PASTORAL PRODUCTION SYSTEMS IN SOUTH KORDOFAN

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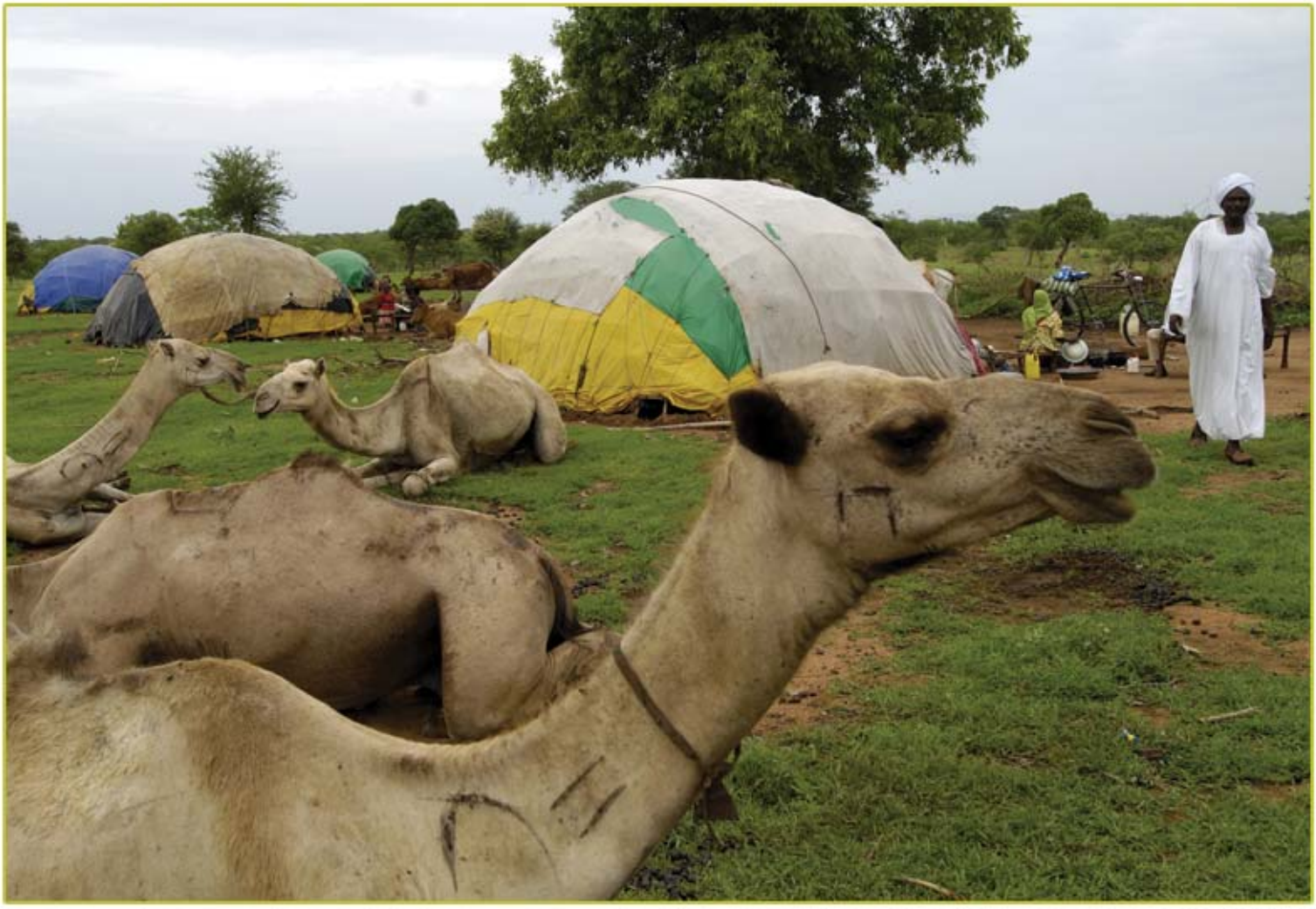

PASTORAL PRODUCTION SYSTEMS IN SOUTH KORDOFAN

(STUDY 2)

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The Core Team of researchers for this report comprised of:

1. Professor Mahdi Bashir, Environmental Expert, Team leader and Principal Investigator.
2. Dr. Ali Adam El Tahir, Livestock Researcher, Team Member.

Preface

Competition over natural resources, especially land, has become an issue of major concern and cause of conflict among the pastoral and farming populations of the Sahel and the Horn of Africa. Sudan, where pastoralists still constitute more than 20 percent of the population, is no exception.

Raids and skirmishes among pastoral communities in rural Sudan have escalated over the recent years. They have degenerated into a full-blown war in Darfur that might have been contained if the root-causes of the conflict rather than its symptoms were understood and addressed in a timely manner. Understanding the changes pastoralism in Sudan has been undergoing over the past two decades and the traditional modus operandi of conflict resolution and reconciliation among the pastoral communities is the starting point of any conflict resolution effort.

In fact, pastoralism in Sudan is a traditional way of life. It is a product of climatic and environmental factors that has become a form of natural resource use and management. Pastoralism comprises a variety of movements ranging from pure nomadism characterized by year-around camel breeding and long-distance migration, to seasonal movements over shorter distances in combination with some form of agricultural activities.

Historically, there has long been tension along pastoral corridors over land and grazing rights between nomads and farmers. But recently, some parts of the country have been caught in a complex tangle of severe droughts and dwindling resources. Disputes flare up between farmers and pastoralists as a result of migrating camel and livestock herders in search of water and pasture for their animals during the dry season who would sometimes graze on farmers' lands and use their water points. Tribal leaders sometimes settled disputes over lost crops, land, and access to water and pastoralists' routes. Combined with weakened local governance and the lack of institutionalized mechanisms for land and water rights and usage, all these factors have been leading to widespread seasonal tensions between pastoralists and farmers on one hand and between traditional farmers and owners of big mechanized farms on the other.

To help address the root-causes of these tensions the Embassy of the Kingdom of the Netherlands, the Canadian International Development Agency (CIDA) and the United Nations Development Programme launched in 2004 ***the Reduction of Resource Based Conflicts Project*** with the support of the Government of Norway in the preparatory phase (2002-2003). Targeting the drought-prone areas the four-year initiative used to be carried out in North Darfur. But the conflict between farmers and nomads that had started over natural resources escalated into a full-scale war forcing the Project to suspend its activities in Darfur. It has since focused on three states: North and South Kordofan, Upper Nile and Sobat Basin.

The Project operates at the national, local and community level. In addition to supporting the local authorities in establishing institutionalized systems for improved natural resource management, and empowering pastoralists, the project has been promoting legal and policy reforms for land access and usage with the participation of all stakeholders.

Under this project, UNDP and development partners commissioned experts to research case studies covering the identified areas of conflict in rural Sudan. In this context, access to land, water and other productive resources have been identified as major factors in

aggravating conflicts and in marginalizing many rural populations. The research undertaken under the project's guidance led to the following series of publications:

1. ***Nomads' Settlement in Sudan: Experiences, Lessons and Future Action.***
2. ***Pastoral Production Systems in South Kordofan***.
3. ***Share the Land or Part the Nation: The Pastoral Land Tenure System in Sudan.***

We hope that these publications will shed some new light on the sources of conflicts in rural Sudan, and help policy makers and development partners to identify priority areas for policy interventions and development planning.

As the UN's global development network, UNDP will continue to connect partners to knowledge, experience and resources to help communities prevent more conflicts and build a more peaceful coexistence.

Mr. Jerzy Skuratowicz

Country Director
UNDP Sudan

Acknowledgments

Through the Reduction of Resource Based Conflict Project, UNDP Sudan and partners commissioned this publication to enhance and deepen knowledge on pastoral issues and challenges, and build a literature base for developing strategies that address pastoralists' policy issues in the Sudan. It was undertaken with the support and encouragement of UNDP Country Director Mr. Jerzy Skuratowicz and UNDP Deputy Country Director Mr. Auke Lootsma.

All discussions held with Sudanese partners in government institutions and other stakeholders in the process of formulating this publication were led by UNDP's Team including; Mr. Omer Egemi Former Team Leader, Conflict, Environment and Resource Management Unit, Mr. Mohyel Deen El Tohami Project Manager of the Reduction of Resource Based Conflict project, Ms. Dalia M. Ibrahim Project Associate.

We are grateful to the Canadian International Development Agency (CIDA) and the Netherlands Embassy for funding and supporting this publication.

We also extend our gratitude to Sudan's Ministry of International Cooperation, Agriculture and Forests and the Ministry of Animal Resources and Fisheries, The Governor (Wali) of South Kordofan State and his cabinet included state technical services divisions (agriculture, veterinary, range, forestry and extension, the localities commissioners) as well as the Sudanese Environmental Conservation Society, Pastoralism Society and Civic Unions (Pastoralists and Farmers Unions at all levels).

Thanks also go to the civic unions (Pastoralists and Farmers Unions in South Kordofan), the tribal leaders or A*mirs*, UN agencies, IFAD (SKRDP), NGOs including the International Rescue Committee (IRC) and Nuba Mountains International Association for Development (NMIAD), El Furgan Association and Mandy Association for Rehabilitation and Development

This report is a product of collective efforts led by Professor Mahdi Bashir and Dr. Ali Adam El Tahir.

Finally, it is with great sadness that we report the loss of Professor, Mahdi Bashir, the research team leader, who contributed significantly to all the discussions and meetings, held during the preparation of the study.

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EXECUTIVE SUMMARY

This report describes the results of a rapid field assessment of the pastoral environment of South Kordofan, Sudan. The purpose of the assessment is to enable the UNDP Reduction of Resource-Based Conflict Project to formulate programming initiatives in the area. Since January 2002, interest in South Kordofan has risen with the Ceasefire Agreement in the Nuba Mountains and the end of conflict. South Kordofan is significant for Sudan's overall wealth as it has about one-third of the country's livestock population. The area also assumes importance because nomadic pastoralists trek long distances across the territory, crossing state boundaries and encountering other tribal groups. The Reduction of Resource-Based Conflict Project has therefore initiated this rapid assessment to gain insight into issues that need to be addressed in those pastoral areas emerging from conflict.

The assessment was based on a wide consultation with stakeholders, through a two-week field visit to the two states of South and West Kordofan (West Kordofan was later, in August 2005, divided between North and South Kordofan states according to terms of the May 2004 Protocol on Power Sharing between the Government of Sudan and the Sudan People's Liberation Movement/Army). In addition to the field consultations, a rapid literature search was conducted to identify the most recent studies on the area. Information gathered from the two sources was analyzed as a basis for recommendations of suitable conflict-prevention interventions.

The issues defined include: provision of services to pastoralists by the state technical departments, tribal leaders' role in the management of grazing resources; conflict resolution; land tenure aspects, especially after the peace agreement; the role of Pastoral and Farmers Unions; legislation governing the use of resources; attitudes towards the new Land Commission for South Kordofan; organization and demarcation of stock routes; research support for pastoralism, livestock marketing, water supplies and their management; animal health services; droughts and their frequencies and impact on resources; capacity of communities to shoulder rehabilitating and developing the pastoral system; and causes of conflict. The assessment identified several areas where interventions could be made.

Foremost among the issues that need to be addressed is the serious lack of basic information on the pastoral system, which necessitates the creation of a database to enable a quantitative assessment of the system and its components.

The second issue is shortage of dry season water supply, which presents a chronic problem throughout the area. A coordinating body is needed to streamline the efforts of several donors presently involved in providing water.

Other issues where interventions are suggested include monitoring range conditions, drought forecast, mapping stock routes and their resources, assessment of the impact of oil exploitation on the pastoral system and provision of social services, of which health and education services are the most prominent.

This report outlines the objectives of the study and methods adopted; describes the field work conducted and summarizes consultations made; explores components of the pastoral system, veterinary services in South and West Kordofan states, the Pastoral Union,

law enforcement bodies, and the work of some of the agencies operating in the area; and outlines issues identified as areas for possible interventions.

CHAPTER ONE
BACKGROUND

1.1 Introduction

The western and central regions of the Sudan, specifically the semi-arid regions of Kordofan, including the Nuba Mountains area, have been the subject of several resource management and environmental studies, for the area had seen a succession of agricultural development projects during the last four decades. Unfortunately, documents on these studies or projects proved to be difficult to locate. As a result, much of the area experience, indigenous 0knowledge and lessons that could be learned from the different projects are not readily available for review. As an example, documents and maps of the land use survey and plan undertaken by ACCM consultants in conjunction with TT PSICO, under the Southern Kordofan Agricultural Development Project produced by ACCM (May 1993) were not available. Though some of the recent publications and projects documents produced by various UN agencies, international institutions and non-governmental organizations (NGOs) are available online, generally the Western Sudan states reflect a major information gap, which adds to the difficulties for achieving sound development planning. The two ongoing projects from the International Fund for Agricultural Development (IFAD) in Kordofan i.e. the South Kordofan Rural Development Programme (SKRDP) and the North Kordofan Rural Development Project (NKRDP); had not yet established information and documentation units.

This evident information weakness undermines the ability of decision makers and technical staff to propose and implement feasible projects in areas of development and resources planning, including forestry, land use, wildlife, water development, etc. Nearly all concerned bodies are suffering from this gap, and are requesting institutional support to establish information and knowledge management systems for the entire Western Sudan region.

An Internet search for the purpose of this study revealed the presence of a very large amount of material on South Kordofan and the Nuba Mountains area. Its sources are extremely varied, consisting mainly of contributions by individuals, or by organizations interested in political and social issues and the impact of war on the area, with little material on resource management.

The United Nations has initiated a database project called Sudan Transition and Rehabilitation (STAR) to provide quantitative data collected from different resources on population, water supplies, health, education, etc. The project covers Sudan's 26 states, with the generated data utilized in measuring Sudan against the Millennium Development Goals.

1.2 Objectives

The purpose of this study is to conduct a rapid assessment of the pastoral system of South Kordofan state and identify possible project interventions to rehabilitate and develop the system. The area covered by the study includes South Kordofan and West Kordofan states, (82,000 and 120,000 km^2 respectively), which according to the Protocol on Power Sharing was to be emerged to form the new South Kordofan state (202,000 km^2). For the study to attain its objectives, the following aspects were deemed priorities:

i. Identify the most recent studies on the South Kordofan pastoral system and resources;

ii. Conduct a rapid assessment of the status of the pastoral system after the emergence of the area from conflict, following the Ceasefire Agreement of January 2002.
iii. Consult with stakeholders on the current situation of pastoral populations, their problems and constraints.
iv. Develop potential interventions for the near-term and projections of the future directions of development of pastoralism and possible UNDP inputs for reduction of resource-based conflict.

1.3 Methodology

A two-step methodology was adopted in conducting the study: a rapid literature search followed by a two-week field consultation. A computer search was helpful in familiarizing the consultants with the type and quality of information available and ongoing development programmes. Worth mentioning in this regard are two studies conducted by IFAD as part of its South Kordofan Rural Development Programme (SKRDP) and Western Sudan Resources Management Programme. The South Kordofan Range Management Strategy Study and the Khor Abu Habil Catchments Basin Planning and Water Development Study, conducted by YAM Consultancy & Development Co. Ltd., has among their objectives the enhancement and sustainable use of range resources, and therefore the reduction of pastoral conflict.

In addition to formulating a strategy for managing range resources, the former study produced maps of South Kordofan based on satellite images, enabling the identification of range conditions. Though extremely useful, the maps produced are static, presenting a first step in the analysis of range conditions. As the maps only depict the range condition in any one year, they could be made more useful by changing them into dynamic maps, through manipulation by geographic information system (GIS) software to enable year-to-year comparisons, providing detection of changes in range resources.

The 2004 Western Sudan Resources Management Programme proposes innovation in resource management by small producers, examining positive and negative impacts on five developmental components: range, pasture, animal production, veterinary services and institutional support. The Programme also suggests mitigation measures to redress environmental adversities.

Another important source of information is maps produced by SKRDP assessing environmental degradation.

The fieldwork, which was conducted 13-17 March 2005, involved visits to Abbassiya, Rashad, Kabos, Abu Gibeiha, Kalogi, Liri, Talodi, Kadugli, Lagawa, Fula, Babanusa, Muglad, Odaya, Nahud and El Obeid. In all these areas, consultations were held with the staff of the state departments and individuals engaged in pastoral production, which included: state technical services divisions (agriculture, veterinary, range, forestry and extension), the localities commissioners, the tribal leaders or *amirs*, the Farmers' Union, the Pastoralist Union, UN agencies, SKRDP, the Joint Military Commission (JMC), and foreign and national NGOs including the International Rescue Committee (IRC) and Nuba Mountains International Association for Development (NMIAD).

The consultations were greatly facilitated by the veterinary staff in the locations visited, and the study team is grateful to them. The substance of the consultations revolved around the following issues:

- Coordination between state technical divisions regarding provision of services to pastoralists;
- Tribal role in grazing management and conflict resolution;
- Land tenure issues after the peace agreement;
- Role of Pastoral and Farmers' Unions;
- Legislation governing the use of the rangelands and its effectiveness;
- Outlook of the new Land Commission for South Kordofan;
- Organization and demarcation of stock routes;
- Livestock census estimates;
- Research on and support for pastoralism;
- A marketing system;
- Water provision, management and availability;
- Animal health services;
- Droughts and their impact on resources;
- Capacity of communities to shoulder rehabilitating and developing the pastoral system; and
- Causes of conflict, and where possible statistical records on conflict occurrence.

1.4 Study Challenges

With the Ceasefire Agreement in the Nuba Mountains effective January 2002, and the signing of the Comprehensive Peace Agreement in January 2005, life has been returning to normal in Kordofan. Traffic has resumed, and the team traveled safely between the destinations it had planned to reach. The team's impression was that South Kordofan has in fact returned to pre-war conditions. There is some concern that the return of the displaced population might bring some conflicts over land.

It was evident to the team that reliable information is lacking, which is unsurprising since war conditions have disturbed many aspects of life. Also, successive administrative changes imposed through attempts to implement a suitable federal structure have also had a negative impact, since decentralization has created difficulties through the abolition and recreation of administrative units. The lack of accurate information means that no programming effort for rehabilitation or development could be started before the accumulation of a database, including the essential aspects of pastoral production.

One of the most serious gaps of information is in the area of water services, regarding the number, distribution and production of water facilities in the state. Such information is lacking since the practice of recordkeeping has been interrupted. Another evident gap is of statistical information on conflict, disputes and violations related to the utilization of natural resources. With such information gaps, the study team encountered an atmosphere of growing dismay among the rural communities towards the many development and humanitarian agents who visit the area collecting information.

A local leader in Liri said, "NGOs come and collect information from us, but there is no feedback. They know our problems. Digging a *hafir* (reservoir), making a water impoundment or drilling a borehole is an achievement which is more valuable for us than a series of meetings and talks."

A pastoralist from En Nahud said, "NGOs spend lots of money on training and capacity-building. We want water facilities, veterinary and agricultural services, schools and hospitals."

CHAPTER TWO
ENVIRONMENTAL SET-UP OF SOUTH KORDOFAN

2.1 Basic Characterization

As mentioned, the area covered by the study embraces South and West Kordofan states (which were later merged into the new South Kordofan state). The vegetation in this area includes semi-desert in the northern parts, followed by poor, medium and wet savannah belts as rainfall increases to the south. There is also some mountainous vegetation on the many *jebels* in the area, where elevation reaches 1,000 metres. In these areas, there is extensive erosion and loss of topsoil.

The area is characterized by a large livestock population, which represents about 30 percent of the estimated national livestock count. Off-take is below potential, however, for the economy is of subsistence nature, with the pastoralist's perception of his stock as both an asset and as social wealth. The prevailing strategy is to increase the size of the herds to offset potential hazards, such as outbreak of disease and occurrence of droughts.

Rain-fed farming, both for subsistence needs and commercial operations, is practised in the area. Rainfall is adequate and there are extensive plains of clay soil. In addition to raising animals and growing crops, a third source of livelihood is derived from the natural forests in the form of fuel wood production, building material, gum arabic and fruit harvesting from various trees.

There are no permanent watercourses in the area. Torrential rain, however, forms seasonal streams, the most prominent among which are Khor Abu Habil, Shalango, Awai and Batha, which carry substantial run-off between July and October. After the rains, the sources of water are *hafirs*, shallow wells and deep boreholes. Groundwater is an important source, and there are four formations that provide aquifers.

The national government owns land in Sudan, yet apart from registered freehold land, under the 1970 Amendment of the 1925 Land Settlement Ordinance, traditional farmers and pastoralists tend to regard the land they use as personal property. Women's access to land takes place through their households.

The strategy of survival adopted by most rural households is to ensure household food security. All households cultivate an area sufficient to produce their cereal needs. Livestock is relied upon as an asset, which could be liquidated in times of grain shortage. The size of the cultivated area varies with geographic location and growing conditions. Smallholders' cultivation in the drier areas is typically four or five *feddans*, reaching 50 *feddans* in the wetter southern areas.

2.2 Farming Systems

The livelihood activities found in the area are agro-pastoralism, nomadic pastoralism, mechanized farming, horticulture and collection of woody and non-woody forest products. Agro-pastoralism is practiced under different subsystems, depending on the availability of the land and the amount of rainfall. In the northern parts of the area, where the soil is sandy, millet is grown as the staple crop, with cash crops including sesame, groundnuts and *karkade* (hibiscus), supplemented by watermelon as a source of water and animal feed. In the southern areas, which have good rainfall and clay soils, rural households produce sorghum for subsistence, and commercial production takes place under large and small mechanized farming. A third important farming subsystem that

expanded recently is horticultural production, mainly mango groves, combining limited vegetable production grown along *khors* and *wadis*, tapping shallow groundwater aquifers. With the exception of large mechanized farming, all of the mentioned farming types combine small-scale livestock raising with forestry production.

Nomadic pastoralism, ranking as the second major activity in the state, is practised by two groups—the Baggara (cattle raisers) and the Abbala (camel raisers) nomads. Under the former, ethnic or tribal groups include Hawazma, Awlad Humeid, Kawahla, Kenana, Messeriya and smaller groups including Habbaniya, Nuba, Bedereiya and Fellata, who could be counted among the indigenous populations of the state. Among the latter, we include the tribes of Hamar, Kababish, Kawahla, Hawawir, Dar Hamid, Shanabla and Beni-Gerar, who came from the northern parts of Greater Kordofan into the state and utilized its grazing resources, especially during the summer. They move south starting in November and stay until May, when they begin their return journey to the north. The Baggara spend the summer months in the southern parts of the state, where there is adequate grazing and water, and move northwards with the start of the rains, to spend the rainy season in central Kordofan, south of El Obeid.

2.3 The Pastoral System

As described above, different pastoral groups inhabit South Kordofan or seasonally utilize its grazing resources. The bulk of livestock production takes place along the stock routes, for animals move from north to south in a synchronized pattern, with the onset of the rains or the dry season. The long-distance movement enables full utilization of the available sources of grazing and watering. The stock routes have invited open competition between the nomads, the settled population and the mechanized farmers, and thus turned into a major source of conflict in South Kordofan which has been further intensified in recent decades by the interplay of two important factors—drought and armed conflict, often resulting in changes in the traditional routes. Drought had also forced the camel owners from North Kordofan to penetrate deeper into South Kordofan, with the exception of two main areas—the east and west *jebels*, which were part of the war zone and thus movement within them was restricted.

2.4 Grazing Resources and Stock Routes by Locality

2.4.1 Administrative Structure

The administrative division of the two states consists of five localities in South Kordofan (Rashad, Abu Gibeiha, Talodi, Kadugli and Dilling), and seven localities in West Kordofan, of which three (En Nahud, Ghibeish and Abu Zabad) will likely revert back to the state of Northern Kordofan. Each locality is divided further into smaller administrative units. A commissioner is responsible for administering the locality, through legislative and executive bodies. At the village level, the government is represented by the tribal system. Assessment of the grazing resources and the stock routes crossing each yields the following features:

Abbassiya: This is one of the administrative units of Rashad locality. The area lies in the northern part of South Kordofan state, and south of the resource-poor grazing belt that extends into Northern Kordofan. The road from Um Ruwaba to Abbassiya is under construction. Bushes and forest trees have been removed for the road alignment. The local people have cut trees extensively as a new source of income, since road building is generally accompanied by an increase in charcoal making, with sellers on the roadside undercutting the prices at local markets. Besides being a fragile area, with only 350

millimetres of rainfall annually, such environmental impacts will accelerate the process of resource degradation already taking place.

The main stock route here is used by Shanabla (Abbala) and Messeriya (Baggara) and terminates in Upper Nile state. It passes through Abu Gibeiha and Rashad, and at Abbassiya radiates into two branches that enter North Kordofan.

The main sources of water are government boreholes, surface wells and *hafirs*. The surface wells are privately owned, and may at times be locked by their owners. The watering fee is 10 Sudanese dinars for a cow, and 2.5 dinars for sheep or goat.

Abbassiya is a wet or rainy season grazing area *makhraf* for the Messeriya and Shanabla pastoralists. Animals are allowed to stay from July through September, however, in practice this is extended until December, with the extension period causing conflict with the sedentary herds.

The *amir* of Tegali stated that grazing routes are defined and known, however, the non-availability of water confuses the use of the routes. The poor quality of grazing also compels the herders to extend their stay. As for settling disputes, the local tribal leaders believe that they are more capable of resolving them, but they do not have the necessary legal or administrative powers, for these are vested in the local administrative staff, who are not familiar with the attitudes, values or customary law of the pastoral and rural people.

Rashad: The road from Abbassiya ascends over rocky area, reaching 900 metres above sea level, before it reaches Rashad at 1,000 metres. Grazing is therefore limited, and the grazing source is provided by forest trees. The area has a large livestock population and horticultural activities. Water is becoming scarce and so is grazing land, due to the expansion of agricultural and horticultural production. Stock routes exist in the area, but are not demarcated because of the high cost of opening the routes, which at present cannot be borne by the locality budget.

The main cause of conflict is scarcity of water, due to the unsuitability of the area for drilling boreholes and poor development of other water resources. The available water is deficient in iodine.

The tribes in this area are Hawazma, Kennana, Borno, Fellata, Kawahla and Habanniya. Though they live in peace and cooperate with one another, incidents of conflict sometimes occur, for the moving herds are looked after by daring young men who may be regarded as professional herders, carrying weapons and highly paid by the herd owners. Their job is to ensure that the animals graze well, and therefore they do not hesitate to break into agricultural land.

According to tribal opinion, legislation regulating the use of natural resources, as issued by the state government, was formulated to be applied statewide, with little or no consultation with the localities. This has resulted in regulations that do not take into consideration the local ecological conditions, the availability and use of water resources, harvest times and rainfall, and the customary laws observed locally. Since these factors were not considered, the legislation remains ineffective. There is also little awareness about these regulations among the rural population, and local authorities are slow in settling disputes, which also discourages people from heeding the regulations.

Abu Gibeiha: The road descends from Rashad to Abu Gibeiha, crossing several streams and valleys that drain from the highlands. There are potential sources for water harvesting, if suitable structures could be designed. Many tribes live in the area, in peace and social harmony, maintaining good relations and solidarity between them. Strong ties were developed among them during wartime.

There are two main stock routes crossing the area and terminating in Upper Nile state. They are used by Shanabla, Messiriya and Hamar tribes, who spend the summer months in Upper Nile state. However, the local people resent the presence of these tribes because they share with them the area's limited resources. The added pressure on resources accelerates degradation of the hilly area. One of the hazardous practices of the camel nomads is the burning of *talh* trees to induce fresh foliage for the camels to browse. Minor disputes occur, but are settled by tribal and community leaders.

Between Rashad, Abu Gubeiha and Tagmalla, there are large areas of mangroves, grown on shallow water tables that are replenished by several streams carrying substantial runoff. However, production is constrained by the high cost of transporting the produce to markets.

Kalogi: From Abu Gubeiha to Kalogi the soil is cracking clay. During the rainy season, both locations become isolated, as the roads are impassable, with tractors the only means of transportation. There are two main stock routes in this area, the western and the eastern route. The western stock route terminates in North Kordofan, while the eastern connects Liri to Kalogi, then joins the western route.

Kalogi is *masyaf*, or summer grazing, for the Messiriya, Hamar, Shanabla, Hawazma and Fellata tribes, who spend up to nine months in the area. *Hafirs* and water ponds are the main sources of water, but are subject to contamination since they are unfenced and have not been maintained or improved since their construction. Disputes over herders watering their animals occur frequently, especially towards the end of the summer months.

Liri: This area is inhabited by Hawazma, Nuba, Baggara and Fellata, with the Messeiriya and Shanabla also spending the dry season in the area. There are two main stock routes crossing this area—an eastern one entering Upper Nile state, ending at Malakal and Tonga, and a western one entering Unity state. Short routes radiate from these two, depending on the availability of water.

The area has abundant range and forest resources, which were not accessible during wartime. It also includes El Baida mechanized farming block of 150,000 *feddans*, allocated as individually owned mechanized schemes of 500 to 15,000 *feddans*. Local people openly expressed the opinion that the owners of the schemes have obtained the land by virtue of their political power or allegiance, and that there is a need to redistribute the land following the implementation of the Peace Agreement in order to achieve equitable sharing of land and water as a necessity for sustaining peace.

Conflicts are rare, however, because of the abundance of grazing and water, and the limited numbers of livestock entering the area. Pastoralists reported, however, that an invasive plant causing the depletion of soil moisture has spread in the area.

Talodi-Kadugli: This area is characterized by dense vegetation of forest and rangeland. Its richness is due to its inaccessibility during the war. The road from Talodi to Kadugli was opened in March 2005, as JMC cleared side bushes and removed landmines. There are four main stock routes crossing the area, two starting from Talodi that go north, and two starting from Kadugli, one of which goes north while the other goes south into Unity state. In practice, these routes are not clearly demarcated and are not frequently used, because of the security situation. Pastoralists, according to their local leadership, do not follow the land use regulations issued by the state. The local administration units refer conflicts to tribal leaders, who complain that they have no power for resolving disputes.

The area is inhabited mainly by Nuba tribes, and frequently by minority groups of Messiriya and Fellata. Talodi area is a summer grazing or *masyaf,* with nomadic herds spending up to nine months sharing the meager water resources with the sedentary population, whose livestock do not exceed 20,000 head of cattle, while the visiting livestock population can reach 5 million head of cattle. Veterinary services are very poor and there are no vaccines, drugs or diagnostic facilities. Water is available from *hafirs*, and from a borehole in Talodi town that belongs to the State Water Corporation.

Kadugli-Lagawa-Fula: There is rich rangeland in this area as well as good stands of forest, for its livestock population is confined to beds of valleys and streams. The road built by the petroleum industry has brought a new source of water to the area in the dugout borrow pits of construction materials, which fill with rainwater, supplying the moving livestock for a couple of months after the rainy season. The area is populated mainly by Messiriya, Dajo and Nuba, and is traversed by 11 stock routes, most of which are not regularly used because of the scarcity of water.

In this area, the study team encountered an interesting case of conflict in Abu Kuwaigi village, near Lagawa. The inhabitants of the village, which has a borehole, are Komda Nuba, who raise livestock and practise horticultural production. A Messiriya clan lives in the vicinity. After the signing of the Peace Agreement, the Nuba asked the Messiriya to leave and find another home, claiming that historically the land belongs to them and that the presence of the Messiriya has caused overgrazing and shortage of water. The state *wali* formed a committee to settle the dispute. The committee arrived at a solution of separating the two communities, with each to live in an independent village and own a water facility, and a joint school to be located midway between the two villages. The state *wali* paid the cost of one borehole, and the German NGO Agro Action (GAA) paid for the second. The lesson learned here is that similar cases of real or imagined grievances, or old disputes from the war period, may begin to surface gradually, and that local solutions could be worked out.

Fula-Muglad: In this area rangeland is severely degraded, and most of the palatable plants have disappeared. Forest cover is very thin, due to the excessive cutting of trees for charcoal making. There are three stock routes in the area—western, middle and eastern, with each being used by a Messiriya clan.

The main water sources here are boreholes located near the railway line. Again petroleum road construction has provided an additional and temporary source of water in the construction of borrow pits. Pastoralists claim that the grid of roads has obstructed the stock routes and the natural drainage lines, leading to flooding on one side of the road, with negative impacts on the range plants and tree growth caused by waterlogging. In addition, the obstruction will also increase the incidence of water-borne diseases. To

reduce construction costs, the roads of the petroleum grid do not have cross-drainage facilities.

Fula-Odaya: This area lies in the northern part of what was West Kordofan state. The team visited the area to assess the very severe resource degradation that is taking place. More degradation brings southern movement of livestock in search of water and grazing. Hence, the probability of competition, confrontation and conflict over resources is likely to increase.

During the summer months, no animals are to be found in this area. There are no stock routes here because of the very poor grazing conditions and scarcity of water. The only boreholes are at Odaya, with the pastoralists depending on shallow wells.

Odaya-En Nahud-El Obeid: This area is semi-desert of sandy soil and patchy-poor vegetation. The main tribe is Hamar, who cultivate small areas and raise camels, sheep and goats. Despite their harsh conditions, pastoralists and investors maintain that sheep production is profitable in this area.

2.4.2 Short-Distance Pastoralism

Short-distance pastoralism is practiced in all of the above-described pastoral zones, by agro-pastoralists or pastoralists owning small herds. It is more of a seasonal movement in search of grazing and water supply. The view held by some officials is that short-distance pastoralism is decreasing and may soon disappear because the system is no longer economical. To raise livestock economically under the prevailing conditions requires long-distance trekking along the stock routes. This view needs to be verified.

2.4.3 Services

2.4.3.1 Veterinary Services

Veterinary services are poor in the localities of Rashad, Abu Gubeiha, Talodi Liri, Kalogi and Kadugli. The table below shows the existing facilities.

Table 3.1 Veterinary services in South Kordofan State.

Locality	Hospitals	Clinics	Mobile units	Drug Stores	Private pharmacies	Labs
Abbassiya	1	0	0	0	1	0
Rashad	0	1	0	0	0	0
Abu Gubeiha	1	0	1	1	1	0
Kalogi	1	0	0	0	0	0
Liri	0	1	0	0	0	0
Talodi	1	0	0	0	1	0
Kadugli	1	0	2	1	3	1

Annual vaccination campaigns do not cover the entire state, because the supply is insufficient and there is a shortage of trained personnel and transportation. While vaccines are administered free of charge, they are not always available. Their shortage leads to undesirable practices, such as pastoralists administering an under-dosage because they are unable to obtain or pay for all their vaccine needs. The vaccines are also not preserved well by the pastoralists.

As the nomads' movement in the stock routes entails wide livestock crossing of states and locality borders in large numbers, the available veterinary services do not cope with the million heads of livestock crossing north and south. Diseases normally appear and cause considerable rates of mortality. Examples of such disease outbreaks are PPR (peste des petite ruminants), black quarter and sheep pox. The accumulation of large numbers of animals around water sources also results in tick infestation, tick-borne disease and respiratory diseases.

Compared to South Kordofan, West Kordofan has extensive veterinary services, which are distributed all over the state. There are veterinary hospitals in Fula, Lagawa, Nahud, Ghubeish, Babanusa, Abu Zabad and Muglad. In addition, there are four mobile veterinary units, covering the localities of Es Salam, En Nahud, Lagawa and Ghubeish. Veterinary centers are under construction at Abyei, Sunnut and Dibab, and there are 19 private veterinary pharmacies.

The services provided by the veterinary department include disease control, vaccination, extension and clinical work. Pastoralists claim that the vaccination service is not available on demand, especially after the decision to give the service free of charge. Disease surveillance and reporting system is poor, and may be inaccurate because of the lack of a diagnostic laboratory.

2.4.3.2 Water Supply

Pastoralists depend on four types of water sources in obtaining their domestic supply and for their livestock—water yards, *hafirs*, open shaft wells and naturally formed sources. Of the four, their dependency on the last type is greatest. Scarcity of supply at the naturally formed sources magnifies during the dry months with the elapsing of rains, and the pastoralists shift to other sources. Data on the numbers, distribution and size of supply obtained from these sources is not readily available, especially when related to the stock routes, a gap that needs to be addressed if optimum utilization of the routes is to be considered in the future. Shortage of supply during the summer months is a chronic problem, constraining the development of the pastoral system in the state, with negative impacts on the use of the range resources, causing concentration of the herds in certain areas, beyond grazing capacities, with evident signs of degradation in many parts.

The water sector in general suffers from many problems: planning, institutional and managerial. Experience shows that the decision to locate a water facility is not an easy one. Besides the suitability of the physical elements and the other technical considerations, it involves other aspects, such as the stock route alignment, the quantity and quality of the range and forest resources, and the social and political spheres. On the institutional and management sides, we find that many agencies are involved in the provision of water: the State Water Corporation, the IFAD Rural Development Project, UN agencies, including UNICEF and UNDP, foreign and national NGOs and the private sector. Yet coordination among them is weak. As a result, more than three systems of management are operated in the state—public, private and community-based—with each having merits and demerits that need to be assessed regarding effective partnership between the stakeholders. Donors insist on community ownership and running of the water facilities, but in many cases this is unsuccessful, because of lack of preparedness of communities to undertake the incurred responsibilities and meet the requirements of sustained operation.

The situation shows that adequate water provision within the pastoral system is lacking, and presents one of the major impediments to the development of the system, and therefore could be considered as a factor behind the hidden and direct causes of resource conflict in the state.

2.4.3.3 Livestock Marketing

In the area visited, livestock marketing is poor, with common weaknesses of infrastructure and management of marketing activities reflected in the uncontrolled entry of livestock to markets and the absence of marketing information, such as registration and pricing.

The price of stock is determined by bilateral agreement between the buyer and seller, through an intermediary. Mob or group selling is also practiced by livestock merchants and large-scale traders. Stock is divided subjectively by visual grading into groups of similar size, weight and quality. Each group is then assigned a unified price per head. Intermediaries and brokers in fixing the price, and for their services they receive a commission. Animals sold are registered at the market office. Taxes are paid and transfer of ownership is made through the *damin,* who guarantees the sale and testifies the actual ownership of the stock by putting his seal on the sales receipt.

In the Abbassiya livestock market, the following fees and levies are collected: sales receipt fee, locality fee, health certificate and slaughterhouse fee, quarantine and export fees, Pastoralists Union fee, tax and *shaheed* fee. The total market charges amount to 1,000 Sudanese dinars for a cow, and 400 for a sheep. These high market charges and transaction costs induce livestock owners and traders to withdraw from the market. As such, the markets are being used for generating revenue for the state and locality. Though high fees are collected, no funds are channeled back for improvement of the market structure or services.

In comparison, livestock markets owned by the Animal Resources Bank are properly fenced with entry gates. The market area is divided into pens and holding areas. There is also a sales office and an office for the market person in charge.

2.4.4 Security Services

In general, security services are poor in the areas visited. In all localities and their administrative units, there are police stations. However, these are poorly staffed and ill-equipped and have no means of transportation or communication. As such, they are unable to either patrol the area or respond to calls for assistance in cases of conflict. The inability to provide security in the rural areas belittles the local authority at the locality headquarters or in the administrative units in the eyes of the communities.

2.4.5 Tribal Administration

As a result of government policy, nearly each tribe, sub-tribe and sometimes clan within a big tribe has an *amir*. Despite the fact that *amirs* are handpicked and neither elected nor hereditary rulers, they form a potentially very useful network of managers who can be instrumental in developing and promoting the pastoral system.

2.4.6 Pastoral and Farmers' Unions

There are state Pastoral and Farmers' unions, branches of the national unions. Like all other trade or professional unions, they are under the control of the government and the ruling party. Both bodies are potentially useful structures that could contribute to the development of the pastoral system.

There are two areas where they could be very useful—in spreading messages (on range management, animal health women's development, etc.) to the nomads and the sedentary herders through their hierarchical structures; and contributing to the management and monitoring of the range and water conditions along the stock routes.

2.4.7 State Environmental Regulations

The three states of Greater Kordofan had each enacted a law for drinking water and another for regulating use of the rangeland. This development came in response to the lack of a national law or regulation in these spheres. Issuing these laws also reflected the practical need to deal with the issues of resource management, competition over resources and conflict mitigation. The fact that the three states had issued regulations indicates the high level of awareness of the role of management of natural resources for sustaining the livelihood of the population of Greater Kordofan. Enactment of resource management regulations also shows that the three states recognized the common and shared nature of resources, particularly rangelands, where stock routes cross administrative boundaries.

The state of North Kordofan passed the following laws (the translation is unofficial):

i. Drinking Water Corporation Law 1998,
ii. Drinking Water Corporation Law 1998, amendment (1) 2000,
iii. Nomadic Stock Routes Law, 1998,
iv. Nomadic Stock Routes Law, 1999, Amendment (2003),
v. Protection of Rangeland Law, 1999,
vi. Legislation for Organizing the Use of Agricultural Implements Law, 2002,
vii. Drought Mitigation and Forecasting,
viii. North and West Kordofan States Regulation of Drought Mitigation and Food Security Law.

The state of West Kordofan passed the following laws:

i. West Kordofan Water Corporation Law 1996,
ii. West Kordofan Protection of Rangeland and Regulation of Stock Routes Law, 2001.

The state of South Kordofan issued Law No. 3 in 2000 to regulate agriculture and herding. In addition to the forest act, local orders and ministerial orders were issued to protect some endangered tree species such as *Balanites aegyptiaca* (higlig) and *Borasus aethiopum* (daleib), and regulate other activities related to forestry, such as ministerial orders 51 and 52 issued by the Federal Ministry of Agriculture and Forests prohibiting the approval of new mechanized farming projects and putting heavy restrictions on the clearance of the already-approved projects.

2.4.8 Development Assistance

According to the Humanitarian Assistance Commission (HAC) branch of South Kordofan, some 38 national and international non-governmental organizations are registered in South Kordofan alone. In addition, the UN agencies FAO and UNICEF are also present. The JMC, which has supervised the Ceasefire Agreement since January 2002, has a prominent presence. It appears that the role of the HAC branch is limited to the licensing of the

different agencies, with no access to other essential information, such as agency programming or geographical extent of operations.

Nearly all these organizations are involved in one way or another in the provision of water supplies. Competition between them coupled with their lack of information about each other's activities, has led to inability to coordinate their work. However, some attempt at that is done through an annual conference on water and sanitation, in which the different agencies present their plans of actions, mainly drilling programmes, and thus seek to avoid duplication. Other shared interests include peace and capacity-building.

One of the most important foreign agencies in South Kordofan at present is IFAD, which has funded the two rural development programmes in North Kordofan and South Kordofan states. Both are long-term, running for seven and 10 years respectively, offering services to improve rangeland and open fire lines, provide water, train community animal health workers, manage and conserve natural resources and provide extension services in the field of animal production and women's development. The other IFAD-funded project that has been recently formulated for Greater Kordofan involves introducing innovations into the rural production systems through management of natural resources, which is the cornerstone of the system.

The IFAD projects attempt to introduce innovations over a very large and diverse area. As the formulation of the innovations seems to assume uniformity of the pastoral systems over such extensive areas, the ability of the different tribes or clans for adopting them may vary. Not defining the geographical limits where innovations may be introduced prior to the start-up of the project carries the danger of subjecting the project management to pressures and lobbies from the state, locality authorities and communities. It seems prudent, therefore, to define the specific needs of the different geographical localities, being rural settled or nomadic. For example, there is now ample evidence of very severe environmental and resource degradation in Dilling locality, and the bordering belt in North Kordofan state. This justifies critical assessment and treatment in collaboration with the pastoral users of the area. On the other hand, in the Liri area south of Kadugli, the rich range and forest resources are constantly being reduced by uncontrolled forest fires, which destroy up to 60 percent of the range, which also calls for assessment and treatment.

CHAPTER THREE
ESSENTIALS LEADING TO INTERVENTIONS

The above exposition on the pastoral system of South Kordofan state clearly indicates many gaps and weaknesses of the system that must be addressed to improve the system's performance and reduce ongoing conflict over resources. Based on the different analyses carried out, the following suggestions are made to address deficiencies inherent in the system, and as interventions to mend the gaps cited.

3.1 Addressing Negative Impacts
These are present in the study area as:

3. 1.1 Land Tenure Issues
Since the signing of the Protocols on Power and Wealth Sharing and the creation of the Land Commission for South Kordofan, the conviction has developed that land redistribution will take place. This rising public awareness of equitable access to the land is significant. It could be utilized to facilitate the process of land redistribution, recognizing public acceptance of the fact that grievances have occurred and that they need to be redressed, with the stipulation that land redistribution or revision would adopt a fair course, with the application of righteous laws that are fair to the local people.

3.1.2 Mechanized Farming
In South Kordofan state, the total area of land suitable for agriculture is in the range of 15 million *feddans*. Seven million *feddans* are demarcated and allocated area for mechanized farming. However, according to the Ministry of Agriculture, the total area cultivated is no more than 2 million *feddans*. As such, the state minister of agriculture considers that there is available land to accommodate each type of land use.

The Pastoralist Union alleges that mechanized farming schemes have been allocated to individual owners who came from outside the state. The Union also maintains that the scheme operators do not comply with the state land regulations, for they do not use the land for agriculture, but instead sublease it to woodcutters and charcoal makers. It also claims that the planning and demarcation of the schemes does not take into consideration realities in the field. Also, the planners have not accommodated the stock routes into their plans.Attempts to find solutions to such problems include freezing, repositioning and re-allocating land. The Union's view is shared by the JMC. The issue centers on meeting the demands of the pastoral communities. It is believed that the proposed re-division plan will increase the area of rangeland, which in turn will lead to reduced competition. This new scheme when implemented shall enable redividing the land into small holdings of no more than 500 *feddans,* so that the number of beneficiaries may be increased.

3.1.3 Impact of Oil Exploitation
Although there is recognition of the importance of protecting the environment and mitigating the effects of oil extraction, this is secondary to the government priority of exploring for, extracting and exporting oil. With general awareness that the process of oil development leads to environmental hazards, the Ministry of Energy and Mining has issued a series of environmental laws and regulations on environmental protection. One of the most important impacts of oil operations in the area is the effect of the grid of roads on the land surface. Some of the road alignment is at right angles to the line of natural drainage. This has caused accumulation of water on one side of the road, which leads to water logging and retardation of vegetation growth. Water stagnation also induces the

proliferation of water-borne diseases. A third impact of drainage obstruction is that natural depressions and lakes do not fill, causing shortage of summer water supply and organic pollution of these water bodies. It is therefore prudent that a proper assessment of the impact of oil extraction operations on the pastoral system be conducted, so that the necessary measures may be formulated to mitigate negative impacts.

3.2 Supporting Activities

3.2.1 Livestock Census

The following table indicates livestock population as provided by the state Ministries of Animal Resources and Fisheries in 2002.

State	Cattle	Sheep	Goats	Camels
South Kordofan	2,495,073	1,939,881	1,804,598	169,774
West Kordofan	3,272,809	3,740,167	1,199,128	429,113
Total	5,767,882	5,680,048	3,003,726	598,887

These livestock population figures are projections from an earlier census, and the only available figures. Although the need for a new animal census is obvious, there are several constraints, including the cost of the census and technical challenges. Despite these difficulties, it is time to consider conducting a livestock census. There is now a window of hope that the Pastoral Union might be persuaded to convince its members to change their practice of not disclosing the numbers of their stock.

3.2.2 Agricultural Research

The Kadugli Research Station was closed in 1991, and its research staff relocated. The station had served the region for a long time, and its services are needed, especially with the achievement of peace. It is worthwhile considering restoring the station, for it will support improved agriculture and be a resource of much-needed information.

3.2.3 Marketing Improvement

Marketing of excess livestock remains a concern of the projects designed to introduce innovations into the system. No proper marketing could be introduced if the pastoralist continues to cling to his present goal of maintaining a large herd, in order to guard against disease and drought and to bring him social prestige. Attempts at attitude change should be pursued. Extension agents could address this subject along with messages on range management and livestock production. At the same time, market infrastructure and organization need to be improved, and state and local authorities need to revise the sales tax and other levies to encourage the producers to participate more actively in the marketing process.

3.2.4 Sensitization of the Pastoral Union

The Pastoralist and Farmer's Unions have representatives in all the areas visited. They were very keen to meet the study team and participate in consultations. Some representatives indicated a high level of awareness about the issues, such as improvements to be made to the stock routes, land tenure and other development interventions.

Pastoralists, on the other hand, complained that the activities of the Union are centralized and controlled by the chairman of the Union, who is based in Kadugli. Union representatives in the localities have no delegation of roles or responsibilities to do any work. Many also claimed that the chairman of the Union spends his time visiting politicians or collecting the Union fees levied on the markets, yet is not known to the average

pastoralist. All of these factors have created a situation of mistrust between the executive body of the Union, the localities' delegates and the ordinary members. Part of the reasons behind this weakness in organization is the fact that the Union is part of the ruling political party, and as such, the Union is not really an independent body, and follows the political line and instructions of the party.

3.2.5 Facilitation of the Work of NGOs

A large number of NGOs operate in the area, as mentioned previously, and are on the increase with the signing of the Peace Agreement. One of the recent operators to enter the area in the field of partial development is IRC, which has been operating in Lagawa since 2002. The main objectives of IRC's programme include pastoral development and conflict resolution, through raising awareness about peaceful co-existence between the different populations, community organizations, resource management and capacity-building through training of key stakeholders.

Citizens from Nuba Mountains working in the Gulf formed NMIAD, a national NGO, which began operations in the SPLM-held part of the state in 2001. NMIAD now has its head office in Khartoum, with branch offices in Kadugli, Dilling, Lagawa and Kauda. It focuses on combating natural disasters, resettling the Nuba internally displaced persons (IDPs), environmental protection and other aspects of development. NMIAD has implemented UNDP-funded projects on poverty alleviation and confidence building.

GAA operates in Lagawa and Dibab. Its main objective is pastoral development, through drilling boreholes, providing veterinary drugs and training community animal health workers.

3.2.6 Interventions

Below we present issues related to pastoral production that are critical for its growth and development, and where suitable, these are formulated into interventions of two types. The first relates to improvements of the prevailing production environment. The need for introducing the improvements is seen as an investment in an area that is unlikely to attract investors in the short-term other than the state government and pastoralists. The second relates to the human development of the pastoralists, through the provision of social services.

3.2.7 The Information Gap

As shown earlier, there is a very serious gap of information in South Kordofan. It appears that the government institutions are doing little in the area of information building, due to their technical and financial weaknesses and lack of appreciation of the importance of information and its use. For a long time, the role of most departments was limited to issuing approvals and permits and collecting government dues. No records on different activities were regularly kept, and monitoring and evaluation were not practiced.

It is essential that special training in this area be organized for the staff of all grades, including senior staff. Sudanese cadres supported by international experts could provide the required training. It may also be necessary to hire a consultant for a specified period, to ensure that the training material has been incorporated into the daily work of the institutions.

3.2.8 Dry Season Water Supply

Water supply is insufficient to meet the needs of the nomads, especially during the summer months, March to June. The situation is chronic. Geological and hydrological information is available, which will help move toward a solution. What remains to be done is to establish the present deficits in the different areas and along the stock routes, and work on how to bridge the gaps between demand and available supply. However, as no information is available on the latter two, current efforts are unlikely to produce tangible results.

What is disturbing also is that there are several agencies working in the field of water provision with limited coordination between their activities. These include the States Water Corporations, development projects such as the IFAD rural development projects, UN agencies, NGOs and private sector operators. The South Kordofan state government needs to play a coordinating role by establishing a committee for this purpose and encourage the different actors to expand their programmes of water provision.

There is also evidence of organic pollution in some lakes, such as Lake Keilak, on which a large number of livestock depend. The source of pollution is livestock urine and dung. As the summer progresses, the lake water becomes turbid and turns into a thick organic mix. If this situation persists without treatment, the lake may eventually be unusable. This case and others like it that suffer from similar phenomena call for addressing water pollution urgently.

3.2.9 Dams and Embankments on Khors

The field survey encountered very poor engineering designs of water retaining structures, of dams or embankments on *khors* and *hafirs*. In two sites, the reservoir created by the structure became rapidly silted, and in another the structure collapsed. The situation could be improved by applying correct hydrological studies and civil engineering design to the proposed water development sites. Current practices observed during the field survey are wasteful.

Another neglected aspect is the environmental impact of water development on downstream users. In one situation, a structure passed the water downstream by over spilling, and as the volume was small, it led to dispersion of the users, not utilizing the available summer grazing. At the same time, the passing of the discharge by over spilling caused rapid silting of the reservoir. The net result is that the structure served no useful purpose.

3.2.10 Stock Routes Mapping

The three former states of Kordofan each enacted various legislations to organize and control utilization of natural resources for agriculture and livestock grazing. One piece of legislation defines the stock routes. This is an important initiative and needs to be taken a step further by accurately demarcating the routes, using modern survey methods. The demarcation currently applied identifies only the general features of the routes, while accurate mapping entails depicting elements such as topography, water sources, reserved forests, settlements, and demarcated and un-demarcated agricultural land as useful management and planning tools, with other relevant information included, such as geological formations and aquifer maps. As resource management tools, these maps will be useful for establishing the carrying capacity of the stock route, by balancing between its range resources and the size of the livestock population using it. As to the demarcation of

abandoned routes, because of the war, this needs to be done in cooperation with the agencies working on landmines removal.

3.2.11 Monitoring of Range Conditions

The studies and projects carried out by IFAD on range management and environmental assessment provide an opportunity to institute monitoring of range conditions all over the state, using satellite images. This is encouraged by the fact that satellite images could be procured at reasonable cost, and that local expertise is available to produce the needed information. Support of a small research team in a recognized research or higher education institution led by a competent scientist could provide the required service. The information produced will assist the South Kordofan authorities in planning management of the range resources. The advice of an international expert would be useful in setting up and operating the service.

3.2.12 Conservation of Range

The range resources of the state are suffering from different forms of degradation. The southern part, though rich in range and forest resources, is subjected to heavy misuse; foremost among these are forest fires. The western sector, covering Lagawa, Fula and Muglad, is threatened by droughts and desertification. The eastern sector faces soil degradation, as a result of severe erosion owing to elevation. In each of these three areas, remedial measures are needed to reverse the impact of the degrading factors.

3.2.13 Drought Forecast

South Kordofan is prone to droughts, especially in the north. Analysis of long-term rainfall data made by the range management strategy suggested that droughts could occur at a rate of one in eight years. This projection is valuable, and is to be taken into consideration and be advanced further by making use of the quarterly forecast issued by the Regional Weather Centre for the Horn of Africa and other sources of forecast freely available from the Internet. Collaboration with the meteorological authority in this regard is very useful. It is suggested in this connection that drought forecast be incorporated into projects aimed at improving pastoral production systems, to minimize impact risks.

3.2.14 Work of the Land Commission

Field consultations revealed wide acceptance of revising the current status of land ownership, as past practices of granting land leases for mechanized farming have created grievances that need to be addressed. This indicates that people are prepared to accept changes in the current set-up, which is a significant development that should be encouraged, as it will smooth the work of the Land Commission. To avoid conflicts arising from claims and counterclaims, the process of land redistribution and revision of contracts leases should be based on legal procedures applicable to all land cases of individuals and communities. The process of redistribution should also take into consideration the quality of the soil and its potential productivity, for the motive should not be acquiring land and establishing a title to it, but accessing good quality land to enable promoting a productive environment, a policy which would be conducive to the small producer. If the process of land redistribution is based on administrative or political procedures, and not on strictly legal grounds, dissatisfaction and dismay will arise and plant the seed of conflict.

3.2.15 Provision of Social Services

The nomads are in evident need of basic services, most importantly water supply, health and education. Taking their mobile nature into consideration, these services are to be provided to suit their movements. Experiences of other countries of sizable nomadic

populations could be drawn from. Their contribution to the provision of services and their involvement in management of the services could also be explored.

CHAPTER FOUR
SUMMARY AND CONCLUSIONS

Successful application of interventions in a wide area, such as the new state of South Kordofan, requires**:**

1. Bridging the information gap by building reliable and adequate basic information about the system. The essential data needed include:

- Identification and accurate mapping of the stock routes and their resources of grazing and water, as well as the agricultural land, and settlements.
- Estimation of the size of livestock and numbers of people using each route.
- Calculation of the seasonal supply and demand of water and the current deficits in human and livestock consumption.
- Compilation and quantification of the available information on environmental degradation, through change detection studies and analysis of satellite images.

2. Dividing the area into regions that have distinct features, to facilitate collection of data, and hence identification and formulation of suitable interventions.
Accordingly, and to facilitate the acquisition of information, we propose to divide the area into the following regions and localities as shown in the table below, which also summarizes the main threats and constraints faced by the system, and lists the major proposed interventions.

Regions	Localities	Threats to Pastoral Production
Northern Part	Dilling	- Severe environmental degradation. - Accelerated desertification. - Felling of trees and shrubs for household energy, as the nomads pass through the area twice a year. - No organized entry and exit of camel nomads.
Eastern Jebels	Rashad	- Severe soil erosion because of elevation. - Poor ground vegetation because of loss of topsoil. - Not all stock routes are open for grazing.
Western Jebels	Es Salaam, (Lagawa and Fula)	-Northern sections of the area face droughts, as they fall within the semi-desert zone. -Impact of oil exploration operations with loss of forest and rangeland. -Impact of oil roads on natural drainage. -Storage of summer water supply.
Southern Part	Liri Administrative Area (Kadugli Locality)	-Forest fires. -Remoteness and inaccessibility during the rainy season. -Encroachment of neighboring states on local forest resources.
Major Proposed Intervention		-Addressing the gap in summer water supply. -Demarcation of the stock routes and estimation of their resources (range and water) and size of livestock using them. -Assessment of range conditions and environmental degradation, including organic water pollution resulting from crowding at water sources. -Improving vaccination and animal health facilities and provision of services, particularly in the eastern areas.