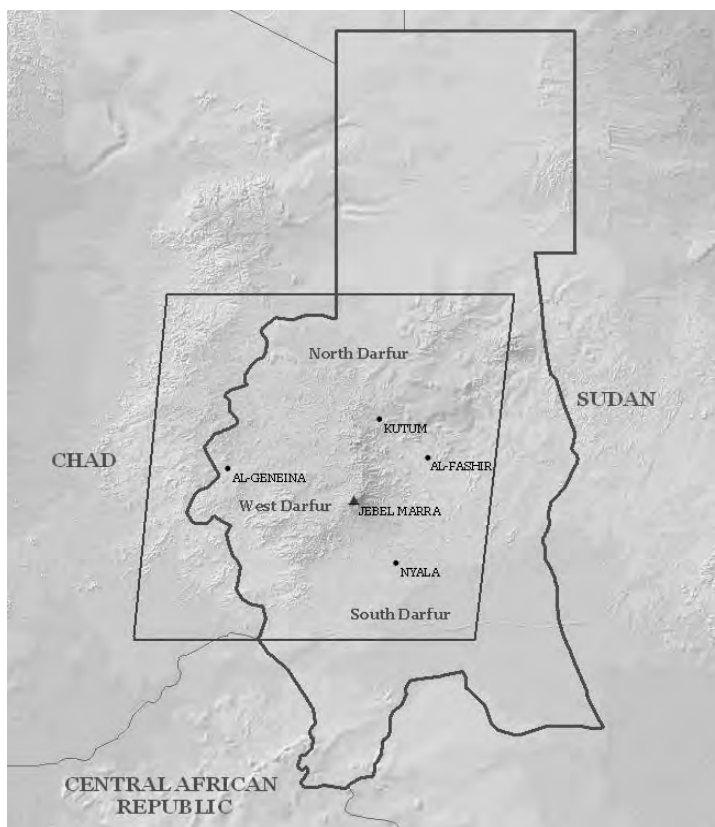


Figure 1: Darfur with study area outlined in the parallelogram, 308,000 km²

distinguishes vegetation phenologies. This method analyzes NDVI based on image stacks (23 for MODIS Terra and 36 for SPOT Vegetation) with temporal coverage of one calendar year for each stack respectively.

The research integrated ancillary data, using Geographic Information System (GIS) techniques, in order to establish contextual correlations between observed changes to land cover-vegetation coverage and their temporal and spatial relations to documented reports of violence and other anthropogenic activities. Based on the climatic,

economic, and land use patterns existing in Darfur prior to the 2003 violence, I suggested that the following would take place: (1) livestock grazing will reduce NDVI vegetation vigour, regardless of water availability; (2) a reduction in livestock grazing will stimulate a rebound in natural vegetation vigour; and (3) the displacement of people and the gradual decline of livestock in the region are uniquely related. I stated the following working hypothesis: if a primarily agrarian society experiences a sudden and massive disruption to annual crop and pastoral grazing cycles due to anthropogenic factors, it should be possible to track these changes using remote sensing through satellite images using NDVI series, and distinguish these changes from environmental stress due to fluctuations in annual rainfall characteristic of drought conditions.

4. Methods

The *Moderate-resolution Imaging Spectroradiometer* (MODIS) was used to measure contiguous temporal change in vegetation vigour and biomass from 2000 through 2008, and create land cover classifications based on twenty-four phenology classes. The NASA satellite, carrying *MODIS Terra*, was launched in December 1999. The imagery has a 250m spatial resolution (0.0625km² pixel size) and a spectral range in the visible and near-infrared portions of the electromagnetic spectrum (620–670nm, 841–876nm, respectively). MODIS datasets comprised nine total stacks of twenty-three individual scenes, each stack comprising temporal coverage of one calendar year—one scene per approximately sixteen days.

Le Système Pour l'Observation de la Terre (SPOT) was used to measure continuous temporal change in vegetation vigour and biomass from 1999 through 2008. The *SPOT Vegetation Instrument* system on the French CNES, SPOT 4 satellite was launched in March 1998. The imagery has an 1165m spatial resolution (1.36km² pixel size) and a spectral range in the visible and near-infrared portions of the electromagnetic spectrum (610–680nm, 790–890nm, respectively). SPOT datasets comprised ten total stacks of thirty six individual scenes, each stack comprising temporal coverage of one calendar year—one scene per approximately ten days.

The *Tropical Rainfall Measuring Mission* (TRMM) was used to calculate and graph annual rainfall data for the research area from 1998 through 2007. The NASA satellite carrying the *TRMM Precipitation Radar* was launched in November 1997. The data has a spatial resolution of approximately 784km², and collects microwave measurements; the satellite makes multiple passes daily. For this research, TRMM data sets comprise daily rainfall data with temporal coverage charted from calendar day 101–290 (April through mid-October), the rainy season in Darfur, which triggers general vegetation growth and parallels the agricultural growing season.

Fourier Classification. The algorithm used to record change in NDVI, was developed by Roland Geerken and is based on the Fourier classification method (Geerken, 2009). Geerken's classification clusters vegetation covers according to the shapes of their respective annual growing cycles, which are based on individual measurements of an

NDVI. The periodic acquisition of spectral remote sensing data used to calculate an NDVI creates NDVI-time-series that enable the study of growing characteristics, or phenologies, of vegetation covers. Temporal vegetation signatures can be interpreted in a biophysical context that allows identification of distinct vegetation types, e.g., deciduous – evergreen, or of particular land use management practices, e.g., single crop - double crop.

Output data of NDVI-cycles, clustered according to their shapes, can be linked to distinct vegetation types or land use practices. Intra-class coverage variations in the form of continuous fields, and measured relative to the reference cycle, provide additional information about vegetation covers (Geerken, 2009). Phenology is the scientific study of periodic biological phenomena, such as flowering, breeding and migration, in relation to climatic conditions. Phenology is directly related to species, and can be used to map vegetation and help to classify plant species.

For measuring changes in biomass or vegetation vigour, I developed an arbitrary system that calculated a per image biomass amplitude factor weighted by pixel area and intensity fluctuations in NDVI. Thus, for each stack, the amplitude factor was calculated by first multiplying each pixel magnitude value by its pixel area (e.g. MODIS 0.0625km²), and then summing up the total of these products. This factor represents the total area change as a function of the amplitude of that change. These data were graphed per stacked image year, either using 2000 (for MODIS) as a base year, or measured sequentially. From these plots, a mean curve of change in amplitude between consecutive years was derived.

5. Findings

From 2004 through 2007, both MODIS and SPOT images showed a steady increase of non-agricultural vegetation coverage and vigor, likely grasses and shrubs, in formerly agrarian and livestock grazing ranges. The regions experiencing most change have clear spatial correlation with systematic local violence during the same period. This trend occurred despite a continuing decrease in annual rainfall (Figure 2), suggesting that a greatly reduced number of people and livestock in these regions is likely the main factor driving the increase in vegetation. The findings show a clear distinction between the effects of rainfall and livestock grazing on environmental stress. My primary thesis is that this change in vegetation coverage is a result of the displacement of people and cattle rustling that have substantially reduced livestock numbers and disrupted semi-nomadic grazing practices.

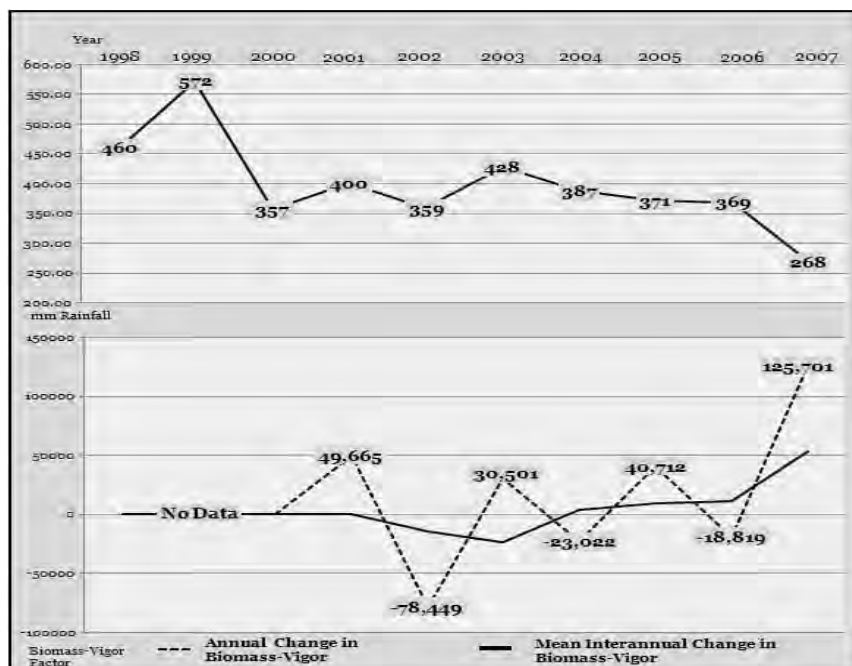


Figure 2: Graphed annual rainfall in mm and annual change in vegetation biomass-vigour for the period 1998 - 2007

The majority of livestock in Sudan are raised in traditional pastoral systems, on community rangelands. Herders raise an estimated eighty to ninety percent of Sudan's livestock (Ahmed, Azeze, Babiker, & Tsegaye, 2002). Almost all Darfurians own some livestock, and almost all of the refugees report the loss of these animals (Hagan & Rymond-Richmond, 2009). Typical farmers might own as many as ten goats, five to ten sheep, seven cattle, and one camel. A better-off farmer might own 200 each of goats, sheep, and cattle, as well as horses, donkeys, and camels. Fully-grown camels are worth more than US \$1000, as much as most Sudanese workers earn in a year (Hagan & Rymond-Richmond, 2009).

Annually, pastoralists moved north during the rainy season (July to October) and south during the dry season. Since 2003, however, herds in Darfur have been reported to be migrating southwards in search of safety, even during the rainy season (FAO, 2005). The violence has further restricted grazing ranges and, for security reasons, surviving livestock are being contained in concentrated areas, especially in the south, throughout the year (Southern African Regional Poverty Network, 2005). The concentration of livestock in the south, and the resettlement of some southern and western locations, might explain the 2008 MODIS findings (Figure 3), which show a discernible demarcation, east to west through west-central Darfur, of contrasting vegetation vigour. North of this line, vegetation vigour has continued to increase since 2007, but south of this line it has stabilized or, in some areas, it has even begun to

decrease. However, the effects of rainfall on this particular observation are unclear because the TRMM data for September 2008 were unavailable at the time this paper was prepared. In addition, the results have detected reductions in vegetation vigour in the proximity of IDP camps and refugee camps in East Chad, as well as near growing urban areas, e.g., Nyala.

The issue of rainfall is part of this climate discussion. But rainfall is only part of a water quantity, quality, and distribution problem. It is an invaluable resource. As such, it falls well into the rubric of politics. Whereas climate fluctuation one can do little about other than prepare for its possible impacts, available water is well under one's control. I argue that the causal effects of climate change, more specifically declining rainfall, on the violence in Darfur is not the primary causal agent and the conflict the resulting effect. Omitting the human impact on the availability of usable water has contributed to the cumulative result of these two factors, which have escalated into a tipping point of diminished water and plant resources.

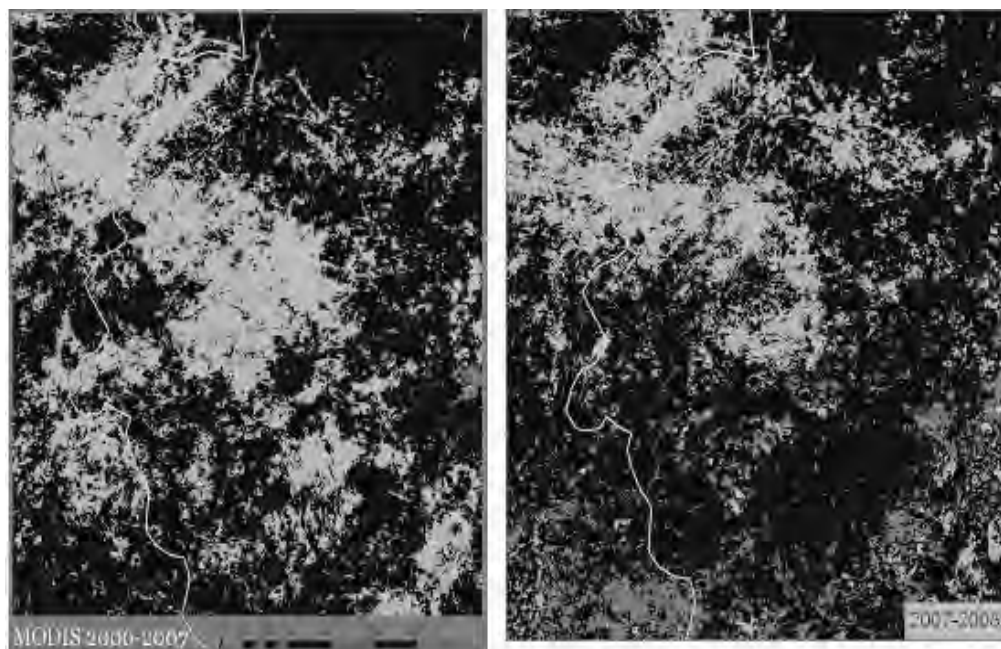


Figure 3: MODIS findings that show changes in Vegetation Biomass-Vigor between 2006-2007 and 2007-2008. The 2006-2007 findings demonstrate the incredible rebound of biomass-vigor (lighter-gray) in spite of a decrease in rainfall for 2007 (see Figure 2). The 2007-2008 findings demonstrate a north-south diverging trend in biomass-vigor, likely due to the increasing number of resettlements and livestock herds kept in the south although rainfall for 2008 has not been assessed.

As an example of this, I graphed the MODIS findings that measured change in biomass or vegetation vigour as a function of magnitude or amplitude, in two approaches. The first graph uses year 2000 as the baseline comparison to subsequent years, and the second graphs the years sequentially (Figure 4). The year 2000 marks the year following the annual highest rainfall during the study period, and allows for an assessment of whether the year the violence erupted, 2003, was really the lowest in terms of biomass and vegetation vigour. The advantage to the sequential approach is that it tracks how annual rainfall fluctuations influenced the spatial dynamics of vegetation coverage and vigour, especially the movement of the desertification zone, before, during, and after the violence. Both graphs show that 2003 had the lowest biomass magnitude over the nine years from 2000 through 2008. In addition, the study compared changes in biomass and vigour with changes in species distribution, based on phenology. The findings show that plant community structure or distribution has changed as dramatically as overall biomass vigour. Likely, one reason for this is the alteration in seasonal livestock grazing.

6. Discussion

In the case of Darfur, the approach that policy makers and political agents consider must be critically examined. If the view of Darfur is one of chronically diminishing resources and environmental degradation, then the policies that lead to the reorganisation of society and its infrastructure will reflect this attitude of attrition. However, if the view is that Darfur has historically had adequate resources, and that this potential can be restored, then the policies should reflect one of growth and development. A key element to understanding which of these two views apply, will be determining what potential resources are available to Darfur and how they should be managed.

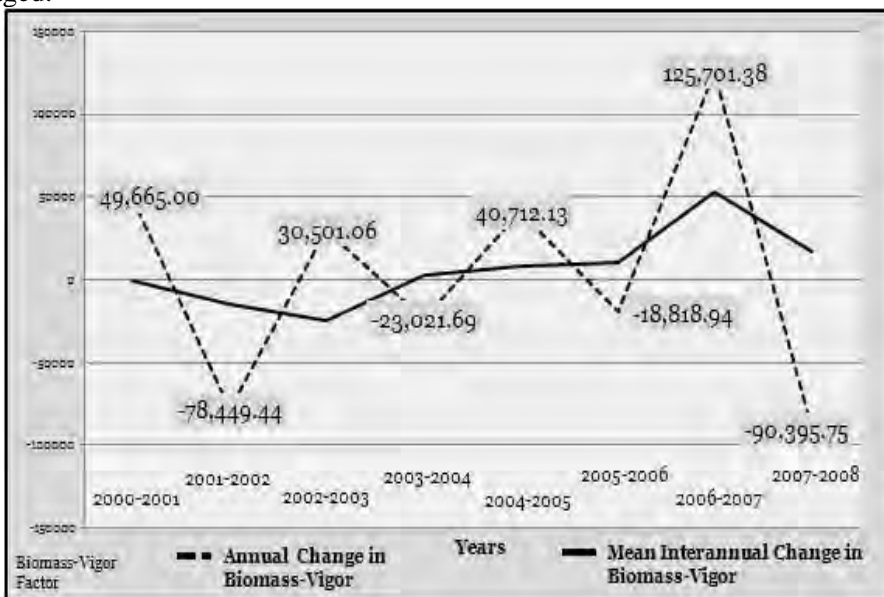


Figure 4: MODIS Interannual change in vegetation biomass-vigour 2000 – 2008. Biomass-vigour (y-axis) is measured on an arbitrary rating of -3 to $+3$ multiplied by the area of that change.

Thus, how can remote sensing technology be used in synthesis with other disciplines to provide policy makers and administrators with reliable data on population movements, resource availability, sustainable resource management, and environmental integrity, in an effort to avoid future conflicts in Darfur, especially those conflicts in which resource scarcity is a factor?

The ability to determine the carrying capacity of an ecosystem is greatly influenced by existing types and abundance of local species, and the customs and social values of Darfur's tribes. Distinguishing phenologies based on the annual growing cycles of different plant species provides a mechanism for classifying vegetation. Because phenology is uniquely related to species, if individual species are positively linked to observed phenologies, it is possible to inventory the annual availability of different vegetation species in a region. This determination can be expanded to assess those plant species' utility as resources to local communities. It is the availability of useable resources, and the demand on those resources, that will determine an ecosystem's carrying capacity in terms of human consumption.

In order to determine and predict the carrying capacity of subsistence resources, it is also necessary to qualify and quantify factors inducing stress on vegetation coverage. In considering issues like rising global temperatures, identifying and evaluating plant species traits that determine both photosynthetic optima and thermal tolerance is important to establish to what extent these traits are plastic in response to changes in average growth temperatures and water availability (Nicotra et al., 2008). Hence, knowledge of vegetation vulnerability for species in a region becomes a factor, *i.e.*, determining which plant species will adapt and regenerate given the types and magnitude of local stresses.

A reliable remote sensing model could be useful for (1) predicting possible outbreaks of violence caused by competition for diminishing resources; (2) developing approaches to land management practices and other relief efforts aimed at mitigating the environmental and socio-economic stresses that can cause conflict; and (3) suggest suitably adaptive plant species that have resource value and could be introduced to environments experiencing long-term vegetation stress.

The following list of vital elements to designing such a remote sensing approach is not exhaustive but a sampling of these principle components:

- 1) Document land cover types, features, geographic locations, roads, soils, hydrology, and topography
- 2) Map land tenure and ownership plots
- 3) Identify land use practices by regions
- 4) Inventory vegetation cover by plant species
- 5) Identify wild and cultivated plant species' utilities to humans and these plant species' behaviour to environmental variations
- 6) Determine carrying capacity of available resources

In situ, ground coordination is essential to develop accurate and dependable remote sensing applications designed to monitor annual changes to land cover, vegetation vigour, plant community dynamics, and rainfall. The goal of these applications is to provide information to land use planners, resource managers, and regional oversight or governmental agencies. However, any form of management requires governance. This governance applies to the management of people, land, and resources. How the rules are organised, and from which tradition they originate, should matter much less than whether those governed by these laws will respect them. Nevertheless, for any set of laws to be effective they must also be flexible. Thus, in any form of governance, dynamic thresholds and tipping points, especially concerning available resources and environmental degradation, must be well understood to avoid conflict. Most importantly, the law can be written and adjudicated, but it must also be enforced. Without a fair and consistent enforcement mechanism, law only exists on paper.

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Discussion

Regarding the IDPs, participants asserted that aside from its effects on livelihoods, the conflict also resulted in socio-economic change. It was noted that IDPs have adapted to new ways of livelihood within the camps. Most IDPs are working as domestic labourers in residential houses, while others are engaged in skilled labour activities. Moreover, the social interaction in the IDP camps has not only created diversity but has also enhanced community integration through marriage.

Some nomadic populations are settling in urban centres which, unlike rural areas, are expanding. Participants identified urbanisation as one of the main causes of deforestation, given the increase in the demand for timber. Some participants noted that the fact that IDPs are building houses for themselves could be understood as their decision to settle.

Referring to Dr. Nagla Bashir's suggestion on encouraging people in the camps to plant trees, it was noted that the IDPs can be mobilised to plant trees upon their return to their original settlements. Some participants mentioned that since the IDPs are held accountable for the destruction of trees around IDP camps, they should participate in the areas' rehabilitation. Concerning the issue of the IDPs planting trees, Dr. Nagla Bashir highlighted the importance of providing training on forestry to them, so that they can be part of the tree planting initiative.

As regards the participation of women in the peace process, participants noted that, in the Abuja peace talks, efforts were made to include women in the discussions. It was asserted that with the help of UNIFEM and the Government of Norway, the Abuja talks were successful in involving women and incorporating their inputs. However, participants underlined that a lot remains to be done on the issue of women's participation in any renewed peace process, with the help of DDDC and the UNAMID Civil Affairs Section.

Participants pointed out that the biggest transformation that takes place as a result of conflict, involves women. Rwanda, for instance, now has the highest rate of representation of women in parliament in the world. Some participants also discussed the fact that there has been a strong resistance to women's participation in the peace process.

In response to questions posed by participants, Dr. Abduelbasha Yousif noted that women tend to suffer more from conflicts than their male counterparts, given that their concerns are often not adequately addressed in the peace process. He further argued that there has been minimal representation of both women and CSOs in the various rounds of talks, adding that even though there is an issue of misrepresentation of the interest of the Darfurians by the CSOs, the latter still need to be strengthened so that

they can be in a position to play a meaningful role in the restoration of peace and development in the region.

Regarding Mr. Schimmer's contribution, participants raised issues concerning maps that were shown during his presentation. Major cities and population density should also be covered. In terms of biomass production in Darfur, various participants called for the need to assess the size of livestock herds, the period of grazing, the grazing capacity of the land and the soil type in order to ensure a proper classification.

Some participants remarked that although rainfall recovery improves biomass production, there are cases where the production of charcoal has impeded biomass regeneration. Furthermore, it was argued that the variation of rainfall further complicates the understanding of climate change in Darfur. It was finally suggested that there is a need to see the crisis from an international perspective with respect to biodiversity and climate change.

Mr. Schimmer was asked to share his thoughts on how tools could be developed to avoid degradation of natural resources as a result of both the movement of livestock and the periodic use of resources. He replied that exploring the factors causing the depletion of natural resources, and making an inventory using technological means, would be helpful in this regard.

Regarding the function of remote sensing (satellite observation) *vis-à-vis* identifying water sources, Mr. Schimmer noted that the satellites are capable of locating water resources over 1500 feet underground through collaboration with geologists. Hence, he stated that ground surveys should be combined with satellite data. He further stated that there are some instances where ground coordination is also required, particularly whilst classifying the different types of vegetation species and validating the observed greening.

Another question concerned the possibility of collecting information on underground natural resources, including oil and other mineral resources, through remote sensing. Mr. Schimmer affirmed that sensors are currently being used by oil companies to locate oil and other mineral resources underground. However, he noted that the information obtained in this way is neither disclosed nor accessible to researchers, for security and business reasons.

Mr. Schimmer was also asked how accurate the digital satellite images were with respect to forestry planning, and whether the information available through digital satellite images would enable them to make distinctions among species and to estimate the extent of deforestation. In response, he remarked that the images were quite accurate, and that it was certainly possible to distinguish vegetation species based on the obtained information. Furthermore, Mr. Schimmer added that the local people have a great role to play in providing information with respect to natural resources available in their surroundings. Consequently, there are some efforts in place to

involve the local population in understanding how natural resource management must be combined with technology.

Regarding whether environmental management should be centralised or decentralised, Mr. Schimmer responded that there is a need for the central government to set the base line, instead of devolving the issue to the regional level, in order to achieve stronger management in this regard.

In relation to the *hakura* system, Dr. Abduelbasha Yousif emphasised that the term is rarely understood by the international community and that the government, the international community and the rebels all see the *hakura* system differently. He stressed the importance of developing a common understanding, possibly through organising a conference on the *hakura* system.

Referring to the presentation of Mr. Bromwich, it was suggested that, aside from the programs undertaken by NGOs in strengthening the already existing peace committees, there is also a need to reform the *hakura* system in a way that allows for the pastoral community to be resettled in alternative villages.

It was further commented that although the NGOs have performed in providing water for the region, they have to pay due attention to the environmental degradation that their good-will activities may cause. Some participants supplemented this by stating their fear that the work undertaken by the NGOs could deprive farmers of their livelihoods by diverting the supply of water away from their farmland, creating scarcity. In addition, some participants suggested that the water-supply dams and wells should be built in view of their periodic use and proportionate to the livestock concentration. It was noted that, in so doing, land degradation could be avoided. However, many argued that the locals, be it the pastoralists or the traditional leaders, are also to be blamed for the extensive degradation in the region.

Participants stated that in most cases, humanitarian governance not only tends to withhold important data from the government, but also tends to replace local institutions and traditional leaders, instead of strengthening them. This has caused difficulties between the local authorities and NGOs. Some participants further felt that the replacement of the government by the NGOs has become obvious in recent times, undermining the government's legitimacy.

Mr. Bromwich was asked whether there are any practical measures being taken to address livelihood and climate change issues in Darfur. He responded that there is an inadequacy of governance in response to climate change, including drought, in the region, adding that the local institutions are desperately weak and that the government has very little access to rural areas. Another question was posed concerning the local level agreements in rural areas. Mr. Bromwich believed that local agreements were regularly being carried out by the people, instead of them waiting for the national government to resolve their issues. He further mentioned that CARE has performed

well in promoting traditional governance through simply extending support for the local peace committees.

In response to the capacity of the Darfurian authorities to make use of collected data, Mr. Bromwich stated that there are notable hydrologists who could handle the data and plan accordingly. In terms of water supply in Darfur, the presenter highlighted that once ongoing projects—funded by the Chinese Government—are accomplished, the tension regarding water supply will ease. Additionally, he noted that the Nile Basin Initiative also has a great role to play in this regard.

Theme 7

Environmental Peace-Building

Introductory Notes

The term Peace-building was originally applied specifically in relation to post-conflict situations. However, it is now used more broadly to refer to a set of activities that help promote stability and end direct violence (Canadian Council for International Cooperation [CCIC], 2009, p. 8).

Conflict zones suffer from a lack of stable governance and limited observance of the rule of law. In environmental terms, this results in a complete lack of environmental protection as well as impunity for those who extract or process natural resources in an uncontrolled manner, or cause other forms of environmental damage (UNEP, 2007, p. 95).

Conservation of the environment and the sustainable management of natural resources have not been regarded as priorities for Sudan since independence. Even when such efforts have been considered, they have generally not been sufficiently funded to bring about positive change. Bromwich (2008) reported chronic environmental degradation and loss of traditional environmental governance during the Darfur crisis, both through massive displacement and because of the fighting itself.

The quest for environmental justice is an integral part of social justice, human rights and women's rights, as well as the promotion of peace. Environmental injustices such as unfair access to land and water can contribute to poverty, marginalisation, and violent conflict (CCIC, 2009, p. 1).

Adaptation efforts can support peace by enabling communities in fragile states to increase their resilience to adapt to climate hazards. Proactive and planned adaptation strategies can help build the capacity of the state and communities in fragile contexts, thereby preventing an overburdening of both state systems and community coping mechanisms. Adaptation efforts can also promote social justice, human and women's rights, and gender equality by ensuring the adaptation efforts are accessible and responsive to women and men in vulnerable and marginalised communities. Such an approach can help prevent violence and build the conditions for a just and peaceful society. Adaptation, in this sense, could also benefit conflict prevention (CCIC, 2009, p. 7).

The environment and climate change can offer peace-building opportunities in conflict-affected areas. They could be mobilising issues around which rivals can identify a common threat and unifying purpose.

The United Nations Environmental Programme (UNEP) has been undertaking research on the role of natural resources and the environment in peace-making. In *The Case for Environmental Peacemaking*, Professor Ken Conca explains that cooperation over natural resources can establish collaborative and co-operative relationships over

sharing resources on a small scale between parties to conflict. According to Conca, shared resource systems and ecological interdependencies are part of a durable peace (Conca and Dabelko 2002).

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Communities and Natural Resource Conflicts in Africa: Reflections on Conflict Management Options for Peace-building in Darfur

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Abstract

The paper embarks on conflict and resource management issues in Darfur. In so doing, it explores how natural resource conflict management processes can contribute to conflict transformation in the region. It opens by examining some of the main issues that emerged from the University of Peace's 2009 conference, which stressed that peace-building efforts cannot be separated from immediate and long-term livelihood, resource management, and development issues. The paper then shifts to its main concern i.e. identifying and assessing strengths and limitations of key institutional settings and practices used by rural people for dealing with natural resource conflicts. Accordingly, it focuses on three major institutional domains viz. rights-based approaches exercised within national legal systems; informal/local practices rooted in custom and living law; and alternative dispute resolution (strategies and techniques aimed at consensus-building). Finally, the paper concludes by emphasising that enhancing people's ability to access a number of domains in seeking to address tensions and disputes related to resources must be a major part of peace-building efforts.

1. Introduction

The scope and magnitude of Darfur's conflicts, with destruction on a regional scale, a multitude of displaced people, persistent insecurity and profound unresolved political issues, distinguish it from the typical 'resource dilemmas' featured in the participatory-oriented natural resource conflict management literature.¹ Such studies, particularly of successful cases, overflow with terms such as pluralism, partnership, co-management and adaptive learning, denoting situations where a strong sense of predictability and trust was developed among participants (Berkes, 2009; Blackmore, 2007; Castro & Nielsen, 2003; Wollenberg, Anderson, & López 2005). It is important to bear in mind, however, that these participatory institutional arrangements were often created in response to chronic and sometimes seemingly intractable conflicts (Castro & Nielsen, 2001). Darfur's horrific violence has demonstrated the dangerous side of conflict. Despite this, conflict also serves crucial social purposes, allowing people to voice their grievances and to express interests and concerns. Conflict can be an integral part of constructive cultural change. As the people of Darfur seek to

¹A recent report highlighted the still volatile situation in many parts of Darfur (International Crisis Group, *Sudan: Justice, Peace and the ICC*. African Report No. 152, July 17, 2009; also see the Blog "Making Sense of Darfur").

reconstruct their communities and livelihoods, the issue of how to resolve conflicts related to the use of, or control over, natural resources will be of paramount importance. Natural resource conflicts² are often complex and multifaceted, involving resource users from different cultural backgrounds, as well as competing claims between local communities and the state. Such disputes have been major elements in Darfur's crisis (Alden Wiley, 2008; de Waal, 2007a; Mamdani, 2009; University for Peace, 2006). Political settlements will need to take into account the diverse institutions and procedures employed by communities and resource users to address these issues.

2. Reflections on the conference: an interpretation of key issues

The presentations and discussions at the 2009 University for Peace conference emphasized that Darfur has many kinds of conflicts, occurring in different areas and at different societal levels. These conflicts are embedded in its historical circumstances, demography, socioeconomic characteristics and drought-prone environments. However, the scale and intensity of violence and insecurity are not inevitable outcomes of history, population growth, identities or nature. Instead, people's reliance on bloody coercion, in pursuit of their perceived interests, with its high human costs, reflects contemporary social forces and processes. Sudanese national politics, marginalisation of large segments of Darfur's population, decline of customary land use and conflict management authorities, actions by neighbouring countries and by global superpowers and the global arms trade are examples of such forces and processes. If one is looking for a positive message, it is that widespread, extreme conflict is not predestined or inescapable in Darfur. At the same time, violence and insecurity often beget further violence and insecurity, creating a downward spiral of trouble. So, if large-scale violent conflict is not preordained, neither can peace be expected in Darfur without sustained effort aimed at reconciliation and participatory conflict resolution. Urgent action is required, but peace-building also requires considerable patience.

Conference discussions also highlighted the complexities and difficulties of trying to respond to Darfur's multiple conflicts. There is not a singular conflict setting, but situations straddling the categories of post-conflict, active conflict and even pre-conflict. Displaced populations, disrupted livelihoods and widespread availability of arms not only serve as legacies of past violence but also contribute to ongoing instability. These dynamic circumstances call for site-specific analysis and flexibility in promoting conflict transformation. Such analyses should aim to illuminate past and present socio-economic, political and ecological dimensions of the conflict. General assumptions about the supposed role of identity politics, scarcity-driven motives, or bad governance cannot substitute for hard data on specific cases. This is not simply a plea to understand the micro in order to facilitate macro-level action. Disputes at the

² Conflict here refers to two or more parties engaged in a dispute arising from incompatible claims an issue, thing, or situation related to natural resources. Having a conflict of interest in a resource is not the same as being in conflict over it ((Hussein, Sumberg & Seddon, 1999).

local level are often closely connected to wider systems of power and politics. Peace-building efforts at all societal levels will require a deep understanding of these linkages.

Finally, the conference stressed that peace-building cannot be separated from livelihoods, resource management and development planning. These facets of life in turn depend on the strengthening of participatory processes for handling contentious issues regarding political representation, displacement, compensation and rights to resources. As in other parts of the world, people in Darfur seek greater involvement in the key decisions affecting their lives. How to promote participatory processes in Darfur's complex conflict settings is a challenge. Even under ideal conditions, outsiders hoping to foster participatory processes within communities face the tough question of when to furnish assistance, versus when to back away or exit. Overall, Sudanese scholars and practitioners – particularly those in Darfur – should receive substantial support to extend their activities related to such issues. Entities such as the Peace Centres at the three Darfur Universities offer enormous promise for merging conflict management with broad socio-economic concerns.

3. Managing natural resource conflicts in Africa: multiple approaches

Many of the ambiguities and questions regarding Darfur's conflict are mirrored in the wider literature on African natural resource conflicts. Analysts attribute these conflicts to a number of causes, sometimes summarised by pithy phrases, including environmental scarcity, need or greed, resource curses, failed states, structural inequalities, historical political economy and neo-patrimonialism (see Castro, 2005; Castro & Engel, 2007; Chabal, Engel, & Gentili, 2005; Gausset, Whyte & Birch-Thomsen, 2005; Peluso & Watt, 2001). These various interpretations reflect the theoretical interests and assumptions of analysts, for example, political ecology versus neo-Malthusianism. However, the interpretations are also an indicator of the dynamism of conflicts, as different kinds of resource conflicts exist, and these events and processes are linked in complex and dynamic ways to wider socio-economic, political, and environmental processes (Mason et al., 2008).

Although the notion that conflict is related to resource scarcity is highly popular, it must be treated with caution. Conflicts can arise when people place multiple and competing demands on a resource, yet such circumstances do not always result in tensions or disputes (Hussein, Sumberg & Seddon, 1999). Similarly, poverty is sometimes treated as an obvious cause of conflict, yet when and why poor people decide to support confrontation and violence is unclear, or not yet convincingly established (Justino, 2008). The plausibility of singular prime movers or conflict triggers declines when one moves from the macro level to particular conflict cases, where site-specific variables usually become apparent. In general, whether conflicts of interests, scarcity driven by inequalities, poverty, the environment, or some other trigger results in disputes or violence depends on other circumstances within the economic, social, and political context (Markakis, 1998).

People throughout Africa, including Darfur, use a range of institutions and settings to resolve or manage natural resource conflicts. These processes may be formal or informal, violent or peaceful, equitable or not. While the specific practices vary, rural Africans rely on the same fundamental procedural modes used by all people to resolve disputes: avoidance, coercion, negotiation, mediation, arbitration and adjudication (Nader & Todd, 1978). They pursue these procedural modes in a number of different institutional settings or legal domains, including ones rooted in the nation-state, local custom, religion, ethnic group, universal human rights or other social entities. The existence of multiple, often overlapping legal domains is called legal pluralism. Africa's legal pluralism derives from indigenous, colonial and post-colonial influences and experiences. The various legal orders can be complementary or competitive, in harmony or contradictory. Nation states attempt to exercise exclusive control over the definition of legal, extra-legal and illegal orders. People, however, hold their own views of legitimate and illegitimate authority.

Some analysts suggest that legal pluralism may cause conflicts to escalate, because disputants keep shifting their case to different settings (Lavigne Delville, 2000). What can emerge is not only a contest between two parties, but a power struggle among the various authorities concerned with land and resources. Others contend that legal pluralism creates socio-political spaces where multiple claims can be negotiated through a range of dispute resolution processes (Berry, 2002). This multiplicity of authorities supposedly provides people with a chance to engage, as much as they can, in strategic manoeuvring to secure their claims. Negotiability has its limits, however, because not all people have equal access to all dispute-resolution options: class, gender, age, social identities, remoteness and other factors can restrict which avenues are open to certain individuals and groups (Peters, 2004).

4. Rights-based approaches and national legal systems

Discussing the role of national legal systems and rights-based conflict management may seem incongruous or naïve in the case of Darfur, where many of its people perceive the central government as responsible for the large-scale violence, deaths, destruction, and displacement (Buchanan-Smith & Jaspars, 2007; de Waal, 2007a). Adding to the practical and ethical issue is the fact that in counterinsurgencies, national officials often seek to replace local authorities and institutions with ones unquestionably serving state interests (Castro & Ettenger, 1994). Even before the outbreak of warfare in 2003, Darfurian communities may have felt that they have had too much involvement by the central government in their affairs. Since 1971, National leaders have imposed a series of top-down institutional interventions reducing the long-standing roles and authority of local administration. In combination with broader socioeconomic changes occurring in Darfur, these interventions diminished local capacity for natural resource conflict management (Abdul-Jalil, Mohammed & Yousuf, 2007). However, conflict transformation in Darfur will depend ultimately on the re-establishment of a system of governance linked – in whatever way determined by a peace agreement – to national institutions and policies (Mamdani, 2009). It is

within this context that I consider the role of national legal systems in natural resource conflict resolution.

Rights-based approaches to natural resource management have gained popularity, at least in terms of rhetoric. Rights are legally enforceable entitlements, held by individuals or groups, which pertain to civil, economic, or cultural aspects of life. Some analysts now link poverty alleviation and sustainable resource management to principles of human rights, equality, well-being, and participation (Moser and Norton, 2001). International agreements and national policies seek to define such entitlements, but many people contend that inherent human rights exist (Wollenberg et al., 2005). A society's effective ability to use its national legal systems to clarify and enforce rights, including natural resources, is evidence of its members' empowerment. Public use of national legal systems can help keep governments accountable, transparent and responsive.

The national legal system consists of the overall framework of legislation, policy and state institutions, including regulatory and judicial administrations extending from national to local levels. National constitutional structures throughout Africa are based on civil or common law, traditions inherited at independence, with Islamic legal traditions included in several countries. Elements of indigenous law were sometimes incorporated into colonial states, usually falling under the jurisdiction of native administration. Current governments often include customary law within their formal judicial institutions as long as it conforms to official statutes. Adjudication by judges, administrative officers, or local authorities is the main conflict management technique of national legal systems. Arbitration, negotiation and mediation are also used in some settings.

Table 1 summarises general strengths and limitations of national legal systems. In all countries including Sudan, the poor community, women, remote communities, pastoralists and other marginalised groups, often encountered difficulties accessing courts and officials due to financial, political, social or other constraints. Female heads of household, for example, may need to take male kinfolk along with them for their grievances to be handled adequately by authorities. Slow procedures can make national systems unappealing, as disputes may linger for years in the courts or in administrative offices. Finding a lawyer or legal advice can be difficult, especially for rural dwellers, since environmental advocacy law is a small specialty in most places. National and regional alliances of lawyers, non-governmental organisations and others concerned about environmental rights are emerging, but greater capacity is needed to meet the public's needs (Environmental Law Institute, 2004). Individuals and groups may face intimidation when pursuing grievances through official channels and repressive laws, and oppressive practices pose a threat to activism and dissent.

Table 1: Strengths and limitations of the national legal systems

Strengths	Limitations
<ul style="list-style-type: none"> • Reinforces rule of law, promotes accountability • Standardized rights, rules & procedures involving judicial specialists • Decentralization offers community participation • National & international concerns can be taken into account • Advocacy movements widening access • Potentially impartial & legally binding decisions 	<ul style="list-style-type: none"> • Lack of accessibility to the poor, marginalised • Burdensome & timely process with high costs • Often excludes local institutions & knowledge • Locally inappropriate national or global standards may be imposed • Activists vulnerable to repression • Domination/corruption, lack of enforcement of agreements

Adapted from Matiru et al., 2000

Public sector reforms, such as decentralisation, are supposed to increase responsiveness and efficiency. For example, de-concentration shifts responsibility to field units of ministries, while devolution conveys substantive power to the local level. Privatisation, economic liberalisation and co-management arrangements seek to widen public access to resources, simultaneously reducing the role of the state agents or repositioning them as partners. In practice, these reforms frequently fail to meet their high expectations (Ribot, Agrawal, & Larson, 2006). Due to a number of motives and circumstances, state officials may be unwilling or unable to transfer sufficient authority or resources to the local level. A major issue for many countries is that administrative and judicial systems are under-resourced, undermining their capability. Bureaucracies are reeling from demoralising years of shrinking budgets, reduced staff and declining policy-making roles. Local-level authorities may lack the resources, information and training to engage in new responsibilities. Political and personal motives, especially regarding valuable natural resources, also exert an influence. Regional or community elites may use their political connections and market access to enhance their access to resources at the expense of less powerful groups. Decentralisation can exacerbate, rather than reduce, natural resource conflicts (Castro & Engel, 2007). Ironically, initiating conflicts, including use of violence, may be one of the few options that less powerful groups can use to defend their interests. Official decisions, perceived as self-serving by the public, fuel mistrust of state administrative and legal procedures.

For lasting peace to come to Darfur, effective engagement is needed between diverse members of civil society, the government, the national legal system and other interested parties. It is beyond the scope of this paper to cover the troubling, and at times even dismal, history of conflict resolution in Darfur. As de Waal (2007b, p. 367)

states, “Darfur’s peace is no less complicated than its war.” In a recent posting to the Blog “Making Sense of Darfur,” de Waal describes the dilemma of Sudan’s legal system, citing criticisms about the judiciary’s lack of independence, the overall lack of concern for human rights issues, and so on (<http://blogs.ssrc.org/darfur/2009/07/14/the-au-panel-and-the-justice-challenge-iii/>, accessed July 15, 2009). However, in a related posting about sessions held in Darfur and Khartoum by the African Union Panel on Darfur, de Waal reported that many people eagerly seek increased engagement by civil society in negotiations and other legal processes related to peace-building in the region (<http://blogs.ssrc.org/darfur/2009/07/13/the-au-panel-and-the-justice-challenge-ii/> accessed on July 15, 2009). Nonetheless, national legal systems are indispensable for conflict transformation and sustainable resource management.

5. Informal/Locally-based conflict management processes

People within and across communities possess their own means of handling disagreements and disputes over natural resources. Frequently, the same authorities that governed natural resources also handle conflicts and transgressions related to them. This situation reflects the fact that resource management and conflict management are essentially one in the same process. Both aim to bring consistency, order and accountability to situations of competition and conflicting interests. In fact, the local authorities that manage resources are also the same ones that deal with conflict. For example, Haro, Doyo, & McPeak (2005) describe “nested” resource management and conflict management institutions among East African pastoralists consisting of households, camps, assemblies of camps and “neighbourhoods.” The term informal does not mean that local resource management processes are ad hoc, but that state officials do not recognise their processes and decisions. The main techniques used by communities are negotiation, mediation, arbitration and adjudication. People also frequently use avoidance and coercion, with the latter manifested in peer pressure, gossip, ostracism, public humiliation, witchcraft and the fission of kin or residential groups.

Table 2 identifies strengths and limitations of local/informal approaches. The greatest strength of informal dispute resolution is that it is rooted deeply in the norms, values, institutions and practices of communities, fostering reconciliation in a context where conflicting interests in resources are rife. People generally know a conflict’s context: the principals, their interests and events leading up to the dispute. Discussion takes place in the local language, and within a cultural context with which people are comfortable. Customary practices offer several advantages: low cost, flexible schedules, inclusion of local knowledge, reference to local norms and public participation in the proceedings. Community leaders can serve as mediators, facilitating negotiations and promoting conciliation, or they may act in adjudication roles if the parties cannot reach a solution. In many cultures, agreement is marked by a ritual or ceremony aimed at fostering reconciliation.

Reliance on local relationships and knowledge is also one of the limitations of customary approaches. Such practices depend on disputants being “local and identifiable... neighbours with an interest in strengthening the system of local accountability” (Mamdani, 2009, p. 290). What is “local” in Darfur has been altered in many places by destroyed villages, displaced people, new occupants on the land and chronic insecurity. Nonetheless, informal dispute resolution processes continue to operate throughout Darfur, including among internally displaced populations. As Abdul-Jalil et al. (2007, p. 66-67) observed, “While understanding the fragile and limited capacity of native administration, the international talks should recognize and seek to enhance the function of the tribal leadership at the grassroots levels.” While their comments are directed primarily at local administration tied to the national legal system, they are also applicable to the role of informal processes.

Table 2: Strengths and limitations of the local/informal system

Strengths	Limitations
<ul style="list-style-type: none"> • Familiarity, participatory & promotes stability • Principles of consensual decision-making can be extended to integrate new situations and parties • Involves local leaders as negotiators & mediators • Consensual decision-making • Locally appropriate agreements fostering reconciliation • Respects local culture, promotes empowerment 	<ul style="list-style-type: none"> • Exclusion due to sex, poverty, social identity or other factors • Difficulties can arise accommodating conflicts between distant social groups or between a community & the state • Leaders may be biased towards their own interests • Decisions may reflect political strength • Agreements may not be recognised by officials, nor sustained by participants • Vulnerable to take-over by the state

Adapted from Matiru et al., 2000

It is important to bear in mind other limitations of informal conflict management practices. Socially marginal groups can encounter difficulties accessing dispute resolution forums. The poor, women, lower castes, migrants and others seen as “strangers” may lack the social standing to participate in local tribunals. Many studies now emphasise the influence of powerful individuals and groups in informal conflict management processes (Moore, 2005). Instead of being a forum where disputes can be resolved through reference to tradition, informal conflict management processes may serve mainly as an arena for testing the political strength of local factions. Local conflict management processes do not necessarily yield more equitable, harmonious or longer-lasting settlements than other approaches (Moore, 1986). Providing legal recognition to informal conflict management processes can bolster their legitimacy, but it can also have a deleterious effect. In South Wello, Ethiopia, for example,

officials tried to incorporate religious leaders, who possessed informal conflict management roles, into state-run tree planting campaigns. Because the trees were often planted on local pasture - to the detriment of local livelihoods - they proved highly unpopular within communities. The religious leaders were reluctant to get involved because of the threat to their moral authority (Pankhurst, 2003). In spite of these limitations, informal, locally-based practices continue to serve as a major option for conflict management in rural Africa.

6. Alternative dispute resolution

Alternative dispute resolution (ADR) promotes consensus-based approaches for managing and resolving conflicts. Its development in the United States was inspired in part by James Gibbs' account of informal dispute resolution among Kpelle villagers in Liberia. ADR has been used extensively in American environmental conflicts since the 1970s (often with government support), it is seen as a flexible, low-cost substitute to adversarial legal proceedings and adjudication. Major ADR techniques include interest-based negotiation, multi-stakeholder dialogue, and negotiated rule making, with strong reliance on the role of facilitators. Substantial attention is also directed in ADR towards capacity building. The proponents of ADR see it as a means of encouraging creative "win-win" settlements and its emphasis on training and building social capital are portrayed as enlarging human and social capital whilst promoting social justice. In theory, such processes should result in environmentally appropriate, socially sound and sustainable agreements. Only recently, however, have such claims started to be evaluated (O'Leary & Bingham, 2003). Meanwhile, international donor agencies, technical assistance agencies and the ADR industry have promoted its introduction into Africa and other developing areas (Castro, 2005).

Critics of ADR question its assumptions, uses and impacts. Much of this criticism centres on issues of power. Nader and Grande (2002, p. 574), who attack its export to Africa, state that, "ADR has power dimensions that have not been adequately analysed or understood." ADR proponents are portrayed as accepting too easily the claims that its interest-based negotiation techniques can significantly level power differences among disputants. Sceptics contend that masking power differences behind participatory discourse only perpetuates, if not widens, inequalities (Cooke & Kothari, 2001). Some analysts suggest that the effectiveness of ADR may be helped by political reforms that increase government accountability, while also supporting democracy (Castro, 2005). Such reforms, however, would probably enhance the performance of all conflict management processes, since each shares difficulty in dealing with power and social exclusion. ADR's emphasis on "managing" conflict is viewed by some critics as disguised people-manipulation, reducing the legitimacy of conflict as a political process. In addition, ADR has been depicted as undermining or supplanting indigenous conflict management practices. Another criticism is that ADR proponents often focus only on capacity building (to be provided by their consulting firms), while failing to follow-up on what people do with this knowledge in the absence of additional resources for conflict management activities. Finally, it is not

clear that ADR-based agreements are more equitable or sustainable than those reached by other means.

Strengths and weaknesses of ADR are summarised in Table 3. As with any social innovation, caution and sensitivity are needed in promoting and using ADR. The Food and Agriculture Organisation's (FAO) recent experience with its African Training of Trainers Programme showed that ADR could be combined with customary practices in effective, yet culturally appropriate ways (Castro & Engel, 2007). The FAO programme emphasised the need to treat both informal practices and ADR techniques as adaptations, with the overall aim of trying to widen people's options for dealing with conflict. The FAO programme differed from many in that some resources were provided to trainees for follow-up conflict management work in their home areas. Two case studies from the Gambia and Namibia prepared by trainees showed that this modest support for community visits and other expenses produced significant outcomes, resulting in agreements in previously intractable conflicts (Castro & Engel, 2007). Thus, ADR has potential to contribute to conflict management processes in rural Africa, but its form and deployment need to match local circumstances.

Table 3: Strengths and limitations of alternative dispute resolution approaches

Strengths	Limitations
<ul style="list-style-type: none"> • May help overcome obstacles to participation • Emphasis on capacity building through training • Uses means similar to traditional practices such as consensual negotiation • Promotes consensual decision-making • Fosters ownership in solution/implementation 	<ul style="list-style-type: none"> • Power differences are difficult to overcome • Usually few resources for post-training work • Imported methods may not fit local context, displace customary practices • May be difficult to engage all stakeholders • Decisions may not be implemented/sustained

Adapted from Matiru et al., 2000

7. Conclusion

The conflicts in Darfur require urgent action. Peace-building efforts are required at all levels: local, national, regional and global. The challenges are daunting and so both considerable effort and patience will be required. However, one cannot succumb to paralysis. Big steps, little steps, macro concerns, micro concerns all matter. Conflict transformation is not possible in Darfur, however, without addressing the issues of livelihoods, long-term development needs and the use and management of natural resources. Agreements will need to take into account institutions and procedures for communities and resource-users to resolve natural resource-related conflicts in a participatory manner. Addressing these conflicts will require a multifaceted approach

based on legal pluralism. This paper reviewed strengths and limitations associated with three main conflict management settings: rights based approaches within national legal systems, informal/local conflict management processes rooted in custom and living law and alternative dispute resolution.

Peace-building in Darfur also requires the strengthening of local capacity to handle the tensions and disputes that inevitably arise in accessing, using and managing natural resources. In this regard, increased support is especially needed for Sudanese institutions, scholars and practitioners - particularly those in Darfur - concerned with natural resource conflicts, livelihoods, development and other issues related directly and indirectly to peace-building. They have the ability to work efficiently and effectively with the area's population. My prior experience with the FAO's African Training of Trainers Programme has shown that even modest investment of resources in conflict management activities can provide significant results.

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Discussion

Throughout the discussion period, participants commented that conflicts *per se* are neither good nor bad. They also mentioned that it is always important to identify and address the bone of contention prior to making efforts to settle the dispute or trying to suppress conflicts.

Regarding the issue of the decision on whether Sudan should be one or two states, participants commented that Sudan is presently one country with two governing systems. They highlighted the need for local communities to have a forum within the mediation team, so that the team could benefit from information about the existing situation on the ground. Participants added that such a discussion should be carried out with those people whose lives are directly or indirectly affected by the problem, and that the voices of the various minorities should be heard across the table.

One participant insisted on the merits of side shows and other new methods of negotiation, instead of expecting different results while pursuing the same process over and over again. Additionally, the participant explained that the strategies that have been used in the peace process so far should now be replaced with educating the armed movements together with the minorities, and bringing CSOs on board to have a dialogue with both the armed movements and the government.

Participants also raised the need to involve environmental activists, who were absent in the Abuja peace talks, and to globalise the issue in order to bring environmental and ecological issues on board.

The need to understand the Darfur conflict within the wider context of Sudanese conflicts was also raised and discussed. Participants emphasised that the intervention of the international community has both helped and harmed the Sudan. They stated that, since the primary interests of the parties are political arrangements and the issue of power sharing, the presence of the international community is important in helping the parties identify whether conflict is intractable or not. However, in order to do this effectively, the international community needs to understand the local realities, the nature of the conflicts and the implication for the national economy—particularly on pillars of the economy such as trade, the war economy, livelihoods and the question of leadership.

Deliberating on the recent decision made by the ICC regarding the indictment of President Al Bashir, participants expressed their fear that this move may hamper the ongoing peace process and asked how the AU-UN Mediation would be able to continue leading in Darfur, given the ICC decision. They mentioned that this should be seen within the context of a lack of homogeneity among the international community *vis-à-vis* the issue of Darfur before airing their fears that the Darfur problem may not be resolved prior to the national election. Participants were anxious

that if the election takes place without involving the Darfurians, it may have negative repercussions on the stability of Sudan.

The recent CSO mapping study was mentioned by the participants, who stated that it demonstrates an inadequate representation of the society, given that the CSOs themselves represent a particular group. For instance, the recent mapping of CSOs indicates that only ten out of between 250 and 300 civil society organisations have interests in the *abbala* and that a significant portion of the society is not represented by the CSOs at all. It was also noted that a similar gap exists through the lack of representation of Sudanese professionals, who are not necessarily the voices of the civil society, the political system or the tribal administrations. Participants commented that more participatory processes facilitated by local experts are required, and that these could be one way through which the voices of Sudan's professionals could be brought to the table.

In their discussion, participants asserted that, as the rebel movements may not have an adequate understanding of the issues related to the conflict, there is a need to involve them in any workshops, consultation meetings and academic seminars pertaining to the conflict. They also noted that the ongoing changes in the Darfur region should be continuously incorporated into the peace process. Some participants further stressed the need to use environmental issues as a tool in peace building in Darfur. For instance, it was pointed out that organising workshops on pastoralism and adaptation across the Sahel might facilitate the peace process.

Various participants noted that the ongoing research and dialogue facilitated by UPEACE could be linked with institutions such as the Darfur Peace and Stability Fund and the Darfur Joint Assessment Mission, in order to encourage synergies. A similar exercise involving a larger number of stakeholders was also suggested.

As a concluding remark, the need for a follow-up to the conference, a wide distribution of the conference report and making the report accessible to a wider audience, were all highlighted. Participants especially emphasised the importance of a follow-up meeting in Darfur involving a broader number and range of participants, including UNEP, UNAMID Civil Affairs Section, UPEACE and the Darfur Universities. They also remarked that the mediation team should organise confidence building and knowledge sharing workshops. As a final point, it was suggested that another workshop should be organised on IDPs in Darfur, in collaboration with partners such as Tufts University, UNAMID and the IDPs themselves, to draw lessons from other experiences of displaced populations.

Closing Remarks

to the Conference on Environment and Conflict in Africa, with Special Emphasis on
Darfur, Addis Ababa 23 July 2009

Statement by Mr. Pekka Haavisto

Mr. Pekka Haavisto provided a general summary of the discussions and major points raised during the four-day conference. He stated that the issue of environmental factors as a source of conflict is no longer in question. Instead, the issues of environment and conflict should be discussed in parallel ways as both are relevant to one another. He further noted that deliberations about ecology, natural resources, and livelihoods are all complementary; hence, one issue alone should not be given special attention at the expense of others. He then reminded participants of the fact that the issue of environmental sustainability is often set aside, which he underlined to be a mistake, before stating that some of the tools used for environmental assessment would be useful in the ongoing peace process.

In addition, Mr. Haavisto mentioned that the creeping urbanisation (the impact of which has not been closely observed), as well as the changing social and physical infrastructure in Darfur, should be considered and integrated into the peace process. He further highlighted the issue of land rights of those who had lost their privileges over land use and ownership during the conflict, adding that it is important to discuss how to adapt to the changes brought about by the conflict and to protect the rights of the people who consequently lost their land and other properties.

Regarding the representation of specific groups of Darfurians, including women, IDPs, the youth and CSOs, Mr. Haavisto stated that the parties that are currently negotiating (the rebel movements and the Government of Sudan), do not represent the interests of all the people of Darfur. He then posed the question to participants to reflect on how to organise these groups so as to get a proper representation, without overshadowing the rebel movements or challenging the government.

Mr. Haavisto went on to discuss the importance of environmental rights. He emphasised the need to consider the local, national and international levels of environmental rights, stating that Darfurians have the right to all of these. In this regard, he commented on the interests and concerns of the Sudanese people on various issues including the environment, climate change, desertification, the issue of the River Nile, Southern Sudan's problems, oil issues and the numerous environmental debates that prevail in Sudan. He finally asserted that interest and concern are constructive tools that enhance the understanding of the Darfurians and other Sudanese people of environmental issues.

Statement by Ambassador Boubou Niang

Ambassador Niang noted that the role of mediators and the international community is to help the parties to come to an agreement. He argued that for peace to prevail in Sudan, all parties should be committed towards peace and have the good-will to resolve their differences in a peaceful way. He added that, although the international community is playing a significant role in the peace process, most of the responsibilities lie on the parties in the conflict itself.

Stressing that there is mistrust between the government and other parties, Ambassador Niang said that bringing experts to the negotiation table is as difficult as finding a common ground for negotiation. He further commented that whenever CSOs identify experts and organise a workshop in relation to the peace process, the government may label them as pro-movement, whereas the movements may consider them as pro-government. This shows that there is fear and mistrust on both sides.

Ambassador Niang pointed out that it is important to make use of best practices, lessons learnt from past experiences and workshops organised on related issues as a basis for future interventions. Illustrating this, he stressed that the experiences and lessons learnt from the Abuja and Kenyan peace processes are both relevant and important.

Focusing on the need for representation, Ambassador Niang stressed that the problem with the mediation process is that it is difficult to include all groups as negotiating partners. He explained that this was because—as a rule—peace can only be negotiated between those who carry arms. Bringing the minorities into the negotiation process may lead to losing both the government and the rebel movements. Therefore, a new mechanism should be sought through which the concern of all parties in the conflict, and other stakeholders, can be channelled towards the discussion table.

Ambassador Niang stated that it is important that any peace process takes into account the people at the grassroots level. He also underlined that the parties should be informed about the issues of local communities in order to feed them into the negotiation process.

Statement by Mr. Abdul Mohammed

Mr. Abdul Mohammed focused his remarks on the civil society organisations and their representation in the peace talks. He commended CSOs for having played a pivotal role in creating awareness and clarifying issues raised in the peace talks, which has, in turn, produced a visible improvement in articulating subsequent steps to be taken.

He further stated that there is a consensus regarding which outstanding issues pertaining to the Darfur conflict should be addressed. These issues include whether Darfur should politically be one region or not, the compensation for the damage inflicted during the conflict, the creation of a post of Vice-President reserved for Darfur and a return to the 1956 borders of Darfur.

Mr. Abdul indicated that the political infrastructure of the region is still lacking, despite the fact that the main issues in the mediation have matured. Reminding participants of the crucial decision for Sudan on whether it is going to be one or two states, he commended CPA for introducing a timeline for the national elections and for the referendum in the South. He cautioned, however, as to whether the existing political infrastructure would enable Sudan to have a smooth transition, questioning whether, given the timetable, it is feasible for the Darfur issue to be resolved before the April 2010 election and whether it might enter into an intractable conflict if not.

Statement by Dr. Jean Bosco Butera

In his closing remarks, Dr. Butera thanked participants of the workshop for their active participation, helpful discussions and continuous commitment. He extended his gratitude to the participants and all resource persons from various universities and peace centres for their contributions. Finally, he concluded by re-emphasising the importance of involving local communities, CSOs and women's groups in the peace process. To this end, Dr. Butera affirmed that UPEACE will continue its commitment to the ongoing efforts.

Some Conclusions on Environment, Conflict and Darfur

Marcel Leroy

The following conclusions are based on presentations and discussions during the conference held in Addis Ababa 20 to 23 July 2009, as well as on research conducted in-house at the University for Peace Africa Programme. This work forms part of the project on “Environmental and resource issues as factors in African conflicts”, which started in February 2009 and is funded through the Preventive Diplomacy Programme of the Belgian Ministry of Foreign Affairs.

1. Is Darfur an environmental conflict?

There has been a wide range of explanations regarding the conflict in Darfur. The absence of a common view on the nature and causes of the conflict has hampered international convergence about how to act on the Darfur crisis. This has delayed a coherent response and has contributed to the escalation of the conflict.

One way of grasping the complexity of the Darfur issue is to disaggregate the conflict into different levels: the perennial natural resource conflicts, linked with land and water resources; the dispute between the government and the rebel groups; and regional cross-border conflict involving neighbouring states, in particular Chad and Libya. Our focus has been primarily on the first of these.

Mischaracterisation of the causes and nature of the conflict in Darfur has contributed to oversimplified views, which allowed the conflict to be politicised in a way that has complicated the search for solutions. This has hampered progress toward defining a political settlement, and toward finding a formula for allowing the various population groups to pursue compatible and sustainable livelihoods.

Our research has focused on how climate change as well as environmental and resource factors contribute to African conflicts. However, in our own research, as well as in our dealings with Darfur-based academics and discussions with international scholars who have spent many years doing field work on the ground in western Sudan, there is a consensus that viewing the Darfur conflict as resulting only from climate change and environmental factors does not do justice to the complexity of the issue.

Identifying climate change as the main culprit, for example, would reduce conflict to a process over which the actors on the ground have little or no control. This would virtually absolve them of responsibility, as they would be seen as having little freedom to act. Putting all problems on nature belittles human ingenuity and ignores the role played by social factors and human relations.

In examining whether conflicts are linked with environmental degradation or not, it is therefore essential to look also at other variables including the political system and the

inclusiveness of the decision making processes. Moreover, environmental degradation may also be a deliberate weapon used by some warring groups—including governments—to aggravate the conflict by denying adversaries access to natural resources or even by destroying them.

In adverse conditions, a group's survival may depend on its ability to secure sufficient resources to meet basic needs. Political power is a tool to protect these needs and can be used to acquire resources, as well as to protect them. This is crucial in cases of resource scarcity. Having insufficient resources for collective survival often demonstrates a group's lack of political power.

A few key elements will need to be kept in mind for understanding the Darfur conflict, as well as for planning any development and reconstruction efforts:

- Just as environmental degradation does not dictate descent into war, improving environmental conditions will not suffice to solve Darfur's problems.
- The weakness of governance in Darfur, which has become more pronounced since 1970, has been a major factor in aggravating conflict. Traditional conflict resolution mechanisms have been undermined without effective new institutions being put in place. Weak local government has also been unable to regulate and mediate access to resources.
- Lack of development, coupled with the absence of natural resource management, is the main underlying cause of the crisis. Fostering common views for sustainable development in the region is essential, in addition to addressing administrative weaknesses.
- Sudanese governing elites have for decades promoted irrigation schemes located in Central Sudan as a way to boost food production and to supply commodities for export. Rainfed agriculture has been considered irrelevant by those who cultivate irrigated lands. Hence, the neglect of Western Sudan has been reinforced by the 'cotton ideology' adhered to by the elite at the helm of the GoS.

2. Environment and climate change

Darfur has experienced severe climate shifts over recent decades. Reduced rainfall has turned marginal grazing land into desert, placing significant stress on the livelihood systems of local groups and thereby increasing the risk of conflict. The droughts of 1974-75 and 1984-85 have represented a major factor in the present crisis by altering the diverse ecological features of the region.

It is, of course, important to differentiate between climate change—induced by global shifts which the Sudanese cannot influence—and environmental changes which result in part from climate change, but are also influenced by human actions. Both climate

issues and manmade degradation of the environment must be integrated when analysing the Darfur conflict.

Declining agricultural productivity in Darfur has resulted partly from climate change, aggravated by excessive livestock numbers, overgrazing, and deforestation. The impact of rainfall on agricultural productivity is influenced not just by the amount of precipitation, but also by for how many days and during which period of the year the rains occur. Accurate rainfall data are hard to compile in the tropics due to the wide variability of precipitation. This is obviously the case between Darfur's three climate zones—desert and semi-desert; arid and semi-arid; and monsoon—but local variations can also be substantial. Variations in rainfall amounts and distribution increase vulnerability to drought, even though rainfall has generally been high in recent years.

Furthermore, climate change is not only about rainfall. Wind, carbon dioxide, and temperature are also factors which should be given due attention in the analysis of how climatic factors contribute to the vulnerability of livelihoods and to conflict.

After the recovery of rainfall at the end of the 1980s, there is evidence of regeneration of vegetation, although not in all areas. Both ground observation and satellite evidence show a greening in the last two decades in Darfur, though there appears to have been a significant change in plant species composition.

The displacement of about one-third of the Darfur population has also had a severe impact on the environment. The following examples demonstrate that the environment is a victim of conflict, as well as being a contributing cause:

- In areas abandoned by IDPs there is a recovery in vegetation, due to reduced population pressure, although with changed species. The reverse is true near IDP camps.
- There is complete deforestation near IDP camps, mainly due to firewood collecting and brick making. Deforestation has also accelerated as a result of the displacement of traditional foresters, the growing demand for timber, and the loss of proper governance.
- The brick making has also accelerated soil erosion and furthermore led to the formation of stagnant pools that are breeding grounds for mosquitoes.
- The increased concentration of population in IDP camps and around the major cities also places further demands on groundwater resources, which are not being replenished rapidly enough due to geological conditions and insufficient rainfall.

Both pastoralists and farmers in Darfur have suffered as a result of government failure to ensure an adequate supply of water. Up to the 1970s, Western Sudan had a good share of Sudan's total number of water works, ponds and *hafirs* (excavated water

storage tanks). Since then, lack of maintenance and failure to provide additional water points has significantly reduced the capacity for watering livestock and for sustaining the human population.

The unprecedented increase in demand for natural resources, coupled with the loss of governance to manage its impact on the environment, has resulted in growing vulnerability to drought.

While climate change is undeniable, its impact throughout Africa has been uneven, with some regions receiving less rainfall while other regions receive more. Continuing shifts will occur, and the future might not develop along the lines that are currently being predicted. It remains important to carry out 'reality checks', reviewing adaptation strategies and plans on a regular basis.

Environmental changes strain the livelihood mechanisms of the various population groups in Darfur. Livelihood analysis can be used to identify linkages between the environment and conflicts.

3. Governance and politics

Failure of governance forms an important part of the Darfur conflict. There is an absence of strong institutions to manage natural resources and contain conflicts over access to resources, thus accelerating environmental degradation. Strong institutions and leadership can limit the consequences of conflict, drought and famine. Conversely, improved environmental conditions will not lead to greater stability unless governance improves.

Conflicting legal systems and institutions are another aspect of the failure of governance. Traditional bodies and systems were recognised both under British colonial rule and during some periods after independence. Until the 1980s, most resource conflicts were resolved through traditional mechanisms. However, institutions and laws issued under the colonial administration and successive Sudanese regimes have increasingly superseded native administrations and customary arrangements. The re-establishment of native institutions in the 1980s, without removing the structures which had been created after independence, has merely increased the level of confusion and unpredictability, in particular regarding land rights and property management.

Three overlapping legal systems have the effect of confusing land claims: *sharia*; customary law (often the basis for laws proclaimed by the Sultan of Darfur prior to 1916); and post-independence laws issued in Khartoum and El Fasher. Following the turmoil since 2003, groups which had been established for generations in one area may face conflicting claims for land use rights and entitlements by relative newcomers. The latter might invoke religion-based *sharia* rules or legislation emanating from national institutions.

Increased centralisation of decision-making has removed authority from local communities, making it more difficult to manage local resources in an equitable manner. For instance, the traditional communal system of range management among pastoral communities, regulated by local authorities, was seen as an effective way of dealing with overgrazing. State-controlled administrations now compete with traditional and tribal authorities. Moreover, the extensive humanitarian presence in Darfur in recent years has added yet another layer, with international involvement in distributing resources and benefits.

Water management is of crucial importance for Darfur. Availability of water affects the migration pattern of pastoralists. If the number of water points is reduced, different population groups and livestock concentrate around the remaining water sources, which potentially leads to localised environmental degradation and conflict. The water problem in Darfur has been exacerbated since the centralisation of the management of groundwater and other water sources by the Sudanese government. This has impeded interaction between water users and managers. The water sector is plagued with underinvestment and maintenance of dams is lacking, with many of them partially or completely silted. Whether the government supplies new water points or repairs existing ones, it will be necessary to balance statutory law with customary law in managing access to water. Water quality also requires attention; again, this is difficult to manage centrally.

Equally, with respect to land use and land management, reviving the capacities of traditional institutions may assist in restoring stability in Darfur, including through re-establishing the symbiotic relationships which have long existed between farmers and nomadic groups. These relationships have for centuries been governed by *hakura*, a traditional system that governs rights for access to land and bestows responsibilities for managing it, rather than granting exclusive use or ownership. If climate and environmental changes created bottlenecks that might impede a return to these traditional mechanisms, such as a shortage of water points in migration corridors historically used by pastoralists, they could be flagged as possible areas for intervention in the reconstruction phase.

Dryland management is another area which has been neglected in post-independence Sudan. Drylands have been administered by forestry departments, as there is no established institution in charge of managing them, nor are there sufficient experts in the area of dry land management.

4. Adaptation mechanisms to cope with climate and environmental change

The adaptive capacities of communities in the Sahel and in sub-Saharan Africa in response to changing ecological conditions have been quite impressive. Pastoralists have been able to survive by migrating over wide areas and by adapting livelihood strategies. However, state borders, population increase and global climate change are

posing new challenges to traditional adaptation mechanisms. It is important to understand the extent to which climate change and environmental factors can be absorbed, and under what circumstances they are likely to lead to strains which contribute to conflicts.

In Darfur there has been a long tradition of adaptation, and continuous changes have been observed in the pursuit of livelihoods, including through migration to Khartoum and to neighbouring countries, even for long periods. Although the current conflict seems to indicate that traditional adaptation mechanisms have failed, explanations need to be sought in a wide variety of factors besides decreased rainfall.

Uncoordinated adaptation strategies seem to have been applied in response to climate change, and some increased the propensity for conflict with other groups. As a result of overgrazing, low quality fodder including invasive species began to dominate, and this in turn led to intensification of the conflict as herders lacking sufficient grazing resources began to trespass onto the lands of neighbouring farmers. Amongst farmers, there has been a tendency to cultivate more land in order to maintain sufficient production, thus reducing the available stock of land for grazing.

Many of our interlocutors believe that pastoralists are more marginalised even than other Darfurians, be it by the government, international community or humanitarian assistance groups. Lack of information regarding pastoralists and mal-adaptation to climate change has led to further marginalisation.

Recognition of the pastoralists' contributions to the national economy would allow incentives for their productive contribution (one-fifth of Sudan's total export revenue is generated from livestock, mainly raised by pastoralists), as well as greater legal acknowledgement of their plight. Some participants at the July conference felt that, since the government of Sudan is not willing to integrate policies pertinent to Darfur into its macro level approach, more autonomy for Darfur and a development effort guided by rules agreed upon within the region, offer the best prospect for sustainable development in the region. In the reconstruction phase, the interests of pastoralists—including land use rights—should not be neglected.

5. Ethnicity and social change

The displacement of two and a half million Darfurians, and the resulting dramatic increase in the number of people living in urban environments and in quasi-urban camps, has brought about a dramatic shift in Darfur's social picture. Agricultural output has decreased sharply, and locally produced staple foods have been largely replaced by food aid.

It will not be easy to turn around the decline of agriculture. Children growing up in IDP camps do not acquire the skills needed to contribute to the livelihood of their

families—as they would have been expected to do in the rural areas, at least by age twelve.

A further effect of displacement has been that the youth have de-linked themselves—both from traditional governance that existed in their native areas and from the formal centres of government—as their needs are not being met. They have become agents of conflict as they can be easily mobilised by any group, a development assisted by the increased movement of arms in the region. Issues surrounding youth should be given particular emphasis during the formulation and implementation of the post-conflict resolution strategies. This should include providing education, which will give young Darfurians new employment options.

Attention should also be paid to the gender aspects of African conflicts. Our analysis of various conflicts indicates that females and males tend to be affected in different ways. The role of women remains more clearly defined (i.e. caring for children, cooking, fetching water and firewood, cultivating some crops if land is available, etc.), even though these tasks become more arduous under conditions of conflict and environmental stress. However, the roles performed by men are often more profoundly affected by conflict, in particular among pastoralists whose herds are decimated, with the result that men are easily drawn toward armed movements, in a quest to affirm their identity and their significance for the community. A preliminary conclusion of this analysis is that a redefinition of gender roles, identifying new socially useful roles for men, may decrease the potential for violence and allow a more balanced distribution of tasks between genders in uprooted and conflict-ridden communities.

As regards ethnicity, there was broad agreement that it cannot be considered as the major factor in the crisis. Bad governance is at least in part at the basis of ethnic strife. Worse, the GoS was believed to have mobilised certain groups in Darfur seen as 'Arabs' to fight against others seen as 'Africans', in order to weaken the rebel movements that were drawing support in farming areas.

Darfur has traditionally been a multi-ethnic society in which multiple identities were common because of intermarriage and co-existence of various groups. Even the *dars* (tribal homelands) were not mono-ethnic. However, government has at times instigated conflict, also amongst Arab groups, and sought to strengthen loyalties by giving specific rights to manage or secure access to resources—such as water—to certain tribes. This has brought about new tribal conflicts and misuse of resources.

6. Reconstruction and development

Since lack of development has been a major factor in the Darfur conflict, it is obvious that development efforts must lead the way toward resolving the crisis. A political settlement and improvements in the security situation would obviously facilitate development of the region. Even in the absence of a settlement, however, a review of

some points concerning reconstruction and development raised in the course of our work may be helpful, perhaps also in the context of further humanitarian interventions.

Bad governance, in particular the failure to regulate and mediate access to resources, has aggravated the Darfur conflict. Humanitarian and recovery programmes that build the capacity for restoring governance at local and state levels should therefore be given priority. Efforts to develop solid economic rules and institutions should be integrated in economic development programmes for the region. Improving governance in the environmental sphere is crucial for long-term stability. Peace-building processes need to be steered locally, for it is at the local level that resource constraints need to be addressed and that bridges can be built toward allowing sustainable livelihoods for all.

Reforestation is an obvious focus for reconstruction efforts. Deforestation has been very severe in recent years, partly as a result of increased demand for timber and charcoal in IDP camps and urban settlements. The complete removal of forests seems to have been organised for profit and perhaps with the intention of destroying traditional settlements and livelihoods. However, reforestation may face legal hurdles, as planting trees is seen as an intention to take possession of the land. This is a further reason for resolving legal confusion over land use rights.

Any development efforts will also need to take into account that Darfur's economy has been transformed, becoming more urban, with a growing service sector. The value of urban property has risen rapidly. In the countryside, land use rights are unclear because of displacement, immigration of new population groups, and competing legal systems. A clear system of property registration, offering predictability for investment and for improvements to buildings, is needed by urban populations. For agricultural and grazing land, recognition of traditional rights will need to be coupled with an effective mechanism for settling disputes.

In rural Darfur, it is essential to restore traditional mechanisms governing the symbiotic relationships which have long existed between farmers and nomadic groups, including regarding access to land. Since climate, population growth and environmental changes have created bottlenecks that might impede a return to these traditional mechanisms, such obstacles should be identified as areas for early intervention in the reconstruction phase. Rural development will furthermore require trained experts in agriculture, forestry, water management and in dry land management.

Although it is not clear which proportion of IDPs would choose to return to their villages after political and security conditions allow, it is generally believed that a majority would do so. IDPs also feel that they are entitled to compensation for the losses and suffering they have endured. Provision of services—possibly in the form of mobile services for pastoralists or isolated villages—including education, is a key element to induce IDPs to return.

Reconstruction efforts will also need to be cognisant of gender issues. Many pastoralist societies have been uprooted and their livelihood system needs to be severely adjusted in order to adapt to changed environmental and social conditions. Opportunities and training will need to be provided, for men and for women, which are culturally acceptable as substitutes for occupational patterns that had to be abandoned. Women are often seen as more willing to accept social changes. A redefinition of gender roles, identifying new socially useful roles for men, may decrease the potential for violence and allow a more balanced distribution of tasks between genders in uprooted and conflict-ridden communities.

7. The peace process

Any further efforts in the Darfur peace process should involve broader participation of civil society and of the various groups that have been competing for dwindling resources. Attention should be paid to the need for sustaining the livelihoods of all Darfurians, including pastoralists and marginalised groups. However, a way should be found to address more interests without encumbering the peace process. This could be done by involving them in preparatory workshops, seminars and consultations. A political settlement would have to flow from direct negotiations between the government and the armed rebel movements, and this process might be impeded if there are too many voices around the table.

Many participants agreed that rebel groups did not have a full grasp of environmental changes, nor of the environmental impact of the conflict. Organising workshops on environmental issues could therefore have a confidence building effect, while also allowing a broader consensus to emerge on issues affecting resource use and livelihoods. The ill-fated Darfur Peace Agreement (DPA), negotiated in Abuja, did not include detailed provisions on these issues. It was assumed that, following a general agreement covering political and security matters, the Darfur-Darfur Dialogue and Consultation (DDDC) would conduct hearings at which resource questions would be addressed. However, the political and security situation since the conclusion of the Abuja talks in May 2006 has not permitted official DDC meetings to go forward inside Darfur.

The failure of the DPA does, however, allow a new opportunity, by turning its logic around. The DPA approach had been to look at political issues first, and follow later with discussions on resources and livelihood questions. However, by settling matters related to resource use and livelihoods at the local level—where the need for rational resource management is most obvious—it may be possible to lay the basis for a broader political settlement.

Representatives of UNAMID, the AU, and the AU-UN Joint Mediation Support Team for Darfur agreed with the academic participants at the conference that there was a need for consultations—in neutral locations as well as on the ground in Darfur—to discuss environmental and resource issues. These talks should also include exchanges

of views on strategies to adapt livelihoods to changing conditions, in particular with respect to pastoralism. It was suggested that the University for Peace, as well as the Peace Centres at each of the three Darfur universities, could play a role in this respect. Disseminating the results of the Conference held in Addis in July could be a starting point. This would also permit Conference findings to be integrated in the peace process.

Issues of concern to local communities should be addressed at roundtables and fed into the negotiation process. This process should include representatives from traditional leadership, IDPs, women, rebels, CSOs, government and humanitarian leaders in IDP camps. Peace initiatives should also be cognisant of the ongoing social transformation of Darfur.

The issue of *hakura* has been reviewed in different contexts. It is widely recognised that this matter should be included in any further peace negotiations. Expertise on the concept and on the way it has been applied should be available at future talks, and efforts should be made to reconcile the traditional system of land rights which *hakura* represents with more recent legislation, so as to arrive at an integrated system of settling land-related disputes. The Land Commission provided for in the DPA should play a significant role in this regard. The issue of pastoralism is closely related to the land question and should be part of the peace process.

Climate issues and manmade degradation of the environment must also be integrated into attempts to find durable solutions for the conflict.

Besides a political settlement for the Darfur conflict, it will be necessary to investigate competing land claims, as well as to look into complaints by individuals and population groups that have suffered losses during the conflict since 2003. For this purpose, a body with wide representation—akin to a ‘Truth and Reconciliation Commission’—will need to establish responsibilities and entitlements.

Given the extent to which young people have been affected by upheavals in the region, issues surrounding the youth should be given particular emphasis during the formulation and implementation of development and peace-building strategies.

Short Biographies of Participants

at the Conference on Environment and Conflict in Africa with Special Emphasis on Darfur Addis Ababa 20-23 July 2009

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Dr Musa Adam is an associate professor in the Department of Social Anthropology at the University of Khartoum. His research focuses on ethnicity and conflicts over natural resources, particularly over land. His most recent publication is the co-edited volume "Development is a key for peace and development in Darfur". He holds his PhD from the University of Edinburgh, UK.

2. Abdul Mohammed (mohammed40@un.org)

Mr Abdul is currently both Director of the Darfur-Darfur Dialogue and Consultation and acting head of Political Affairs for UNAMID, the hybrid African Union-UN operation in Darfur. He was a member of the AU Mediation Team at the Abuja Peace Talks on Darfur, and has previously worked with UNICEF. He is also Chairman of the InterAfrica Group, a regional centre for the Horn of Africa.

3. Ahmed, Abdel Ghaffar M. (abdelghaffarahmed@yahoo.com)

Dr Abdel Ghaffar is a former Dean of the University of Juba, former Director of the Economic and Social Research Council in Sudan, former Director of the Development Studies and Research Centre and former Executive Secretary of OSSREA (1992-2002). Currently, he is Chairperson of the Executive Committee of the Greater Horn Horizon Forum, and a professor of Social Anthropology and Development at the Universities of Khartoum and Juba. His main interest area is pastoralism and development in the Horn of Africa, with special reference to the conflict between farmers and pastoralists. He took his PhD from the University of Bergen, Norway.

4. Akumu, Marianne (MAkumu@uneca.org)

Ms Akumu completed her law degree in 2005. Following this, she interned with the African Union Commission, more specifically the Darfur Desk which is under the Peace and Security Department. She is currently with the United Nations Environment Programme in Addis Ababa, Ethiopia.

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Dr Mustafa has worked with the Development Studies and Research Institute of the University of Khartoum since 1988. He holds a PhD in Sociology and Social Anthropology from the University of Hull, UK. He has also been an OSSREA visiting

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8. Bereket Tarekegn (btarekegn@alumni.upeace.org or shalombek@yahoo.com)

Bereket has conducted research work on pastoral areas, including traditional conflict management and resolution. He has also been a program, monitoring and evaluation specialist for various local NGOs dealing with social issues. Currently, he is working as research assistant in the project on the role of environment and resources in African conflicts at the University for Peace, Africa Programme. His research interests include environmental governance in pastoral areas, adaptation in pastoral socio-economic systems and inter-faith peace building through development. He completed his MA in Environmental Security and Peace at the University for Peace, San Jose, Costa Rica in 2008.

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Mr Bromwich is Programme Coordinator for UNEP and has been working in/on Darfur since 2004. He initially worked on the implementation of a water and sanitation programme in West Darfur, before moving to research and advocacy on environment and water resources. In 2007, he joined UNEP to establish their Darfur programme. Prior to working in Sudan he was an environmental engineering consultant on water and environmental programmes in Europe, Asia and the Middle East.

10. Butera, Jean-Bosco (jbbutera@upeace.org)

Dr Butera is currently Director of the Africa Programme of the University for Peace (UPEACE). Before joining UPEACE, he was Vice-President for Academic Affairs at the National University of Rwanda, with the responsibility of rebuilding the teaching and research capacity of the University after the 1994 Genocide. During this period he co-founded and was National Director of the Centre for Conflict Management, 1999 to

2002. He was a patron of a youth association working towards human rights and development (AJPRODHO) and is a patron of the local chapter of Never Again International, a collaborative network which aims to prevent violent conflict and remedy its effects. He has published work on conflict issues in Africa, Education for Peace, Governance and Development and Capacity building. He holds a PhD in Parasitology from the University of Ghent, Belgium in 1991.

11. Castro, A. Peter (ahcastro@maxwell.syr.edu)

Dr Castro is an applied cultural anthropologist with research interests in natural resource conflicts, land issues, agriculture and participatory development. Most of his fieldwork experience is in East Africa. He has worked with FAO on natural resource conflict management, including developing training materials and editing case studies. His books include *Negotiation and Mediation Techniques for Natural Resource Management: Case Studies and Lessons Learned* (Co-edited) and *Natural Resource Conflict Management Case Studies: An Analysis of Power, Participation and Protected Areas* (co-edited), among other publications. His PhD is from the University of California-Santa Barbara, USA, 1988.

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Mr Colman is an official at the unit which handles Preventive Diplomacy and Peace Building at the Belgian Ministry of Foreign Affairs and International Development in Brussels.

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Dr Balgis is a senior researcher at the Higher Council for Environment and Natural Resources (HCENR) in the Sudan. She has worked extensively on forest planning and management, rural development, social forestry, and climate change issues with special focus on vulnerability and adaptation assessment related to African countries. She has served as a leading member in the area of conservation and sustainable development at the Inter-governmental Panel on Climate Change (IPCC). She holds a PhD from the University of Khartoum in Forestry Science.

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Dr El Moghraby has over 40 years of experience as an environmental specialist in water and natural resources management. He is currently professor of Ecology at the University of Khartoum, Sudan. He has been an independent environmental and water consultant and policy advisor to various government bodies, UN agencies and NGOs. He has chaired the Water Resources Desk at the Sudanese Environment Conservation Society since 1985. He has a PhD in Zoology from the University of Khartoum. He has written widely on fisheries, the ecology of the Nile, and the state of the environment in the Sudan.

15. Elias Cheboud (EChéboud@upeace.org, elias@uvic.ca)

Dr Elias is programme coordinator at the UPEACE Africa Programme. He holds a PhD from the University of Victoria, Canada. Before joining UPEACE, he was the academic coordinator and a professor at the Institute for Peace and Security at Addis Ababa University, Ethiopia. He was previously adjunct associate professor at the University of Victoria and associate professor at Dalhousie University, Canada and Zayed University, UAE. He has also worked in community and social services, environmental and research activities, primarily in British Columbia, Canada.

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Dr Eltigani is a senior regional advisor to NEPAD at the United Nations Economic Commission for Africa, Addis Ababa. Previously, he was a senior lecturer at the University of Khartoum and part-time senior lecturer at the American University, Cairo. He was also Minister of Finance and Economic Planning for Darfur State, as well as the Governor of Darfur State in Western Sudan. He served as chairman of the Westminster Refugee Consortium and was a researcher in the World Bank in Washington D.C. His publications deal with the conflict in Darfur, with economic development in Darfur, and with the marginalisation of its communities. He holds a PhD from the London Business School.

17. El Zain, Mahmoud (mhamid@upeace.org)

Dr Mahmoud works as an assistant professor in the Department of Environment, Peace and Security at the main campus of University for Peace in Costa Rica. He has a PhD from the Institute of Social Studies in The Hague, the Netherlands. His PhD research focused on environmental scarcity and hydro politics in the Nile Basin, and explored the impact of mass population displacement and settlement along the River Nile and its tributaries on domestic and foreign policy of riparian states. His research interests include issues of hydro-politics, environment and sustainable development.

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Professor Abduljabbar is a senior lecturer in Natural Resource Management and Food Security in the Faculty of Environmental Sciences and Natural Resources at Al Fashir University, Sudan. He was the Director General of Natural Resource Planning at the Darfur Regional Ministry of Agriculture, and he founded the Centre for Peace and Development Studies at Al Fashir University. He holds a Masters degree in Rural Development and Food Security from the University of East Anglia, UK.

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Fana is currently a research assistant at the UPEACE Africa Programme, working on the role of climate change and other physical factors in African conflicts. Previously,

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20. Haavisto, Pekka (haavisto@fin.la)

Mr Haavisto is currently a member of the Finnish Parliament, where he serves as a member of the Committee for Foreign Affairs and the Committee for Defence, and as a deputy member of the Grand Committee (EU Affairs). He was appointed as a Finnish Special Envoy for the Horn of Africa, with emphasis on the conflicts in Somalia and Sudan. He was the first EU Special Representative for Sudan (2005-2007). He also worked as a UN Senior Advisor for the Darfur Peace Process in the summer of 2007. He is a former Finnish Minister for Environment and Development Cooperation, and worked for UNEP from 1999-2005.

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Ambassador Haggag is Secretary General of the Africa Society in Cairo, a member of the Egyptian National Council on Human Rights and National Coordinator for the Human Rights Capacity Building Project. He is a former Egyptian diplomat. He was Assistant Secretary General of the Organisation of African Unity in the 1980's and 90's. He is member of various institutions working on African affairs and has written extensively on Africa, the Middle East and Human Rights.

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Mr. Hikmat is Project Director for the International Crisis Group (ICG) in the Horn of Africa. He oversees the activities of the organisation in Sudan, Somalia, Ethiopia, Eritrea, Chad and Kenya. He researches and reports on conflict prevention and resolution issues in the region, as well as making recommendations to national and foreign governments, international multinational institutions, NGOs, warring parties, and the media. His areas of expertise include socio-political analysis in conflict zones and development of humanitarian, early recovery and post conflict strategies. He has previously worked as a humanitarian operations advisor, has been engaged in management of humanitarian and post conflict programming, and has also been a mechanical engineer, designing rural water systems for drinking water and irrigation.

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Mr. Hussein worked with UNDP in Darfur for 18 years and is currently at UNEP as a national consultant. He obtained a BSc in Economics and post graduate diploma in Rural Development from the University of Khartoum. He was born and received his early education in Darfur.

24. Karbo, Tony (tkarbo@upeace.org)

Dr Karbo is a programme officer for the UPEACE Africa Programme. He was previously a senior lecturer in the Institute of Peace, Leadership and Governance (IPLG) at the Africa University of Zimbabwe. At IPLG, he coordinated the Peace and Conflict Unit and the institute's training programmes, including the Northern Uganda Internship Programme. He is an associate director and trainer for the South-North Center for Peace building and Development. Dr Karbo has also served as the southern Africa representative for the Institute of Multi-Track Diplomacy (IMTD), a Washington, D.C.-based peace-building and conflict transformation organisation that utilises the systems approach to peace building. He holds a doctorate in conflict analysis and resolution from the Institute for Conflict Analysis and Resolution, George Mason University, Virginia, USA.

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Dr Leroy joined UPEACE as senior researcher in 2008, working in particular on the significance of environmental factors and climate change for African conflicts. He studied international relations at the University of Brussels and at Johns Hopkins University, where he completed his PhD in 1974. He taught at universities in Canada and Belgium, attaining the rank of full professor in 1984. His research in the 1970s and 80s centred on the relevance of population and environmental factors in international affairs and on development issues. From 1991 onwards he carried out international assignments in Brussels, Ethiopia, Djibouti and Moldova. He was Political Advisor to the European Union Special Representative for Sudan from 2005 to 2008.

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Dr Manger is Professor of Social Anthropology at the University of Bergen, Norway, where he completed his PhD in 1991. His research is mainly in ecological and development anthropology, and has also dealt with agro-pastoral adaptations and socio-cultural processes of Arabisation and Islamisation. His early research was conducted in Sudan and included studies on household adaptations in oasis environments, mountain environments and savannah plains.

27. Markakis, John (johnmarkakis@hotmail.com)

Professor Markakis is a social scientist with a long-time professional interest in political developments in the Horn of Africa. He has carried out extensive research, the results of which are published in several books and many articles. Among the former are *National and Class Struggles in the Horn of Africa* (1987), *Resource Conflict in the Horn of Africa* (1998) and *Pastoralism on the Margin* (2004). He is editor and contributor to *Conflict and the Decline of Pastoralism in the Horn of Africa* (1993), *Ethnicity and Conflict in the Horn of Africa* (1994) and *Ethnicity and the State in Eastern Africa* (1998).

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Ms Mbugua is currently working for the AU-UN Hybrid Peacekeeping Mission in Darfur (UNAMID) as the Director of the Civil Affairs Division, concerned with restoring local governance and promoting conflict resolution at the local level. Prior to this, she worked at the UN in New York as a Principal Social Affairs Officer in the Department of Social and Economic Affairs (DESA) and focused on policy issues. Ms. Mbugua has over fifteen years experience with the UN in Africa, where she has undertaken more than fifty technical missions in more than 35 African countries on population, gender, policy analysis and capacity development issues. She is Kenyan by nationality and holds a BA (Cum Laude) in Sociology from Princeton University and a Masters in Demography from the University of Pennsylvania.

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Dr Mkandla is the UNEP Representative of the AU, UNECA and Ethiopia. Prior to this posting, he worked at UNEP's Nairobi headquarters as a Consultant in the Office of the Executive Director (OED) and with the Division of Communications and Public Information. Subsequently, he was Coordinator for Outreach at UNEP, and then head of Technical Cooperation in the Capacity Building Branch. Prior to joining UNEP, he was the head of Information and Documentation at the UN Institute for Namibia (UNIN), which was wound up after Namibian independence. He obtained his Doctorate in International Relations from the University of Kent at Canterbury, UK.

30. Nakaha, Stanislas (nakahastany@yahoo.com, bigoro21@yahoo.fr)

Ambassador Nakaha is Acting Head of the Darfur Desk at the AU Commission. He was a Senior Political Officer for the Darfur Desk and for the AU-UN Joint Mediation Team (Darfur) at AUC before he took his current position. He worked in various functions with the Ministry of Foreign Affairs in Burundi, including as an Advisor in the Directorate General for Regional Cooperation. He was Burundi's Ambassador to Kenya as well as Permanent Representative to UNEP and HABITAT. In the Burundian Ministry of Foreign Affairs, he was Director of the Europe and North America Department, and Principal Private Secretary to the Minister. Previously, he was Consul General of Burundi in Kigoma and First Counsellor for the Embassy of Burundi to Tanzania. He also worked as a Director in the office of the President. He holds a Master's degree in Economic Planning, from the Developing Countries College, University of Antwerp, Belgium.

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Ambassador Niang is currently a Special Political Advisor to the AU/UN Joint Chief Mediator for Darfur with the African Union and United Nations Joint Mediation Support Team (JMST). He was a member of the AU Mediation Team at the Abuja Peace Talks on Darfur, and held other posts on behalf of Senegal and the African Union.

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Dr Raleigh is currently a lecturer at Trinity College Dublin's Department of Political Science and a Senior External Researcher at the International Peace Research Institute. She has written widely and presented on issues of governance, armed conflict, migration, and ethnic politics amongst others. Her research interests include African civil conflict patterns, politics of the developing world, political geography, social consequences of climate change and GIS. Her PhD is from the University of Colorado in Geography.

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Mr Yassir was the Director of the Centre for Peace and Development Studies at the University of Zalingei. He is currently pursuing his MA in Gender and Peace-building at UPEACE, Costa Rica and has written various papers in the areas of conflict resolution, peace building, livelihoods, gender and development, amongst others.

35. Schimmer, Russell (rschimme@earthlink.net or russell.schimmer@aya.yale.edu)

Mr Schimmer is a dual-degree, J.D.-PhD candidate at the University of Connecticut. He pursues his PhD research at the Center for Land Use Education and Research. After graduating from Yale College in 2005, Russell has worked with the Yale Genocide Studies Program under the direction of Professor Ben Kiernan. The purpose of this research has been to document evidence that resulted directly from genocide activities using space-borne remote sensing imagery. Currently, Russell's methods include multi-temporal space-borne remote sensing monitoring of environmental change caused by anthropogenic activities related to land use and conflict.

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Glossary

<i>abbala</i>	Nomadic camel rearing pastoral groups who inhabit the north of Darfur
<i>arit</i>	Isolated homestead
<i>aseeda</i>	Porridge
<i>baggara</i>	Nomadic cattle rearing pastoralists in the center and south of Darfur
<i>bahr</i>	River
<i>bir</i>	Well
<i>birka</i>	Traditional water reservoir, pool
<i>buta</i>	Pool
<i>Daadingawi</i>	A title given for chiefs in Al-Fashir since the Sultanates period
<i>dahal</i>	Collection of pools
<i>dalo</i>	Goat skin
<i>dar</i>	Home land, country
<i>defah shabeh</i>	Civilian army made of young recruits
<i>Dilmanqawi</i>	A title given for chiefs in Zalingei since the Sultanates period
<i>Dimlij</i>	Local Chief
<i>eling wakil</i>	Village head in Fur
<i>feddan</i>	An area equal to 4,200 square meters
<i>Firsha</i>	Title given to local chief administrators
<i>Fugara</i>	Holy men, religious families
<i>fula</i>	Water hole
<i>gineina</i>	Fallow land
<i>goz</i>	Sand sheet soil
<i>gulta</i>	water gathering on rocky surface
<i>hafir</i>	Man made water hole, depression
<i>hakuma</i>	Government
<i>hakura</i>	Traditional land use and management system, territory with boundary
<i>hawakir (plural of hakura)</i>	Land administration rights given by the Sultans to selected groups of people
<i>hawz</i>	Land
<i>idara ahliyya</i>	Local administration
<i>idd</i>	A water yard or cluster of shallow wells
<i>ihya al-mawat</i>	'Making the dead alive'
<i>jah</i>	Land ownership rights
<i>Janjaweid</i>	Armed militia group in Darfur
<i>Jubraka</i>	A backyard farm for growing fast maturing crops and vegetables
<i>kao</i>	A series of woods bound together forming a surface or level
<i>karas</i>	Ropes made of plant roots
<i>kharub</i>	Virgin land
<i>khore</i>	Seasonal stream of water
<i>mahliya</i>	Local or lower level of administration
<i>Malakiya</i>	Settlements in rural areas
<i>makhammas</i>	Unit of land measurement
<i>makharif</i>	Wet season grazing area
<i>Malik</i>	Title given to head of Arab sedentary tribes during the Sultanate period
<i>manzala</i>	A settlement for the nomadic people for a very short period
<i>Maqdam</i>	A title given for chiefs in Nyala since the Sultanates period
<i>marahal</i>	Animal migration routes (big track) nomads use during their movement

<i>masarat</i>	Livestock migration route, a very small and narrow track used by cattle
<i>masarif</i>	A place where nomads stay during the rainy seasons
<i>masdar</i>	Wet season grazing area
<i>matmura</i>	A a pit in the ground lined with chaff
<i>mayaa</i>	Shallow lagoon which stays only for few days
<i>milk</i>	Land ownership
<i>murhal</i>	A passage or a corridor between farms
<i>nafir</i>	Traditional mobilization of a local social labor group
<i>nazir</i>	Head of Arab tribe. land tenure administrator
<i>Nazir Umum</i>	lands entitlements
<i>nazirate</i>	Supreme leader of tribal land or administrative unit
<i>omodiya</i>	Chieftainship
<i>qantar</i>	A unit of measurement of weight which equals 50 kg or 1/20 of a ton
<i>qulut</i>	Water holes in rocks
<i>Radif</i>	See Malakiya
<i>Ragaba</i>	Stream filled from a river and running inland
<i>Rahad</i>	Shallow Lake
<i>Rajils</i>	Unit of length measurement equal to 60 to 70 meters
<i>Rigl</i>	Small stream
<i>saraf</i>	Running stream
<i>sha'aab</i>	Pillars
<i>shaqq</i>	Large hole in cotton soil holding water
<i>shartayas</i>	District chiefdoms, chief of nomadic tribes
<i>shayk al rijal</i>	Chief of People
<i>shayk al urban</i>	Head of Arab tribe during the Sultanates period
<i>sherati</i>	The head of a geographically defined territory
<i>shyl</i>	Credit system for those who don't have collateral
<i>Siniah</i>	A place where nomads stay for social events and relate with the farmers
<i>sweeba</i>	A container, made of unburned mud, mixed with straw and cow dung
<i>trus</i>	Water-harvesting technique
<i>tumud</i>	Water hole
<i>Umda</i>	Chief of a group of villages
<i>Umm Kwakiyya</i>	The killing period (1874-1898)
<i>ushur</i>	Tax levied such as on a harvest
<i>wadi</i>	Riverbed containing water after heavy rain or intermittent stream, endowed with alluvium
<i>wathiga</i>	Traditional Land use and ownership system in Funji
<i>Wilaya</i>	The division of Darfur into three states
<i>zakat</i>	Alms, donation
<i>Zayadilyya</i>	Relates to or of Arab descent

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This volume on Environment and Conflict in Africa examines climate and ecological changes, and how these relate to conflicts on the continent. Particular attention is paid to environmental, social and livelihood aspects of the crisis in Darfur.

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