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SUDAN ENVIRONMENTAL THREATS AND OPPORTUNITIES ASSESSMENT WITH SPECIAL FOCUS ON BIOLOGICAL DIVERSITY AND TROPICAL FOREST



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Cover Photo: Hafir (Traditional Water Storage) in Northern Darfur

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CONTENTS

- Abbreviations..... iv
- EXECUTIVE SUMMARY..... 1**
- INTRODUCTION 4**
- 1. SUDAN: PHYSICAL AND ECONOMIC FEATURES..... 6**
- 2. STATE OF KEY NATURAL RESOURCES12**
 - 2.1. Ecological Zones 12
 - 2.2 The Agriculture sector..... 13
 - 2.2.1 Livestock production..... 14
 - 2.3. Key Forest Resources 14
 - 2.3.1 Forest Situation..... 17
- 3. BIOLOGICAL DIVERSITY18**
 - 3.1 Wildlife Ecosystems 18
 - 3.1.1 Globally important and endangered species in Sudan..... 19
 - 3.1.2 Protected areas of Sudan..... 19
 - 3.2. Wetlands of Sudan..... 21
 - 3. 2.1. The Nile System 22
 - 3.2.2 Marine wetlands..... 23
 - 3.2.3 Fisheries evaluation..... 24
 - 3.2.4 Darfurwater resources 24
 - 3.3 National parks 25
 - 3.3.1 Dinder National Park 26
 - 3.4 Energy resources 26
 - 3.4.1 Biomass 27
 - 3.4.2 Hydropower 27
 - 3.4.4 Exploration, production and the Environment 29
- 4. Environmental Governance in Sudan..... 30**
 - 4.1 Eco-tourism..... 32
 - 4.2 The Higher Education System 34
- 5. The Impact of the structure of government on natural resource legislation and management..... 34**
 - 5.1 The Federal System of government 34
 - 5.2. Natural resources legislation, management and institutions..... 35
 - 5.2.1 Land tenure legislation and land use 35
 - 5.3 Key natural resource management and policy development institutions 36
 - 5.3.1 Institutions for water resources management and policy 36
 - 5.3.2 Institutions for forestry research and education 36
 - 5.3.3 Institute of Environmental Studies (IES), University of Khartoum..... 37
 - 5.4 Forest National Corporation 37
 - 5.5 Range and Pasture Administration 38
 - 5.6 Ministry of Animal Resources 38

5.6.1 Wildlife Conservation General Administration (WCGA)	39
5.6.2. Traditional (tribal) administration.....	39
5.7 Non-Governmental Organizations (NGOs)	40
5.8 Trends in biodiversity conservation	40
5.9 Sudan and the global environment conventions	40
6. Sudan Development Trajectory	42
Investment	43
(In Foreign Currencies).....	43
6.1 Darfur and the Three Areas.....	46
6.2 KEY ENVIRONMENTAL THREATS, OPPORTUNITIES AND SUGGESTED INTERVENTIONS	48
6.2.1 Summary; Sudan Threats, Opportunities and Suggested Interventions.....	49
REFERENCES.....	56
ANNEX I: SCOPE OF WORK.....	58
ANNEX II: Work plan/schedule.....	64
ANNEX III: A list of key institutions/personnel in the field of Environmental management that were contacted in Khartoum.....	65

FIGURES

Fig. 1: The Republic of the Sudan.....	7
Fig. 2: Percentage Share of the Sectors in Real GDP 2010	8
Fig 3. Average Rainfall in mm	9
Fig 4. Seasonal surface non-Nile waters.....	10
Fig 5. Ground water	10
Fig 6. Nile and Tributaries Mean Flows.....	10
Fig 7. Total Inflows in mm ³ /month	11
Fig8. Present and Projected dams	11
Fig 9: The Vegetation of Sudan.....	12
Fig. 10: Sudan Forest Cover 2011	14
Fig. 11: Protected Areas in Sudan	21
Figure 12. Time line of hydropolitical relations in the Nile basin.....	22
Fig. 13: Darfur Hydrology	24
Fig14. Sudan, South Sudan Oil.....	28
Fig15. Pollution in the production fields	28
Fig. 16: The official United States, main donor, development assistance (ODA) 1977-2007.....	43
Fig.15: Pledged aid flows for 2006-7-8.....	44
Figure 18: Sudan.'s Growth Has Been Driven Largely Through The Expansion of its Public Sector	45
Fig19: Sudan 2011 Humanitarian snapshot.....	48

TABLES

Table 1: The Cultivated Areas during 2008/2009	8
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Table 2: Water Inflows	11
Table 3: The Vegetation of Sudan.....	13
Table 4: Sudan area allocations.....	15
Table 5: Forest removal	16
Table 6: Forest products	18
Table 7: The fluctuation of waterbirds diversity and distribution in Dinder National Park in 2009 and 2010	19
Table 8: Protected Areas in Sudan	20
Table 9: Dams of Sudan	27
Table 10: Powers and responsibilities set out in the 2005 Interim National Constitution relating directly or indirectly to environmental governance	30
Table 11: Tourists Numbers 2004-8.....	33
Table 12: Pledged Flows 2006-7-8.....	44

ABBREVIATIONS

CBD	Convention on Biological Diversity
CBO	Community Based Organization
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CPA	Comprehensive Peace Agreement
DNP	Dinder National Park
EAPGREN	Eastern Africa Plant Genetic Resources Network
FNC	Forests National Corporation
FAO	Food and Agriculture Organization of the United Nations
GAB	Gum Arabic Belt
GDP	Gross Domestic Products
GEF	Global Environment Facility
GIS	Geographical Information System
GOSS	Government of Southern Sudan
HCENR	Higher Council for Environment and Natural Resources
ICZM	Integrated Coastal Zone Management
IFAD	International Fund for Agricultural Development
IUCN	World Conservation Union
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-Governmental Organization
NTEAP	Nile Trans boundary Environmental Action Project
NWFPs	Non Wood Forest Products
PERSGA	Regional Organization for the Conservation of the Environment of the Red Sea and the Gulf of Aden
RPA	Range and Pasture Administration
SIDA	Swedish International Development Agency
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Education, Scientific and Cultural Organization
UNFCCC	United Nations Framework on Climate Change
USAID	United States Agency for International Development
WCGA	Wildlife Conservation General Administration
WCS	Wildlife Conservation Society

WRC Wildlife Research Center
IUCN, International Union for Conservation of Nature
JICA Japan International Cooperation Agency

EXECUTIVE SUMMARY

As provided in the Scope of Work, the objective of this work is to deliver to the USAID Sudan Task Force a countrywide Environmental Threats and Opportunities Assessment (ETOA) that will inform the Environmental Annex of the USAID/Sudan Integrated Strategic Planning (ISP) process. This study covers Sudan, involving one person field mission within Khartoum, followed analytical work and write up.

In undertaking the study, the following steps were taken: preparation that included identifying key institutions and personnel to contact; developing assessment methodology; information gathering that involved literature review and interviews with relevant government officials, selected civil society, universities and research organizations' experts; and lastly data analysis and write up. The list of persons contacted is provided in Annex II of the main report.

The detailed report, below, covers the purpose and methodology of the assessment, review of key natural resources, policies, legislations and institutions for natural resource management, and key environmental threats and opportunities.

Key findings of the review of the natural resource situation

Sudan embraces diverse biological resources which represent an important national asset and heritage. The Forest National Corporation (FNC) estimates that, after separation of South Sudan, forests cover about 11.60% of the total area, while agricultural land 13.70%, Rangelands 26.40%, and water bodies 0.17%. The average annual increment of growing stock volume is estimated as 1.340 million cubic meters of which 5 % is removed per a year. The majority is used for firewood and charcoal, while 9% is used for high quality timber, the rest is lost because of fires, drought, overgrazing and unsustainable agricultural practices. UNEP has indicated that between 1990 and 2005 the country lost 11.6 % of its forest cover. Conservation of biodiversity is vital in a country like Sudan, where ecosystems are fragile and the renewable natural resources are endangered through over-exploitation. These ecosystems are deteriorating rapidly due to multiple interacting factors resulting in aquatic and terrestrial species having either disappeared or are subject to severe threats. The recent biodiversity countrywide assessment undertaken by the National Biodiversity Strategy and Action Plan Project (NBSAP 2000-2010), constituted a significant benchmark for marking the different ecosystems, habitats and species in Sudan.

As required by USAID Foreign Assistance Act (FAA) of the United States, Sections 118 and 119, as amended, USAID/Sudan commissioned this Environmental Threats and Opportunities Assessment (ETOA) for Sudan to determine the actions necessary in Sudan to conserve biodiversity and tropical forests; and ways in which USAID is meeting those needs. This ETOA is the first update since the original was submitted to USAID in March 2003.

As part of the ETOA, the following are the key threats to Sudan's forest resources:

Weak federal driven policies versus autonomous state control¹;

Weak local/global stakeholder involvement²;

¹The 1998 constitution stipulated the summon by federal legislation of a national council to lay down criteria for the designated federal and state forests. The Forest national Corporation (FNC) was instrumental in outlining the envisaged criteria. The chamber of Federal Rule had already summoned a separate committee chaired by an X-Minister of Finance to lay down the criteria for the designation of federal and other forests and division of revenue. The committee conducted several public hearings on the matter and submitted its proposals to the presidency. The views of FNC and the States were heard, but nothing was enacted in this respect, some States continue their existing dispute with the FNC over ownership of forest resources, management thereof and revenue

Weak local and foreign investment³ in the forestry sector

Desertification in northern, central, eastern and western Sudan is widespread, severe and continuing at a linear rate

While overall biodiversity threats include:

- Worsening of climatic conditions
- Weak environmental governance, sustainable participatory planning and the rule of law
- Conflict-related, inter-sectorial natural resources' exploitation⁴
- Lack of targeted investment by the government, the private sector and the international community
- Lack of policies to benefit poor people and lessen resource's inequalities
- Low quality supporting research and education

In response to the threats, the Sudan ETOA provides recommendations to USAID for ways to strengthen its support of biodiversity and forest conservation, through the supporting the following:

- Enabled decentralized environmental governance in the forestry sector; integrating plans of the FNC at the federal level and forest administrations at the states' level;
- Improved conditions of forest resources; implementation of base line studies, employing modern technological practices
- Reversing the trend of forest-cover loss by facing and dealing with environmental degradation, deforestation, and desertification;
- Maintaining the competitive advantage of the forestry sector through targeted investment programs and partnerships with the private sector;
- Securing tenure for forestry lands and harmonizing and regulating local/international stakeholder participation activities
- Inclusion of rural people, civil society, and other stakeholders, particularly communities adjacent to large forests reserves in decision-making and benefits
- Developing poverty-eradication programs, in the forestry sector, to contribute to rural people's incomes while ensuring environmental quality and preserving bio-diversity; Heavy reliance on biomass energy. Sudan's diplomatic isolation and economic sanctions. vii. Poverty Refugees from neighboring countries.
- Solid enactment of reformed policies, legislations and institutional development in the environment sector

²The World Bank recommendations on poverty alleviation stipulates that Sudan's prospects for successful and sustained pro-poor development depends on its capacity to operate political systems which provide opportunities for all people, mainly the majority of poor and disadvantaged, through influencing state policy and practice; with the help of the international community

³Sustainable growth comes from local investment, well matched to foreign investment, building on transparent and accountable management of natural resources. The international community needs to take full cognizance of the implications of the fragile post-conflict reconstruction phase the country faces at this time. Ongoing isolation of Sudan, under UN sanctions are taking their toll on all levels of investment; preventing advanced western technology from reaching Sudan, also deterring western companies from conducting business in Sudan. That brought to the front replacement emerging regimes, such as China and Malaysia, with different agendas.

⁴The experience of Sudan clearly demonstrates that diversifying an agrarian economy is not a mundane business that can be undertaken by marginal changes within the existing sociopolitical and economic structures. The oil revenues may present Sudan with the opportunity of diversifying its economy away from the inherited agricultural base toward a modern structure. However, effecting such a transformation requires good governance, culture of peace, and a disciplined role for the state.

- Sustained resource's management to handle certified construction material, charcoal enterprises, and wood products through supporting the establishment of community and privately owned woodlots.
- Promulgation of bio-diversity supportive policies and legislations on protected area management and threatened biodiversity
- create solid base for eco-tourism, controlled hunting expeditions, and legalized bush-meat trade . Heavy reliance on biomass energy
- well-defined inter-sectorial environmental management responsibilities and powers, through capacity strengthening efforts

Strengthened national water/energy capacity through adopting an Integrated Water Resource Management (IWRM)⁵ approach

Enabled integration of the coastal environmental management within the federal mandate of the Red Sea state, through an Integrated Coastal Zone Management (ICZM)⁶ framework

Improved Petroleum Resource Act of 1998⁷, regulating Sudan Oil agreements; financially, technically and environmentally

Promoting development of sectorial guidelines for Environmental Impact Assessment actions, periodic revision of relevant environmental regulations⁸, and their legal and institutional frameworks

⁵The national approach to water resources management in Sudan is based largely on resource exploitation and biased towards mega-projects. The water resources sector currently also faces a range of serious environmental challenges, which will require innovative management approaches

⁶ICZM is a declared regional mandate within the PERSEGA for establishing sustainable levels of economic and social activity while protecting the coastal and marine environment, with more detail on a range of issues such as fisheries, coastal development, land-based marine pollution sources and tourism

⁷The National Petroleum Commission (NPC), Ministry of Energy (MoE) is the sole director and supervisor of petroleum in Sudan. The legal framework for regulating the environment in oil and gas industry in Sudan is based on the legal context of the oil agreements in the Petroleum Wealth Act, 1998. Accordingly the MoE issued the "Regulations for Protection of the Environment in the Petroleum Industry" in 2001 and amended in 2005. Based on the 'Environment Protection Act, 2000', issued by the Higher Council for Environment and Natural Resources (HCENR), that allows the ministries and federal institutions and grants them the right to issue their own laws and regulations to conserve the environment; Sudanese laws relating to protection of the environment, such as Public Health Act 1973, and the Wealth Sharing Agreement of the Comprehensive Peace Agreement (CPA), international and regional Environmental Conventions, such as the Convention on Climate Change, Biological Diversity, and Kyoto Protocol

⁸Recent initiation and modification of laws linked to the environment, such as proposed Laws including; the Law on National Forests and Renewable Natural Resources, the Law on Fertilizer and Insecticides for 2003, the Law on Agreement on Biodiversity, the Law on Rural Development, Food Security and Poverty Reduction, 2005, the Law on Application of Agreement on Genetic Resources of Food and Agriculture, Sudanese Maritime Law and the National Oil Spill Contingency Plan and other.

Modification of Laws, including; the Law on Settlement and Registration of Lands 1925, the Law on the Protection of the Environment, 2001, Pesticides and National Pest Control 1994, Plant Diseases Act 1960, Water Hyacinth Control Act 1960, Locust Eradication Act 1907, and other

INTRODUCTION

The purpose of this work, as provided at the USAID_SOW_ETOA_N_Sudan, is to prepare an Environmental Threats and Opportunities Assessment (ETOA), administered by a national Environmental Specialist, including a country-wide assessment of biodiversity and tropical forestry conservation needs of northern Sudan and the Three Areas, through a desk study of the available literature, collection of data, and relevant documents and maps; in addition to establishing contact and conducting interviews with government officials, civil society, universities, research organizations, experts, and donor organizations.

The ETOA addresses Sections 117, 118, and 119 of the Foreign Assistance Act of 1961, as amended, and Agency guidance on country strategy development, under ADS 201.3.9.1, ADS 201.3.9.2, and ADS 204. The work involves one person, to be completed in approximately 7 weeks (3 weeks of desk work plus 1 week for revisions after a 2-week comments period). The consultancy is being carried out within the period of September 21st, 2011 through December, 2011. All activities are located within Khartoum, starting with three days of preparation, followed by 15 days of analytical work and finally editing and write up of report.

Based on this needs assessment, an analysis of proposed actions is provided, under USAID/Sudan's new transitional strategy to identify how it contributes to the conservation needs identified. This Environmental Threats and Opportunity Assessment (ETOA) will also inform USAID/Sudan strategic planning, and provide a primary level of analysis on relevant proposed areas of programming, as well as address current Administrative and Congressional priorities, foremost, food insecurity, water resources management, global climate change and global health.

Specifically, FAA Sections 118 and 119 require that all country plans include:

1. An assessment of the actions necessary in that country to achieve conservation and sustainable management of tropical forests (118) and conserve biological diversity (119); and
2. Analysis of the extent to which current or proposed USAID actions meet those needs.

The environmental threats discussed in the document allows USAID/Sudan to develop newly designed programmatic activities, as well as opportunities for innovative use of earmarked funding (especially for biodiversity and tropical forestry conservation), and increased sustainability across development sectors. It can also be used by other organization, to help identify environmental opportunities and priorities for interventions. The ETOA update focuses on providing recommendations to USAID which take into account the changes that have occurred, threats that have increased or decreased, and new opportunities in the environment sector since the original ETOA.

Purpose of the ETOA

The purpose of this work, as provided at the USAID_SOW_ETOA_N_Sudan, is to prepare an Environmental Threats and Opportunities Assessment (ETOA), administered by a national Environmental Specialist, including a country-wide assessment of biodiversity and tropical forestry conservation needs of northern Sudan and the Three Areas, through a desk study of the available literature, collection of data, and relevant documents and maps; in addition to establishing contact and conducting interviews with government officials, civil society, universities, research organizations, experts, and donor organizations. The ETOA addresses Sections 117, 118, and 119 of the Foreign Assistance Act of 1961, as amended, and Agency guidance on country strategy development, under ADS 201.3.9.1, ADS 201.3.9.2, and ADS 204. The work involves one person, to be completed in approximately 7 weeks (3 weeks of desk work plus 1 week for revisions after a 2-week comments period). The consultancy is being carried out within the period of September 21st, 2011 through January, 2012. All activities are located within Khartoum, starting with three days of preparation, followed by 15 days of analytical work and finally editing and write up of report.

The preparation included introductions and discussions with USAID/Sudan and USAID Sudan Program, Washington; over the SOW details and other practicalities. This was followed by developing the assessment methodology; data collection and analysis, editing and write up. This summary report covers review of key natural resources' policies, legislations and institutions for natural resource management, in addition to Sudan's development experience and key environmental threats and opportunities. Most of the institutions visited had USAID at one time as project partner, donor or other. USAID history in Sudan goes back to the post-independence era. The programs, projects and other cooperation activities exceed 70000. Higher ranking personnel in government departments, non-government organisations, the academia, the private sector and other have probably at one point took part in those wide-range activities. The highway connecting the capital and the Gezira Scheme was paved with assistance from USAID in the 1960s. Another highway connecting the capital with rural Khartoum North area is still referred to as Shari' Ma-ouna, which translates as the Aid Highway. This accumulated good will of USAID role in Sudan made the study process much easier, taken by most of the interviewees as a logical continuation of an apparently fruitful process. The available literature and recent reports on the environment sector discuss Sudan as a whole rather than provide separate information for both Republics of Sudan and Southern Sudan. Therefore, it is sometimes difficult to disaggregate the information by region. Since the physical, biological, institutional, and policy environments differ significantly from north to south.

Methodology

The preparation of this ETOA included introductions and discussions with personnel from USAID/Sudan and USAID Sudan Program, Washington; over the SOW details and other practicalities. This was followed by developing the assessment methodology; data collection and analysis, editing and write up. This final report covers review of key natural resources' policies, legislations and institutions for natural resource management, in addition to Sudan's development experience and key environmental threats and opportunities.

Most of the institutions visited had USAID at one time as project partner, donor or other. USAID history in Sudan goes back to the post-independence era. The programs, projects and other cooperation activities exceed 70000 in numbers. Higher ranking personnel in government departments, non-government organisations, the academia, the private sector and other have probably at one point took part in those wide-range activities. The highway connecting the capital and the Gezira Scheme was paved with assistance from USAID in the 1960s. Another highway connecting the capital with rural Khartoum North area is still referred to as Shari' Ma-ouna, which translates as the Aid Highway. This accumulated good will of USAID role in Sudan made the study process much easier, taken by most of the interviewees as a logical continuation of an apparently fruitful process in the past, that may continue in the near future.

A Note on Data Availability for Sudan

This is the first update since the original 2003 Sudan ETOA that was undertaken by Mr. MersieEjigu, (Northern Sudan ETOA April 2003), as sole consultant. That contributed to deepening the understanding of, at the time, North Sudan's environmental threats and opportunities. The available literature and reports on the environment sector constituted a substantial advance on previous work that discuss Sudan as a whole rather than provide separate information for both Republics of Sudan and Southern Sudan. Therefore, it is sometimes difficult to disaggregate the information by region. Since the physical, biological, institutional, and policy environments differ significantly from north to south.

Primary data collection proved to be very challenging, sometimes delving into ambiguity and non-transparency. Most of the interviewees had two sets of different data sources; an official short version, and a further deep and inclusive set that can be charged on a private level. That made the process more complicated and time consuming; delaying the process *ad eternum*, and inducing different and divergent interpretations and controversies. During the Study, the government cabinet changed, as well as some of the ministries, especially those linked to the Environment. For example; the Ministry of Irrigation and Water Resources changed into the Ministry of Water Resources, where as the new Ministry of Agriculture

and Irrigation took over all responsibilities linked to irrigation, same for the Ministry of Environment and Forestry and the Ministry of Electricity and Dams, responsible of all current and future dams in Suda.

This study is presented in six sections: review of the environmental resource base; analysis of Sudan's economic and social trends; identification and analysis of threats to the environment; and analysis of opportunities. In presenting these sections, attempt was made to assess, based on secondary sources, conditions, pressures, trends and changes in environmental resources and the impact of primary driving forces such as population, technology, markets and infrastructure and also the impact of secondary forces, e.g., climate change. This is supplemented by the assessment of the strengths and weaknesses of various policy, legislative, technological, or other actions that have been taken or proposed to improve the management of ecosystems. Threats and opportunities identified by the two major strategies that Sudan has put into place, notably, the National Biodiversity Strategy and Action Plan (NBSAP) and Sudan's National Action Plan (SNAP) to Combat Desertification have been considered.

I. SUDAN: PHYSICAL AND ECONOMIC FEATURES

Sudan, Africa's largest country split in two on July 9th 2011, formalizing the independence of South The Sudan Central Bureau of Statistics, 2011 estimates the population⁹ of Sudan as 39 million, growing at 2.7%, with more than 30 million people living in rural areas. Over 80% of Sudan's employment takes place in the agricultural sub-sector of the economy, the majority of the population are farmers and pastoralists living on subsistence farming and livestock herding in a nomadic way of life. However, an increasing number of people live in urban areas, with the tri-metropolis capital of Khartoum, triangularly shaped sided by the two Niles. Khartoum North to the East of the Blue Nile, and Omdurman to the West of the White Nile having a population of more than 5 million people. The share of urban dwellers in the population increased from 27% in 1990 to 42% in 2009.

Sudan is rich in both underground and surface natural resources that have remained mostly under developed because of political and economic constraints. The country's important natural resources include forests, wildlife, water, pasture and rangelands, coastal and marine resources, and arable lands. Sudan is endowed with petroleum and a range of metallic and non-metallic minerals, including gold, silver, copper, iron ore, manganese, zinc, gypsum, salt, marble and granite.

Location

As of July 2011, Sudan is located between latitudes 8 and 22 degrees north and longitudes 22 and 38 east, in the northeastern part of Africa. The area of Sudan is 1,882,000 square kilometers, borders seven countries, namely Egypt, Libya, Chad, Central Africa Republic, Republic of South Sudan, Ethiopia, Eritrea and the Kingdom of Saudi Arabia across the Red Sea.

⁹Population: 45,047,502 include the population of South Sudan (8,260,490-July 2011). This entry gives an estimate from the Sudan Central Bureau of Statistics based on statistics from population censuses, vital statistics registration systems, and sample surveys pertaining to the recent 2009 census.

FIG. 1: THE REPUBLIC OF THE SUDAN



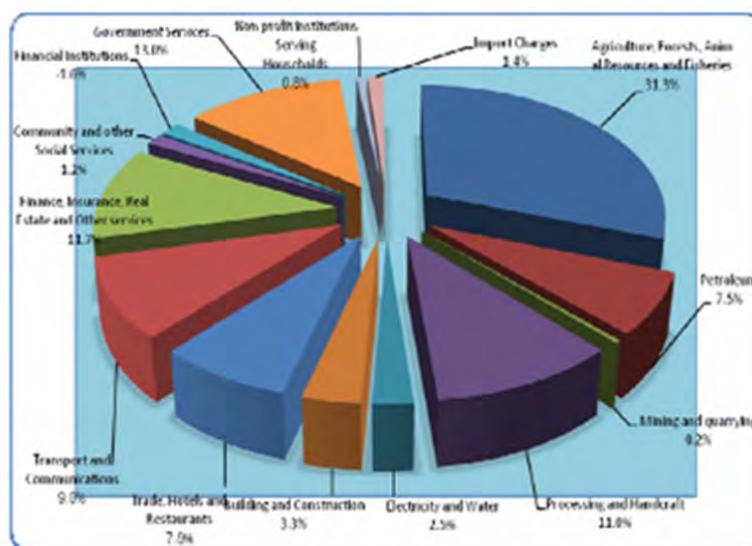
Source: Sudan Survey Department

Population

The Sudan Central Bureau of Statistics, 2011 estimates the population¹⁰ of Sudan as 39 million, growing at 2.7%, with more than 30 million people living in rural areas. Over 80% of Sudan's employment takes place in the agricultural sub-sector of the economy, the majority of the population are farmers and pastoralists living on subsistence farming and livestock herding in a nomadic way of life. However, an increasing number of people live in urban areas, with the tri-metropolis capital of Khartoum, triangularly shaped sided by the two Niles. Khartoum North to the East of the Blue Nile, and Omdurman to the West of the White Nile having a population of more than 5 million people. The share of urban dwellers in the population increased from 27% in 1990 to 42% in 2009.

Sudan had an estimated Gross Domestic Product (GDP) of US \$58 billion in 2008. Agriculture was responsible for 26% of GDP, and industry and services 34% and 40%, respectively. While agricultural land continues to be an important resource, as shown in Fig2; oil production is decreasing, after the cessation of Sothern Sudan. The development of the oil sector, in the last decades, has led to a sharp rise in foreign investment and has boosted the development of the industrial sector (World Bank 2009; USDOS 2009a). Rainfall in some areas of the country has been steadily decreasing over the last 40 years, and the Sahara desert is advancing at a rate of about one mile a year, eliminating grazing land and water holes. Forest ecosystems throughout Sudan have been degraded due to fire, uncontrolled grazing, over-cutting, and encroachment by agriculture. Drought and increasing pressure on land by the expansion of mechanized and rain-fed farming, as shown in Fig.3, have restricted rangelands, and overgrazing is a growing problem. Environmental degradation and competition for limited natural resources has been a contributing cause of conflict in the region (USAID 2007a; Bruce 1998; IRIN 2009a; IRIN 2008; UNEP 2007).

FIG. 2: PERCENTAGE SHARE OF THE SECTORS IN REAL GDP 2010



Source: Bank of Sudan

TABLE1: THE CULTIVATED AREAS DURING 2008/2009

Season	Irrigated agriculture	Mechanized rain-fed	Traditional rain-fed	Total Cultivated
2008/09	2.6	12.3	28.3	43.3
2009/10	2.1	16.3	28.2	46.6

Source: Bank of Sudan

Temperature

Mean annual temperatures vary between 26°C and 32°C across the country. The most extreme temperatures are found in the far north, where summer temperatures can often exceed 43°C and sandstorms blow across the Sahara from April to September. These regions typically experience virtually no rainfall.

Rainfall

The rainfall, on which the majority of the country's agricultural activity depends, is erratic and varies significantly from the north to the south of the country, Fig.3: **Average Rainfall in mm**. The unreliable nature of the rainfall, together with its concentration into short growing seasons, heightens the vulnerability of Sudan's rain fed agricultural systems.

Rainfall is also very variable, and is becoming increasingly unpredictable. The coefficient of rainfall variability, or the percentage deviation from the norm (CV^{10}), decreases from north to south (190% to

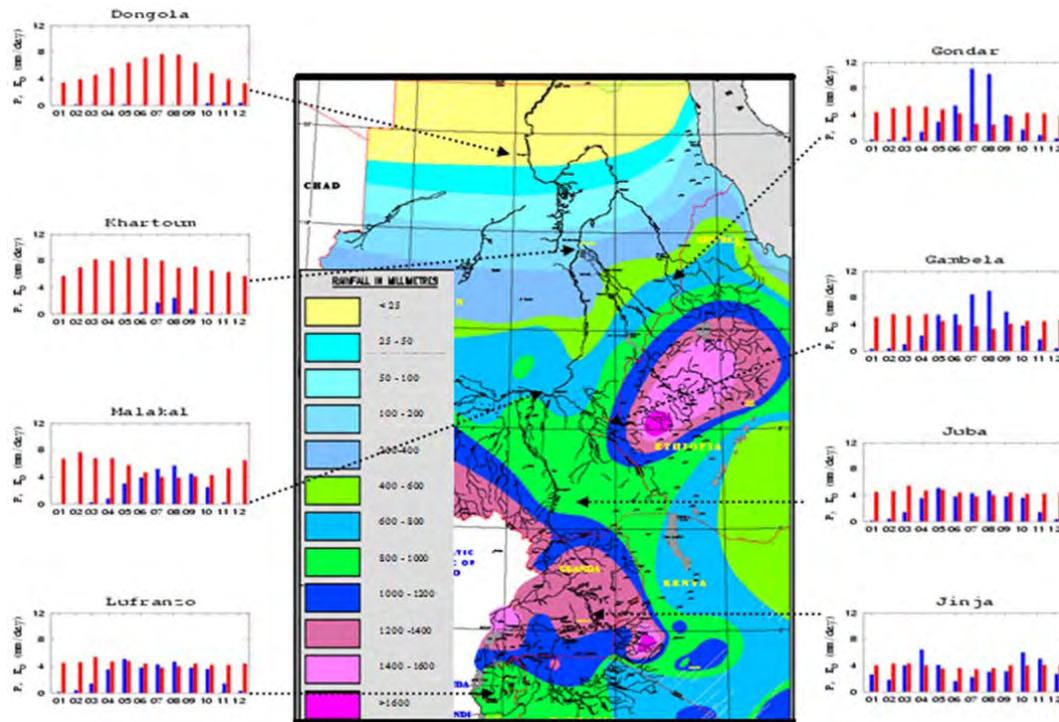
¹⁰The coefficient of rainfall variability (CV) measures the uncertainty of rainfall: the higher the CV percentage the more uncertain the rainfall. The CV seemed to increase between 1941 and 2000 according to data from some weather stations (Elfasher, Kassala, Karima; Figure 3). Average rainfall also declined over the same period (Figure 4). Declining and uncertain rainfall makes life very difficult for traditional farmers and herders and severely affects their livelihoods

less than 15%). Summer is the main rainy season, extending from May to October, with precipitation ranging between less than 50 mm in the extreme north to more than 1500 mm in the extreme south.

Water Resources

Sudan is a meeting point of river tributaries that emanate from the Ethiopian plateau and the region of the Great Lakes. The Blue Nile with its tributaries, Dinder and Rahad, flows from the east annually providing some 54 meters cubic / per day (md.c.m.). The Atbara tributary adds another 12 md.c.m. On the other hand Bahr El Jebel commences from Lake Victoria with permanent rains, but the greater part of the runoff is lost in the *Sudd* area inside the Sudan, bringing only about 15 md.c.m. at Malakal. The Sobat River, which joins the White Nile at Malakal, flows from the Ethiopian plateau and is fed from tributaries inside and outside the Sudan. About 8 md.c.m. of its runoff (estimated at 13 md.c.m.) are lost in the *Sudd* area of Sobat and Mashar. Almost all the water flow of Bahr El Ghazal River (estimated at 14 md.c.m.) is lost in the *Sudd* area of Bahr El Ghazal basin, leaving only half a md.c.m. to join the White Nile at Lake No.

FIG3. AVERAGE RAINFALL IN MM

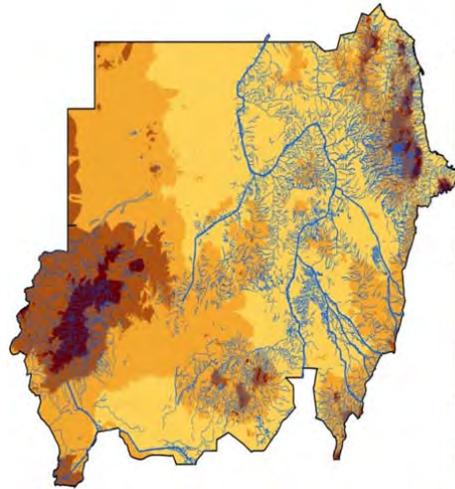


Source: Ministry of Water Resources

The big variation in the Blue Nile and River Atbara flow between the high river during the flood season and the low river during the months from March to May, has necessitated the construction of dams to store water for irrigation and for the generation of hydroelectric power. At present, there are three dams: Sennar (1 md.c.m.), Roseires (3.4 md.c.m.) and Khashm El Girba (1.3 md.c.m.). However, the accumulated silt in the dam lakes has reduced the storage capacity by 25% in Roseires dam and by 40% in both Sennar and Khashm El Girba dams. Thus, heightening the Roseires dam to increase the storage capacity to 7.3 md.c.m. and constructing Siteit Dam across upper Atbara River to install additional storage capacity for irrigation projects are being seriously considered by the Sudan Government. Non-Nilotic resources, Fig4. Seasonal surface non-Nile waters, include El Gash seasonal river which has an annual runoff of 600 million cubic meters (m.c.m.) and Khor Baraka with 500 m.c.m., in addition to about 40 smaller riverlets or wadis scattered all over the central plain, providing about 6.7 md.c.m., which are so far not utilized with the exception of about 0.16 md.c.m. used for domestic purposes. This has been made possible by

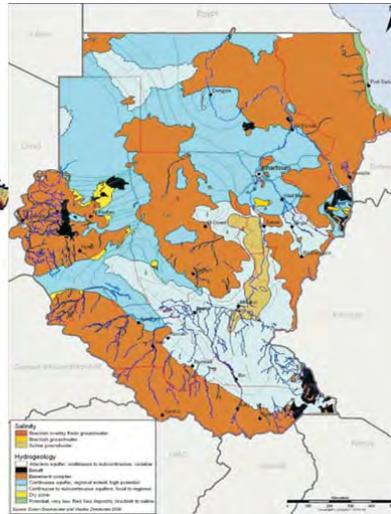
constructing 63 barrages across the wadis to store 130 m.c.m. and by digging 840 hafirs to store about 26 m.c.m. Underground water.

FIG4. SEASONAL SURFACE NON-NILE WATERS



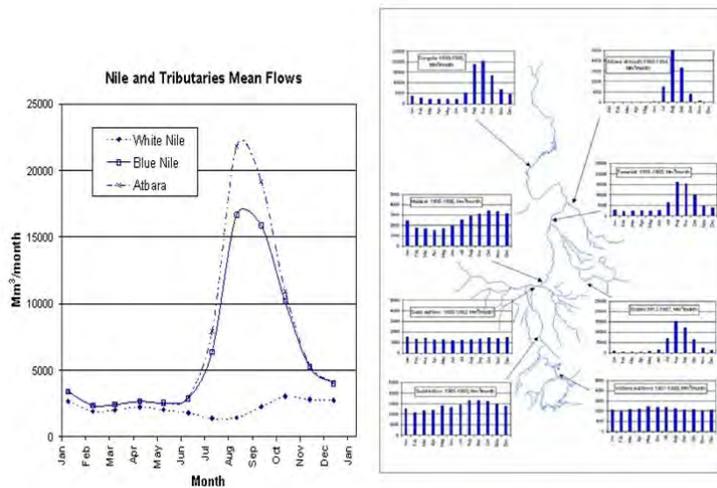
Source: Ministry of Water Resources

FIG5. GROUND WATER



Source: Ministry of Water Resources

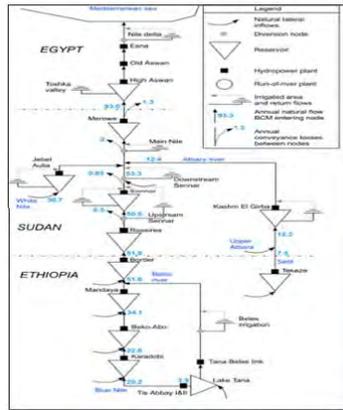
FIG6. NILE AND TRIBUTARIES MEAN FLOWS



Source: Ministry of Water Resources

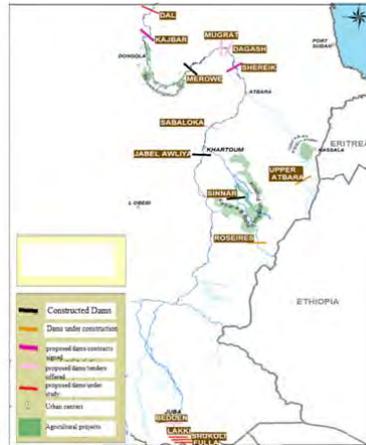
Ground water, potential is present at the water bearing rock strata that comprises the Nubian Sandstone, the Um Rwaba Series and the basement complex which cover, respectively, 28.1%, 20.5% and 9.1% of the total area of the Sudan. The preliminary surveys of the underground reserve quote the figure of nine md.c.m. However, there is need for more research to ascertain the actual figures for the reserve and the replenishment rate. At present, only about 1.3 md.c.m. underground reserves are utilized, of which about 0.45 md.c.m. are used for domestic purposes, while about 0.85 md.c.m. are used to irrigate about 67,200 ha.

FIG7. TOTAL INFLOWS IN MM3/MONTH



Source: Ministry of Water Resources

FIG8. PRESENT AND PROJECTED DAMS



Source: Ministry of Electricity and Dams

TABLE2. WATER INFLOWS

Source	Quantity Km ³	Constraints
Sudan Nile water share (1959)	20.5	Seasonal pattern with limited storage capacity
Non-Nile streams	5-7	Highly variable, short duration, some shared with neighboring countries
Renewable ground water	4.5	Deep water and entails high cost of pumping, remote areas and of weak structure
Present total	30	
Expected share from swamp reclamation (Jongeli canal)	6.0 X	Capital intensive projects, high social and environmental cost

Source: Ministry of Water Resources

Sudan is now utilizing about 14.6 md.c.m of its share of the Nile water for irrigation, of which 9.5 md.c.m. are from the Blue Nile, 1.7 md.c.m. from River Atbara, 1.8 md.c.m. from the White Nile and 1.6 md.c.m. from the River Nile. The heightening of Roseires Dam and the construction of the new dams, such as Merowe Dam at the 4th cataract, in addition to several planned dams, as shown in Fig.7 will enable the country to fully utilize its share of the Nile water, which stands currently at 20.5 md.c.m. at Sennar (18.5 md.c.m. at Aswan) according to the Nile Water Agreement of 1959. While Fig.8 shows the prospect chart for water inflows as planned by the Ministry of Water Resources, the Fig. clearly shows Jongeli Canal Project crossed out, after the cessation of Southern Sudan.

2. STATE OF KEY NATURAL RESOURCES

2.1. Ecological Zones

The ecological zones of Sudan can be used as a basis for the description of biodiversity and populations, as follows:

Arid regions (coastal and arid region mountain ranges, coastal plain, stony plains and dune fields);

The Nile riverine strip;

The Sahel belt, including the central dryland agricultural belt;

The Marra plateau;

The Nubamountains;

savannah;

Wetlands and floodplains;

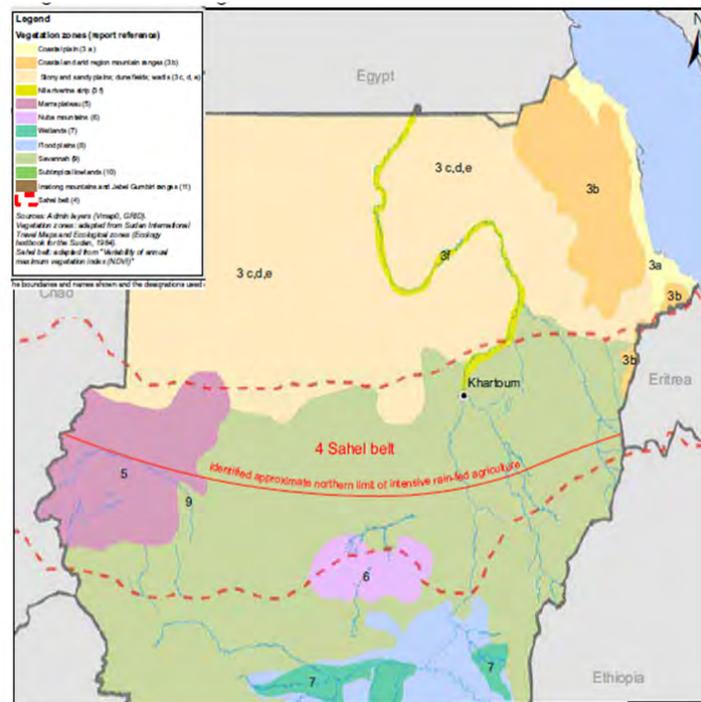
Subtropical lowlands; and

Subtidal coastline and islands

The vegetation of Sudan has been ably described by Harrison and Jackson (1958) and the following Fig and Table are based on several works and modifications such as Agriculture in the Sudan, Arabic version (1999), study on sustainable modern technologies for Forest Resources Development in the Arab Region (1998), and Wickens (1991).

The Vegetation of the Sudan could be divided into the following zones, shown at Table3, Fig8.

FIG 9: THE VEGETATION OF SUDAN



Source: UNEP 2007

TABLE 3: THE VEGETATION OF SUDAN

Major division	Sub-division	App. Area square km.
I- Desert	-	726000
II- Semi-desert	<i>Acacia tortillis</i> – <i>Maerua crassifolia</i> desert scrub	187000
	Semi-desert grassland on clay	104000
	Semi-desert grassland on sand	86000
	<i>Acacia mellifera</i> - <i>Commiphora</i> desert scrub	86000
	<i>Acacia glaucophylla</i> - <i>Acacia etbaica</i> scrub	31000
III- Woodland Savanna	low rainfall on clay soils	
	<i>Acacia mellifera</i> thornland	96000
	On dark cracking clays	52000
	On soils formed in situ with	
	<i>Commiphora</i> and <i>Bascia</i>	119000
	<i>Acacia seyal</i> – <i>Balanites</i> savanna woodland	
	<i>anogeissus</i> – <i>Combretum</i> savanna woodland	49000
	On sand	
	<i>Acacia seyal</i> savanna woodland	65000
	<i>Combretum cordofanum</i> - <i>Albizzia</i>	86000
	<i>Terminalia</i> - <i>Sclerocarya</i> - <i>Anogeissus</i> - <i>Prosopis</i>	65000
	Special areas	
	Toposa area	36000
	Hill catenas	70000
	Baggara catena	18000
	Ragaba catena	34000
	High rainfall	
	<i>Anogeissus</i> - <i>Khaya</i> - <i>Isobertinia</i> savanna	311000
	woodland	
	Woodland savanna recently derived from rain forest	36000

Source: Sudan's Fourth National Report to the Convention on Biological 1 Diversity

2.2 The Agriculture sector

The agriculture sector comprises the agrarian and animal production (animal resources and fisheries), and its contribution to the GDP increased from 30.8% in 2009 to 31.3% in 2010, due to the increase in the area cultivated as shown in Table4, below. Traditional farming accounts for 60-70% of the agricultural output, and is basically subsistence production based on shifting cultivation and livestock rearing. This sector is characterized by low productivity. The extreme rainfall variability has made traditional farmers highly vulnerable to drought, while the extensive farming and slash and burn practices pose serious environmental threats.

The government of Sudan has promoted mechanized rain fed agriculture since the 1960s, as part of its policy to encourage agricultural investment. The 1976 and 1980 Acts are considered to be instrumental for the expansion of rain fed mechanized agriculture. Nevertheless, this unregulated expansion has played havoc to the country's environmental resources resulting in extensive removal of trees, land degradation and destruction of habitats.

There are three types of forests in Sudan,

- (i) Federal forests. This includes riverian forests along the Blue Nile and its tributaries, White Nile and its tributaries, and AIN forest; forests in Jebel Marra, Nuba Mountains, Ingessana, Fau, El Mugrah, and all other montane forests; and forests north of latitude 13 degrees.
- (ii) State forests. All state forests away from the rivers, and all those forests under registration according to the National Comprehensive Strategy (NCS).
- (iii) Community/private forests. All forests established and to be established by communities and private sector, for example, Gezira Board forests, Kennana, Rahad, Singa community forest and private forests in Jebel Mara and Mazmum.

Following a forest sector review by the World Bank, a new Forest Act was issued and the Forests National Corporation (FNC) was created in 1989 with broad mandates. FNC is self-financing and there is no government budgetary support. Partly as a result of this, FNC today is a weak organization both in technical and financial terms. Many forest related legislations remain largely un-enforced and its operations concentrate at the federal level, with ongoing conflicts over states forests management systems. Sudan's community forests development and management experience is less than two decades old. Driven by fuel wood scarcity and environmental protection, community forestry started in early 1984 through extension and awareness raising campaigns. Activities in community forestry include afforestation (plantations) and natural forests development and management.

- After separation of South of Sudan in 2011, the area covered by forests and woodlands is estimated by the Forest National Corporation (FNC) as 21,826,166.62 hectares (ha), equivalent to 11.6% of the area of Sudan, as shown in table4: below.
- Sudan's forests are important sources of food, timber, firewood, and habitat. Fuel-wood and charcoal supply amounts to more than 75% of the country's energy needs. Forests also provide fodder for livestock, marketable non-wood products such as honey, gum arabic, tubers and roots, wildlife, and medicinal plants. Forests contribute to watershed quality by stabilizing off-site soil, reducing off-site sedimentation, reducing flood peaks on streams in small watersheds and replenishing groundwater and watercourses. The ecological-stabilization functions also protect hydropower and irrigation systems. Mangrove forests located along the Red Sea coast serve sink functions, holding excess nutrients and pollutants that could otherwise flow directly into coastal lagoons and coral reefs. In the northern deserts, trees stabilize sand dunes and provide shade (USAID 2007a; FAO 1999; Rahhal and Salam 2006; UNEP 2007).
- Sudan is responsible for 80% of the world's gum arabic production and trade. The country exports 45,000 tons of gum arabic annually, and the crop accounts for an average of 17% of Sudan's annual export earnings. Gum Arabic is produced from the sap of the acacia *senegal*(hashab gum) and acacia *seyal*(talh gum) and is used as a nontoxic binder in a multitude of products, including food and pharmaceuticals. The gum arabic industry provides a critical source of income for rural communities with forestland access (FAO 1993; FAO 1999; UNEP 2007).

TABLE 4: SUDAN AREA ALLOCATIONS

Item	Area/ha.	Item%
Forests Cover	21826166.62	11.60%
Agricultural	25812996.28	13.70%
	49557969.93	26.40%

Item	Area/ha.	Item%
Rangelands		
Bare area	90001343.83	47.90%
Water bodies	319222.033	0.17%

Source: FNC, 2011

- Between 1990 and 2005, Sudan lost an estimated 12% of its forests, 8.8 million hectares. Most of the deforestation has occurred in the northern, eastern, and central regions of the country. The steady degradation and loss of Sudan's forest is attributed to the population's reliance on wood to meet energy needs, drought and desertification in the north, the expansion of mechanized agriculture, and the lack of effective forest governance (UNEP 2007; FAO 1999).
- Most of the country's forests are open or semi-open habitat, with 4% of Sudan's land area; mandated, as forest reserves that receive a special level of protection and management. Forests and woodlands outside of Sudan's official forest reserves are threatened by expanding agriculture and urbanization or are otherwise degraded through unsustainable exploitation to meet the country's energy needs.
- According to the Food and Agriculture Organisation (FAO), the forestry sector contributes as much as 13% to the gross domestic product (GDP) of Sudan. The United Nations Environment Program (UNEP) estimated the fuel-wood requirement for 2006 at 27-30 million m³, based on the 1995 FNC survey indications that fuel-wood contributed 78 percent of the energy balance of Sudan, the rest being provided by oil (8 %), generated electricity (8 %) and agricultural residues (6 %).
- FAO reported that Sudan has already lost an average of 589,000 Hectares (ha)/ year (yr) between 1990 and 2000, through significant and consistent deforestation across the country. This amounts to an average annual deforestation rate of 0.77%. Between 2000 and 2005, the rate of deforestation increased by 8.4% to 0.84 percent per annum. In total, between 1990 and 2005, Sudan lost 11.6 percent of its forest cover or around 8,835,000 ha. In addition, Darfur has lost more than 30% of its forests since Sudan's independence and reforestation of northern and eastern states by invasive species, such as mesquite, is locally significant. Forests and woodlands are continuously being encroached upon by agriculture and urbanization or otherwise degraded by uncontrolled felling. A number of government decrees passed in September 1993 brought the area under forest reserves to 10.0 million ha equivalent to 4.0% of the total country area, at the time. Reforestation of northern and eastern states by invasive species, such as mesquite, is locally significant. Darfur has lost more than 30 percent of its forests since Sudan's independence and rapid deforestation is ongoing.

TABLE 5: FOREST REMOVAL

Year	Forest Area (hectare 1000)	Removal (hectare 1000)	Annual rate (hectare 1000)
1980	34956.2		
1990	30949.2	4007	400.7
2000	26500.0	4449	440.0
2005	24250.0	2250.0	450.0

Source: Talaat 2009

2.3.1 Forest Situation

The undeniable reality is that Sudan is a wood deficit area, in dire and constant need of fuelwood, charcoal and building materials whose supply has been dramatically affected by the expansion of agriculture and livestock. Although Sudan shares some of the forest types found in South Sudan, the majority of the forest resource base there is made up of open woodlands and savannahs of the *Acacia* type. The southeastern clay plains of Sennar, Gedarif and Blue Nile once had extensive forest areas and supplied large amounts of fuelwood, charcoal and poles for the areas further north and the cities. Unfortunately, given the relatively better rainfall conditions, many of these areas have now been cleared for mechanized farming.

Sudan was also once the source of 85% of the world's supply of Gum Arabic, produced from the indigenous "Hashab" (*Acacia senegal*), once the second most important export crop after cotton. In some cases in Kordofan, demand was so high that an indigenous agroforestry practice of "Gum Gardens" emerged whereby local people planted the tree in widely spaced, orchard like configurations and practiced inter-cropping between the trees. The present status of the Gum Arabic resource and trade is unknown. In the mid-1980's, faced with persistent drought and low prices for their outputs as a result of the ineffectiveness of the monopoly control of the market by the parastatal Gum Arabic Trading Corporation and a 40% excise tax on its export, many small producers chose to cut down their trees and convert them into charcoal just before leaving the area.

The hills forests of the Red Sea Hills and Jebel Marra also have more significant tree cover but these, despite reservation and attempts at management, have long been under heavy cutting pressure. In addition, there are *Eucalyptus* spp. and *Poplar* (*Populus* spp.) stands in many of the cutoff areas of the irrigation schemes which take advantage of seepage and water supplies that are inadequate for the chosen crop species. In the Gash Delta of the Atbara River in Kassala State where mesquite (*Prosopis juliflora*) has invaded these wetlands, there is a growing charcoal production system.

Sudan also has some special forests characterized by unique ecological conditions, typically related to the presence of water and drainage-ways. Along the Nile and other rivers, there are some stands of more productive *Sunt* Forests (*Acacia nilotica*) which grows to greater size but is much sought after for rustic building materials and even cut commercially for railway sleepers because of its strength and durability. Two palms were once relatively abundant. The *Dom Palm* (*Hyphaenethebairca*) occurs in well drained permeable soils along river banks or in depressions, in Upper Nile and along the Atbara River. The *Doleib Palm* (*Borassusaethiopum*) is found, sometimes in pure stands, along seasonal water courses on silty soils in the northern fringes of the Nuba Mountains and in neighboring Kordofan. *Tamarix nilotica* is a common species found along the Nile and other river courses, growing in areas where the rise and fall of the water has left relatively high salt concentrations. It was one of the principal species found in the Gash Delta before the invasion of the Mesquite. Along the 850 kilometers of the Red Sea Coast, there are groves of mangroves (mainly *Avicennia marina* and *Rhizophora* spp.). The mangrove forests have been much over-utilized by man for poles, firewood and as a grazing ground for camels.

In 1990, the Government in Khartoum established the Forests National Corporation (FNC) to replace the Forests Administration to provide a more dynamic structure to meet the supply of goods and services of the forests of the country. In recognition of this reality, there have been growing efforts at community forestry since the early 1990's which included: re-stocking of the gum belt, participatory, community forestry efforts at agroforestry, including tree planting for windbreaks around villages in the north, and projects to promote community involvement in the conservation and management of officially reserve forests.

The largest share of this amount was used at the household and services sectors representing about 95% in form of firewood and charcoal, while the rest of the share was in industry sector. The major wood fuels of commercial use is in the brick making industry consuming 52% of wood consumed in the industry sector, equivalent to about 550000 cubic meters in 1995 and 770000 cubic meters in 1999 (HCENR 2003).

TABLE 6: FOREST PRODUCTS

Household	Firewood	Charcoal	Construction	Maintenance	Furniture	Total
Urban	0.133	0.493	0.028	0.021	0.010	0.658
Rural	0.363	0.162	0.064	0.029	0.009	0.637
%	43.5	43.0	7.8	4.3	1.4	100

3. BIOLOGICAL DIVERSITY

3.1 Wildlife Ecosystems

Wildlife ecosystem in Sudan is composed of biosphere reserves, national Parks, game reserves and sanctuaries. The arid and semi-arid habitats of Sudan have always had limited wildlife populations. The delimitations of the various areas in which wildlife are present are derived from a combination of ecological, socio-economic, historical and political factors. It should be noted, however, that the boundaries between certain regions are ill-defined, and the very limited home range migration of some of the species is within those boundaries.

Arid regions. The mountains bordering the Red Sea, as well as those on the Ethiopian border and in Northern Darfur, are host to isolated low density populations of Nubian ibex, wild sheep and several species of gazelle. Larger predators are limited to jackal and leopard. Due to the lack of water, wildlife in the desert plains is extremely limited, consisting principally of Dorcas gazelle and smaller animals. Life centres on *wadis* and oases, which are commonly occupied by nomadic pastoralists and their livestock.

The Nile riverine strip. The Nile riverine strip is heavily populated and as such only supports birdlife and smaller animals (including bats).

The Sahel belt, including the central dryland agricultural belt. In the Sahel belt, the combination of agricultural development and roving pastoralists effectively excludes large wildlife, although the region does host migratory birds, particularly in the seasonal wetlands and irrigated areas. With the important exception of Dinder National Park, the expansion of mechanized agriculture has eliminated much of the wild habitat in the Sahel belt.

The Marra plateau. The forests of Jebel Marra historically hosted significant populations of wildlife, including lion and greater kudu. Limited surveys in 1998 (the latest available) reported high levels of poaching at that time. Due to the conflict in Darfur, there is only negligible information on the current status of wildlife in this region.

The Nubamountains. The wooded highlands of the Nubamountains historically held large populations of wildlife, but all recent reports indicate that the civil war led to a massive decline in numbers and diversity, even though forest cover is still substantial. In terms of plants, a number of species endemic to the Sahel region occur in this ecoregion, there are not many endemic animal species in this ecoregion. In mammals, the rat species *Grammomys aridulus* is near-endemic to the Jebel Marra portion of the ecoregion, and nearby lower areas. Two gerbils, Burton's gerbil (*Gerbillus burtoni* CR) and the hairy-footed gerbil (*Gerbillus lowei* CR), are both strictly endemic to the higher elevations of the Jebel Marra, with the latter confined to hillsides near the crater lakes. Both of these gerbils are regarded as critically endangered. The rusty lark (*Mirafraxifra*) is near-endemic to the area, also being found in other high altitude portions of the Sahara. This ecoregion, particularly the Ennedi Plateau, is also an important location for larger mammals, including threatened antelope populations (Hilton-Taylor 2000). Addax (*Addax nasomaculatus* CR), dama gazelle (*Gazelladama* EN), dorcas gazelle (*Gazelladorcas* VU), and red-fronted gazelle (*Gazellarufifrons* VU) are all found here. The greater kudu (*Tragelaphus strepsiceros*) is considered lower risk but in need of conservation assistance. The scimitar-horned oryx (*Oryx dammah*) is now considered extinct in the wild, but occurred in this ecoregion until the late 1980s. Although unlikely, it may be possible that a few survive on remote locations of the Ennedi Plateau (East 1999). Other common species in this ecoregion include sand fox (*Vulpes pallida*), caracal (*Caracal caracal*), brown hare (*Lepus capensis*), rock hyrax (*Procavia capensis*), African wild cat (*Felis silvestris*), golden jackal (*Canis aureus*) and desert hedgehog (*Hemiechinus aethiopicus*).

TABLE7: THE FLUCTUATION OF WATERBIRDS DIVERSITY AND DISTRIBUTION IN DINDER NATIONAL PARK IN 2009 AND 2010

Year	2009	2010
Total No of birds	14332	1270
Total No of species	63	52

Source: Wild Life Research Centre

The ecoregion includes elements of Afrotropical and Palearctic fauna, with key species including carrion eaters like Nubian buzzards (*Neotisnuba*) and black vultures (*Aegyptiusmonachus*). Not many large predators exist in this ecoregion, except the endangered cheetah (*Acinonyxjubatus*). It also forms part of the greater Sahara ecosystem, where species have developed significant adaptations to drought. For example, dorcas gazelles may not drink water in their lifetime, receiving moisture solely from plants, while the Saharan cheetah can survive on the moisture acquired from the blood and urine of its prey. The only habitats remaining undisturbed in this ecoregion are deep valley floors. However, these areas are inhospitable to larger vertebrates due to their small size and the steep sided valleys. The top of the Jebel Marra was once covered in scrub forest but is now secondary grassland with scattered trees due to human activities. Table 4 shows the fluctuation of waterbirds diversity and distribution in Dinder National Park in 2009 and 2010, the decline in numbers is due to drought and climate change.

3.1.1 Globally important and endangered species in Sudan

The following list includes all mammals which occur in Sudan and are rated as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) in 2009, as reported by the Sudan Wild Life Forces, the country focal point for IUCN, including mammals, birds and reptiles:

Hippopotamus (*Hippopotamus amphibius*); cheetah (*Acinonyxjubatus*); African lion (*Pantheraleo*); Barbary sheep (*Ammotraguslervia*); Dorcas gazelle (*Gazelladorcas*); red-fronted gazelle (*Gazellarufifrons*); Soemmerring's gazelle (*Gazellasoemmerringei*); African elephant (*Loxodontaafricana*); Trevor's free-tailed bat (*Mops trevori*); horn-skinned bat (*Eptesicusfloweri*); greater spotted eagle (*Aquila clanga*); imperial eagle (*Aquila heliaca*); houbara bustard (*Chlamydotisundulata*); lesser kestrel (*Falco naumanni*); lappet-faced vulture (*Torgostracheliotos*); and African spurred tortoise (*Geochelonesulcata*).

By definition, the habitat of most of the Wild Life in Sudan extends beyond all political borders, in the North, South, East and West, within well defined Home Ranges. The migrating birds, represent the major migratory species.

3.1.2 Protected areas of Sudan

A significant number of areas throughout Sudan have been gazetted or listed as having some form of legal protection by the British colonial or the independent Sudanese authorities. In practice, however, the level of protection afforded to these areas has ranged from slight to negligible, and many exist only on paper today. Moreover, many of the previously protected or important areas are located in regions affected by conflict and have hence suffered from a long-term absence of the rule of law. According to the information available to UNEP, northern Sudan has six actual or proposed marine protected sites [11.13], with a total area of approximately 1,900 km², and twenty-six actual or proposed terrestrial and freshwater protected sites, with a total area of approximately 157,000 km²

Nominally protected areas thus cover approximately ten percent of northern Sudan, with three sites – WadiHowar, Dinder and Radon – accounting for a large portion of this figure. While this is significant and worthy of support, the actual level of protection provided and ecosystem integrity are more important than sheer size.

Wildlife authorities interviewed by UNEP in northern Sudan reported consistent problems with protected area management, ranging from poaching to livestock encroachment and land degradation. Many sites

were so degraded from their original condition as to potentially warrant de-listing. The UNEP investigation of Dinder National Park, for example, found that this major site was not only badly damaged and under severe stress, but was also being starved of the requisite funds for proper management.

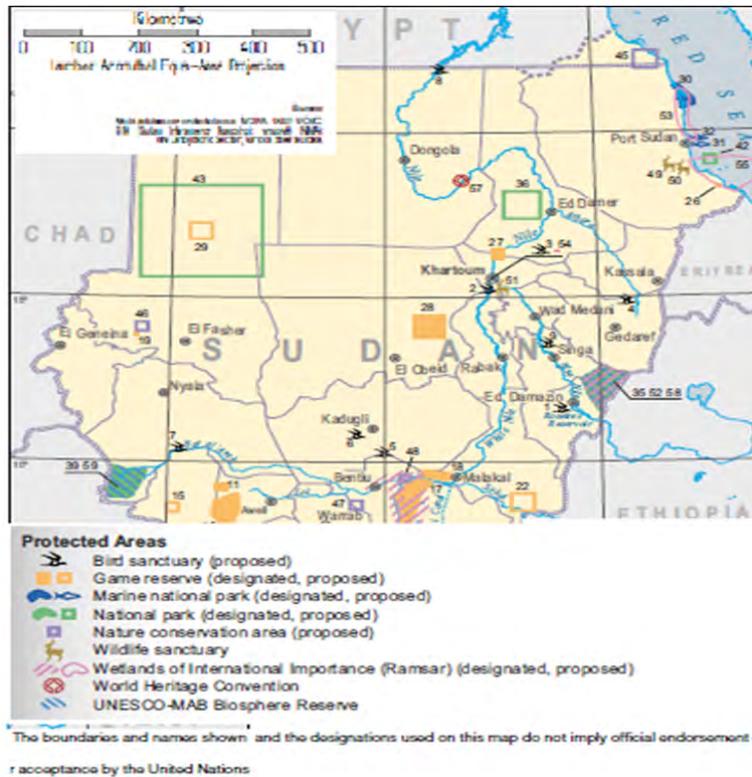
Overall, terrestrial and freshwater sites in northern Sudan were found to be very degraded and on a continuing decline. Marine protected areas were generally in better condition due to a low level of development pressure. The level of actual protection is highly variable but generally weak throughout Sudan. Poaching is a problem in all major parks.

TABLE 8: PROTECTED AREAS IN SUDAN

National Parks	Area (ha)
Dinder	890,790
Radom	1,250,000
Sanganeb	26,000
Game Reserves	
Tokar	630,000
Sabaloga	116,000
Rahad	350,000
Ashana	90,000
Sanctuaries	
Sinkat	12,000
Khartoum Sunt Forest	1,500
Arkawit	82,000

Source: Wildlife Conservation General Administration

FIG. 11: PROTECTED AREAS IN SUDAN



Source: UNEP 2007

3.2. Wetlands of Sudan

Sudan is endowed with several wetland areas that play a vital hydrological and ecological role. They trap and slow seasonal floods, dampening the magnitude of floods downstream and spreading out peak flows over several weeks or months. The delay and extension of flood peaks can facilitate downstream fishing and irrigation, especially in areas with an extended dry season. Wetlands provide habitat for numerous species of animals and plants, many of them unique to these ecosystems.

Those wetlands which are near the edge of the Sahara provide vital staging grounds for migratory birds preparing to cross the desert. Wetlands also trap and hold silt carried by rivers, creating fertile alluvial soils that may be used to grow many crops and vegetables. However, agricultural development schemes, taking advantage of the presence of both fertile soil and water, pose a threat to many wetlands. Wetlands cover about 20% of the total area of the country. Based on the Ramsar definition and according to Morghraby (2001) there are about 13 wetlands types distinguished in the country which include the following:-

- Seasonal Streams (e.g. Gash, Barraka, Dinder&Rahad)
- Nile & its tributaries
- Mountain Streams (e.g. KhorArba'at, River Gilo&Ingassana Hills)
- Lakes
- Man-made lake system
- Dams
- Hot springs
- *Haffirs* (mass man-made seasonal storage)
- Coral reef
- Mangrove Swamps (red sea coast)

The seasonal streams and Nile tributaries wetlands are characterized by their fast flowing, silt laden waters. They perform various functions including nutrients transport to large water bodies, important breeding grounds for fishes, reptiles and water sources for wildlife and domestic livestock. The flora of these wetlands is influenced by the intensity of rainfall (Morghraby, 2001). The largest and most known seasonal streams in the country include Gash, Baraka, Rahad and Dinder.

Aquatic weeds have emerged as a potential threat to the fresh water ecosystem in the Sudan. In 1957, the exotic water hyacinth, *Eichhorniacrassipes*, replaced the once abundant Nile cabbage. Water hyacinth, for example, has infested 3200 kilometers of the White Nile.

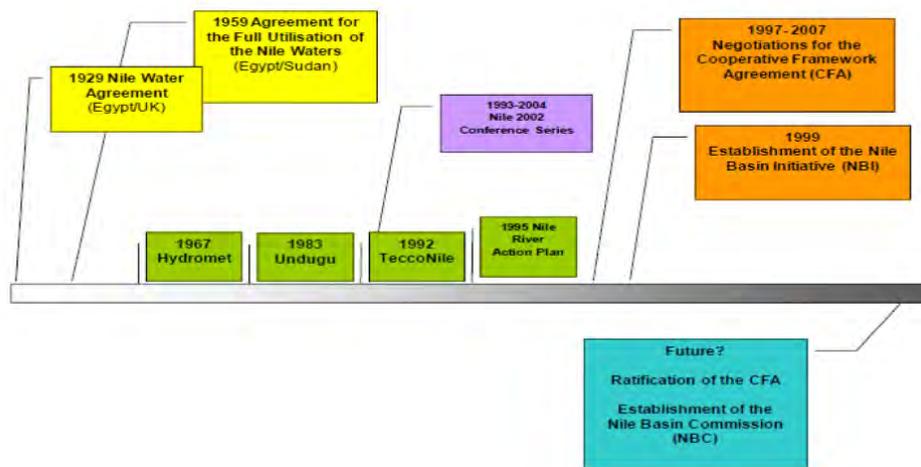
The civil war in Southern Sudan and the postponed Jonglei Canal project, both posed the greatest threat to Sudan’s wetlands, and indeed to the biophysical environment of Africa’s largest wetlands. The Jongeli canal project failed to be implemented due to the conflicts in Southern Sudan and the alienation of the southern people from the preparation and implementation phase, among others. The project failed to take on-board the southern Sudanese people during preparation, designed to address flood problem and to generate hydrological data emphasized by the lower riparians, particularly Egypt.

After the cessation of South Sudan, it is now very difficult to proceed with the project. Sudan government is undergoing an arbitration process with the French Company, once in charge of executing the Jongeli Canal, agreeing to compensate the company for their losses, with Egypt covering its share, while Sudan failing to deliver the decreed amount, hence subjected to penalty clause that tripled the decreed amount. Finally the French Company resorted to freezing Sudan’s assets in France, and planning to go for an international denial of justice motion, as stated by the Sudanese Law firm representing the French company.

3. 2.1. The Nile System

Sudan’s major water resources are the Nile, its tributaries and basins aquifers. Thus, Sudan shares with its neighboring countries, notably Ethiopia and Uganda, both its surface and ground water. For example, the Eastern Nile tributaries extend from Baro, Akobo and Pibor in the south to those of Atbara in the north. The Baro originates from the southwest Ethiopia and forms part of the borders between Sudan and Ethiopia before joining Akobo and Pibor in Sudan. Akobo mark the Sudanese – Ethiopia borders in most of its length. Pibor originates from south of Sudan. The three tributaries join the Sobat River which join the White Nile at Malakal. Dinidir and Rahad join the Blue Nile at Hag Abdalla and Wad Medani in Sudan. The average annual flow at the Sudan-Ethiopian borders is around 48 cu kim. The Blue Nile meets the White Nile in Khartoum.

FIGURE 12.TIME LINE OF HYDROPOLITICAL RELATIONS IN THE NILE BASIN.



Source: Cascao 2009

According to the 1959 Nile Water Agreement between Sudan and Egypt, Sudan has a share of 18.5 Km³ of water. The total water used for irrigation, estimated at 14.0 Km³. This below potential use of water for irrigation is attributed to the limited investment in the irrigation sector, collapse of the infrastructure in some areas in the aftermath of economic liberalization amidst economic sanctions imposed on Sudan. No source of agriculture credit has been possible.

The first Nile Waters Agreement between Egypt and Sudan was signed in 1929. It allocated to Egypt the right to use 48 km³/yr, while it gave Sudan the right to tap only about 4 km³/yr. The treaty does not allocate to Ethiopia any rights to use the Nile waters and also still binds Uganda, the United Republic of Tanzania and Kenya and bars them from using the Lake Victoria waters. In 1959, the Nile Waters Agreement between Egypt and Sudan assigned to Sudan 18.5 km³/yr, measured at Aswan at the border with Egypt. The other riverside nations are still not included in this agreement. Recently, the Nile Basin Initiative has been created and prepared a Strategic Action Programme, which consists of two sub-programmes: the Shared Vision Programme (SVP) and the Subsidiary Action Programme (SAP). The SVP is to help create an enabling environment for action on the ground through building trust and skill, while the SAP is aimed at the delivery of actual development projects involving two or more countries. Projects are selected by individual riparian countries for implementation and submitted to the Council of Ministers of the Nile Basin Initiative for approval. Sudan, Ethiopia and Egypt have also adopted a strategy of cooperation in which all projects to be launched on the river should seek the common benefit of all member states and this should be included in accompanying feasibility studies. Sudan, together with Algeria, Cameroon, the Central African Republic, Chad, Niger, and Nigeria, is located in the Lake Chad basin.

3.2.2 Marine wetlands

The red sea coast extends for about 750 km and includes various small uninhabited islands with low or no vegetation. These islands constitute breeding sites for gulls, terns, crab plovers, boobies, osperys, sooty falcons and spoonbills. There are also fringing coral reefs, sandy beaches, bays and mangroves. Mukawwar, Mayetib and the Taila islets form a small archipelago lying offshore of the fishing town of Mohammed Qol on the red sea coast north of Port Sudan. A little further north lies Dongonab bay, a body of water partially enclosed by a long, narrow strip. There is a small area of mangrove within the bay which is covered by sparsely vegetated coastal dunes. The bay constitutes a good site for the collection of the spat of the mother of pearl shell. The local inhabitants use the bay for fishing and for the collection of trochus, bivalves and other mollusks. The islands are important for breeding turtles. Mammals of global conservation concern, *Equus africanus* and *Dugong dugon* have been reported in the area which has been proposed for protection.

The Suakin archipelago is the largest group of islets on the Red Sea coast, extending southwest south-eastward from the former port of Suakin almost to the Ethiopian border. There are about 30 islets in the archipelago, which are uninhabited and devoid of fresh water supplies. Most of these islands are less than 1 km long, but two, TallaTallaSaghir and TallaTallaKebir, are 5 km in length, some of the larger, rocky islets, formed from raised coral reefs, reach a height of up to 10 m. All the islets, are largely barren, with low vegetation growing only on the sandy fringes. Low, halophytic bushes grow on fossil reefs on some of the smaller islets which are usually fringed by coral reefs. The islets support breeding colonies of *Sterna bergii*, *S. benggalensis*, *S. repressa*, *S. anaethetus*, *Anous stolidus*, *Sula leucogaster*, *Larus bempriehii*, *Dromaardeola*, and four species of turtles. The sea cow has been reported in the archipelago. The site has been proposed as a National Park. The fishermen collect birds, turtles, turtle eggs, shells and corals. Commercial quantities of methane gas have been found but remain unexploited. The area is important for fisheries and has a great potential for tourism.

3.2.2.1 Coastal ecosystem

Sudan's Red Sea coastal line extends 720 square kilometers. Because Khartoum, the capital city, is some 1,200 kilometers from Port Sudan, there has not been much attention given to studying the marine ecosystem. Some isolated research done by the Institute of Environment Studies of the University of

and Water Resources introduced the appeal for some \$1 billion for six years of 65 inter-related water system projects to reverse the rapidly declining water supply in Darfur and in doing so to tackle one of the major factors contributing to the ongoing conflict as well as threatening the livelihoods of ordinary Darfuris. More than 600 water and development experts, Darfur state and Sudan federal authorities and technical experts, and representatives of national and international organizations participated in the Conference, Media and others.

“Between pledges and expressions of interest, more than one half of the Appeal has been met,” said Nils Kastberg, UNICEF Country Representative for Sudan, adding that UNICEF itself intends to continue its \$23 million annual expenditure on water projects in Darfur. The largest commitment came from the Government of Sudan which said it would contribute \$216 million, as well as cancel tens of millions of dollars in VAT and other import taxes for water supply investments. Donors expressing interest in major pledges included the Arab League, whose representative said that several Arab states had indicated they would give a total of well over \$100 million for the six years.

The Islamic Development Bank and African Development Bank, as well as representatives of Turkey and Japan, indicated their interest in supporting water management projects in Darfur and would respond positively to the Appeal. The United Kingdom and the United States indicated they would support work in the sector. The urgency of rebuilding and enhancing a sustainable water supply system for Darfur in order to build a sustainable peace was a major theme expressed throughout the conference. Competition for dwindling natural resources, in particular water, had contributed to the conflict and would ensure its continuation if not addressed urgently, several speakers stressed.

The link between water and peace inspired the AU-UN peacekeeping mission (UNAMID) to collaborate with Sudan water officials and UN country team members UNICEF, UNDP, UNESCO and UNEP to organize the Water Conference.

Government and UN officials described a dire situation in Darfur where climate change, rapid population growth and environmental degradation led to competition for dwindling natural resources and a water crisis. That crisis in turn has contributed to the recent conflict which erupted in 2003, resulting in the deaths of tens if not hundreds of thousands of Darfuris and currently about 1.8 million internally displaced persons. IDP camps are also contributing to the depletion of the water table. The goal of the partners involved in the Conference is to create a new integrated framework to provide sufficient and equitable water for all users and proper management of resources “in parallel with the political process— which together will deliver lasting peace.

3.3 National parks

The protected areas fall under three categories:

- National Parks with highest degree of protection
- Game Reserves with limited permission for use of the resources permitted
- Game Sanctuaries with protection for specific species.

The wide range species and ecosystem diversity that Sudan is endowed with include: 12 orders of flowering plants out of the 13 found in Africa. Of the 3132 species of flowering plants found in the country, 409 species are endemic; of the 265 species of mammals, seven are endemic.

Sudan has also 938 of bird species, 105 Nile fish species, 91 reptile species, The International Union for Conservation of Nature (IUCN) list of threatened species in Sudan includes: 9 plant, 17 mammals, 8 birds, and one reptile, reported by the Wildlife Conservation General Administration, the focal point of IUCN in Sudan. However, no recent proper surveys are conducted to verify those figures, due to shortages of budgets allocated for that purpose. Limited, more specific surveys are carried out by different local and international parties for specific purposes and within limited budgets. A recent FNC study shows that there is 42 threatened species in Sudan. Wildlife management in Sudan is government based. The Wildlife Conservation General Administration (WCGA) is the official government agency responsible for wildlife conservation and management in the country. Conservation practices appear to follow traditional (protectionist) approach with no local community participation in wildlife management.

Wildlife reserves under the government based management system include three classes of protected wild animals:

- Class I include completely protected group
- Class II are to be hunted according to special license approved by the Minister
- Class III Hunted by holders of an ordinary license.

The wildlife and National Park Act of 1987 focused on the conservation and protection of wild animals and neglects or excludes the wild plants. It does not provide for zoning of parks and classifications of areas with potential for multi-purpose uses, in particular the exclusion of people residing around national parks in wildlife management constitutes unsustainable practice.

The IUCN's List of 17 threatened mammal species in Sudan includes the Oryx gazelle, Dama gazelle and Adox gazelle.

Hunting is prohibited except on license. WCGA issues these licenses, which is its major source of revenue. However, WCGA has limited capacity to enforce legislation. Most parks and protected areas are inadequately staffed and financed. In addition, there are no land use plans, and most protected areas are left open to human settlement, cultivation and livestock grazing.

3.3.1 Dinder National Park

February 2012 witnesses a national call for the future of the park, where several ministers, government and non-government wide representatives will meet and consult over the park's urgent issues. Indeed, since 1964 many efforts were made with view to evaluating existing management system and development of approaches to improve and enhance sustainable management of the park. The Dinder National Park is considered one of the most important wildlife reserves. FAO sponsored survey of the park conducted in 1993 by the WRC & SECS and the additional UNESCO sponsored surveys of 1998 indicated the serious threat to the park arising from expansion of agriculture and settlements in and around the park. The surveys suggested the creation of the following management areas:

- A natural resources management area (west of the park)
- An experimental game utilization in north of the park
- Game reserves area

The Dindir National Park Project (DNNP), was based on the above surveys, with an objective to conserve the park's biodiversity through the involvement of local communities in the sustainable use of the natural resources of the park. The project currently housed in the Higher Council for Environment and Natural Resources is funded by UNDP/GEF.

The management of the park is planned to be based on a well-articulated management plan that sought to involve local communities to ensure sustainability of the future management of the park. Supporting technical activities include: habitats rehabilitation for endangered and threatened species; fire control; personnel training in environmental management; conduct problem solving oriented research; and development of 8-park buffer zone land use plan. The involvement of the local communities in the sustainable use of resources forms the main strategy of the park management. At about the same time, Sudan's Environment Conservation Society (SECS) embarked upon awareness raising aimed at community leaders using documentary films, slides show and a visitor guide book.

3.4 Energy resources

The Cessation of Southern Sudan, and the added hydro-power from the Merowe dam, the heightening of Roseires dam, in addition to the positive effect of the oil era on the trends of energy use in Sudan, all that contributed to shifting Sudan's energy profile s from total dependency on biomass. Along the period 2000-2009; biomass consumption shifted from 88% to 65%, while oil accounts for 11-30%, and hydropower 1-5%. The national energy policy of the government accords priority to hydro-power production through the promotion of large-scale dams construction, supported by some 3.3 billion USD

investment in oil production, in addition to succeeding in attracting Foreign Direct Investment (FDI) from a number of emerging economies.

3.4.1 Biomass

Forest biomass provides a total of 4.11 million tons of oil equivalent. Biomass is consumed in the form of firewood and charcoal. Vast areas of natural forest are harvested each year to provide the needed supply. Demand for wood-fuel has been increasing over the past years mainly owing to the increase in population, particularly in the rural areas where this forms the only source of domestic energy. Nevertheless, wood-fuel consumption is expected to decrease from the current consumption level, especially in household and traditional industries sectors as a result of the increase in petroleum production. Currently, the government focuses on improving energy distribution leaving much of the investment in the sector to private organizations and individuals.

3.4.2 Hydropower

The development of the country's water resources have recently become a political priority, investing in the country's great water development potential, within a comprehensive utilisation of the Nile water resources. New hydropower dams and irrigation schemes are being built, such as the Merowe dam at the Fourth Cataract older ones extended, and other projects planned for the coming years, as shown in Table below.

TABLE 9: DAMS OF SUDAN

Dams	MW
Roseires heightening	280
Sennar	380
Jebel Awlia	205
Merowe	1250
Seteit and Upper Atbara	380
Sabaloga	205
KhashmAlGirba	13

Source: Ministry of Electricity and Dams

According to the International Energy Agency (IEA), combustible renewables and waste accounted for 68 percent of Sudan's total primary energy consumption in 2008, followed by petroleum (32 percent) with hydroelectric power accounting for a small share. The large share of biomass in the energy mix represents the large population, located in rural areas with little or no access to the electricity grid, that relies heavily on biomass to meet heating and cooking needs. According to the IEA, approximately 27 million people in Sudan lack access to electricity, the country as a whole has a 36 percent electrification rate with urban areas accounting for half of the population with access.

3.4.3 Oil

Sudan began exporting oil in 1999, 2008 marking the 10th year of its longest and strongest growth episode since independence. The size of its economy, measured by nominal gross national product, has grown fivefold—from \$10 billion in 1999 to \$53 billion in 2008. The impact of exploration and production is at the moment not fully known. It remains an important area of ecological concern. Sudanese authorities, however, see oil production as mixed blessing. While oil production is bound to negatively impact on the natural habitat in the oil production area, they argue that biomass saved as a result of consumers shift to petroleum as a source of energy will far outweigh the direct damage done by the oil fields.

The sustainability of Sudan’s oil-led growth failed under threat of a number of economic and political factors. While the political threat came from the cessation of Southern Sudan, including 70% of the oil fields; the economic threats come from Sudan’s over-reliance on a single commodity as its main source of growth, the neglect of growth in non-oil sectors and the increasingly dominant role of the public sector.

Oil plays a major role in the economy of both Sudans. According to the International Monetary Fund, oil represented over half of government revenue and 90 percent of export earnings for North Sudan. For South Sudan, oil represented 98 percent of total revenues. Under the CPA, South Sudan was given some degree of autonomy from the North but revenues from oil produced in South Sudan were shared equally. Most of Sudan’s oil is produced in what is now the South (about 75 percent, depending on specific field allocations), but the entire pipeline, refining and export infrastructure is in the North.

In the near-term, both countries will remain co-dependent in terms of the oil industry. The loss of oil revenues will have a serious impact on the economy of North Sudan at a time when it is still facing international sanctions – while land-locked South Sudan is dependent on the North to export its crude. At the time of writing, both countries had yet to come to an agreement regarding transit fees.

Sudan was seeking fees that would offset the loss of its 50 percent share of the South Sudan’s revenue. South Sudan was also in talks with interested companies to create a possible export pipeline through Kenya but this would take 2-3 years to build and its development will depend on the terms of any agreement between the governments of South Sudan and Kenya, as well as interested companies.

FIG14. SUDAN, SOUTH SUDAN OIL



Source: Drilling Info International

FIG15. POLLUTION IN THE PRODUCTION FIELDS



Source: Ministry of Energy

After July 2011 most of the oil fields and production is produced in South Sudan, but the pipeline, refining and export infrastructure is in Sudan of the country.

According to Oil and Gas Journal (OGJ), Sudan had five billion barrels of proved oil reserves in January 2011, up from an estimated 563 million barrels in 2006. Other analysts put reserve estimates as low as 4.2 (Wood Mackenzie) or as high as 6.7 billion barrels (BP 2011 Statistical Review).

The majority of reserves are located in the in the Muglad and Melut basins. Due to civil conflict, oil exploration has mostly been limited to the central and south-central regions of the country. Natural gas associated with oil production is mostly flared or re-injected. In 2009, there were announcements of natural gas discoveries in Sudan but these have yet to be determined commercially viable.

In the past exploration and development of Sudan's oil resources has been controversial. International human rights organizations have accused the Sudanese government of financing human rights abuses with oil revenues, including the mass displacement of civilians near the oil fields. Factional fighting and rebel attacks on oil infrastructure have kept oil production and exploration from reaching full potential. China National Petroleum Corporation (CNPC), the largest investor in Sudan, has had workers and facilities attacked while at the same time; China has faced international condemnation for its investments in Sudan. The United States prohibits U.S. nationals from engaging in any transactions or activities related to the petroleum or petrochemical industries in Sudan as a result of the conflict in Darfur. Sudan also faces sanctions from the United Nations and the European Union which include arms embargos, travel bans, and restrictions on financial activities that may impede the peace process – without specifically addressing the petroleum. The Sudan National Petroleum Corporation (Sudapet), Sudan's national oil company, is active in the country's oil exploration and production. However, due to its limited technical and financial resources, Sudapet often develops joint ventures with foreign companies in oil projects but remains a minority shareholder. Sudan is planning to carry out a licensing round for blocks in the northern and western (Darfur) part of the country. Nilepet is South Sudan's national oil. Foreign companies involved in Sudan's oil sector are primarily from Asia. They are led by the CNPC, India's Oil and Natural Gas Corporation (ONGC) and Malaysia's Petronas.

3.4.4 Exploration, production and the Environment

Oil production began in the late 1990s and grew rapidly starting in July 1999 with the completion of an export pipeline that runs from central Sudan to the Port of Sudan. In 2010, EIA estimates that crude oil production averaged just over 470,000 barrels per day (bbl/d). First half 2011 data indicate a slight decline, averaging about 460,000 bbl/d. The legal framework for regulating the environment in oil and gas industry in Sudan is as follows:

- The legal context of the oil agreements is the Petroleum Wealth Act, 1998. Accordingly the MEM issued the "Regulations for Protection of the Environment in the Petroleum Industry" in 2001 and amended in 2005.
- The 'Environment Protection Act, 2000' issued by the Higher Council for Environment and Natural Resources, allows the ministries and federal institutions and grants them the right to issue their own laws and regulations to conserve the environment.
- All Sudanese laws relating to protection of the environment, such as Public Health Act 1973...etc.
- The Wealth Sharing Agreement of the Comprehensive Peace Agreement (CPA).
- International and Regional Environmental Conventions, for instance: Convention on Climate Change, Biological Diversity, Kyoto Protocol etc.
- In the late nineties when the Department of Environment and Energy Conservation was established within the General Directorate for National Energy Affairs (NEA).
- In the year 2003 the Advisory Commission for Environment and Safety (ACES) was established within the organizational structure of the Sudanese Petroleum Corporation (SPC) to coordinate direct efforts and establish safety and protect the environment according to the following axes
- Revision of new plans and project designs regarding safety and protection of the environment.

- Development of systems and regulations concerning safety and combating negative environmental impacts
- Setting of control and inspection mechanism for the petroleum industry, storage facilities, transportation and distribution to ensure the compliance of companies to the rules and regulations of safety and protection of the environment.

4. ENVIRONMENTAL GOVERNANCE IN SUDAN

The powers and responsibilities set out in the 2005 Interim National Constitution relating directly or indirectly to environmental governance as follows at below table:

TABLE 10: POWERS AND RESPONSIBILITIES SET OUT IN THE 2005 INTERIM NATIONAL CONSTITUTION RELATING DIRECTLY OR INDIRECTLY TO ENVIRONMENTAL GOVERNANCE

Schedule (A) National powers	
Section/ Title	
15	National lands and national natural resources
19	Meteorology
23	Intellectual property rights, including patents and copyright
25	Signing of international treaties on behalf of the Republic of Sudan
27	National census, national surveys and national statistics
29	International and interstate transport, including roads, airports, waterways, harbours and railways
30	National public utilities
33	Nile Water Commission, the management of Nile waters, transboundary waters and disputes arising from the
	management of interstate waters between northern states and any dispute between northern and southern states
Schedule (B) Powers of the Government of Southern Sudan	
2	Police, prisons and wildlife services
6	Planning for Southern Sudan government services including health, education, and welfare
9	The coordination of Southern Sudan services or the establishment of minimum Southern Sudan standards or the
	establishment of Southern Sudan uniform norms in respect of any matter or service referred to in Schedule C or Schedule
	D, read together with Schedule E, with the exception of Item 1 of Schedule C, including but not limited to, education, health, welfare, police (without prejudice to the national standards and regulations), prisons, state public services, such authority over civil and criminal laws and judicial institutions, lands, reformatories, personal law, intra-state business, commerce and trade, tourism, environment, agriculture, disaster intervention, fire and medical emergency services, commercial regulation, provision of electricity, water and waste management services, local government, control of animal diseases and veterinary services, consumer protection, and any other matters referred to in the above Schedules

10 Any power that a state or the National Government requests it to exercise on its behalf, subject to the agreement of the Government of Southern Sudan or that for reasons of efficiency the Government of Southern Sudan itself requests to exercise in Southern Sudan and that other level agrees

14 Public utilities of the Government of Southern Sudan

19 Any matter relating to an item referred to in schedule D that cannot be dealt with effectively by a single state and requires

Government of Southern Sudan legislation or intervention including, but not limited to the following:

(1) natural resources and forestry

(2) town and rural planning

(3) disputes arising from the management of interstate waters within Southern Sudan

Schedule (C) Powers of states: regarding environmental governance, most powers – executive and legislative – are at state level

8 State land and state natural resources

13 The management, lease and utilization of lands belonging to the state

17 Local works and undertakings

21 The development, conservation and management of state natural resources and state forestry resources

23 Laws in relation to agriculture within the state

27 Pollution control

28 State statistics, and state surveys

31 Quarrying regulations

32 Town and rural planning

36 State irrigation and embankments

40 State public utilities

Schedule (D) Concurrent powers: The National Government, the Government of Southern Sudan and state governments shall

have legislative and executive competencies on any of the matters listed below

1 Economic and social development in Southern Sudan

3 Tertiary education, education policy and scientific research

4 Health policy

5 Urban development, planning and housing

6 Trade, commerce, industry and industrial development

7 Delivery of public services

12 River transport

13 Disaster preparedness, management and relief, and epidemics control

15 Electricity generation, and water and waste management

17 Environmental management, conservation and protection
19 Without prejudice to the national regulation, and in the case of southern states, the regulation of the Government of Southern Sudan, the initiation, negotiation and conclusion of international and regional agreements on culture, sports, trade, investment, credit, loans, grants and technical assistance with foreign governments and foreign non-governmental organizations
23 Pastures, veterinary services, and animal and livestock disease control
24 Consumer safety and protection
25 Residual powers, subject to schedule E
27 Water resources other than interstate waters
31 Human and animal drug quality control
32 Regulation of land tenure, usage and exercise of rights in land.
Schedule (F) Resolution of conflicts in respect of concurrent powers: If there is a contradiction between the provisions of Southern Sudan law and/or a state law and/or a national law, on the matters referred in Schedule D, the law of the level of government which shall prevail shall be that which most effectively deals with the subject matter of the law, having regard to:
1 The need to recognize the sovereignty of the nation while accommodating the autonomy of Southern Sudan or of the states
2 Whether there is a need for national or Southern Sudan norms and standards
3 The principle of subsidiarity
4 The need to promote the welfare of the people and to protect each person's human rights and fundamental freedoms

Source: UNEP 2007

4.1 Eco-tourism

Tourism industry in Sudan is less developed, as depicted by the figures in Table 12 below. However, many locations offer great potential for eco-tourism, such as:

TABLE 11: TOURISTS NUMBERS 2004-8

Revenue in Million US S	Number of Tourists	Year
68.3	60566	2004
316.4	245797	2005
409.3	328156	2006
427.6	346292	2007
548.7	439661	2008

Source: Ministry of Tourism and National Heritage
Dept . of Statistics and Information

Khartoum, which is situated at the confluence of the Blue, and the White Niles is the capital and seat of the Government, with Omdurman "the national capital" across the White Nile and Khartoum North across the Blue Nile. It forms one unit called The Three Towns Capital. The capital is an amalgamation of many interesting places such as: the confluence of the two Niles, the Sudan national museum, the tomb of the Mahdi, the mosque and the house of the Khalifa, the Karari battle field, the handcraft center, the camel market, the Dervish center in Hamad El-Nil and the Nuba Wrestling at Hamad El-Nil.

Jebel Barkal, the sacred mountain; rocky mass of Jebel Barkal rises from the plain about 1.5 miles from Karima. In ancient times it was a holy mountain the abode of God Amon. At the foot of the mountain are scattered the ruins of the temples dedicated at various to the worship of God. The remains of about a dozen buildings may now be seen through little remains of their former splendor.

Nagaa:The most perfect ruins are the Sudan is at Nagaa, about 2,4 miles from Wad Ban Nagaa and 35 miles from Shendi. There, besides numerous mounds are the remains of several temples, the last preserved of which a small square Kiosk is built in the Roman style of the 2nd. Or 3rd. Century AD Close by is a small temple consisting of a pylon with a single chamber behind and the remains of a portico in front. On the southern pylon tower appears King NetekAman and on the northern Queen Amanteri, who ruled at Meroe from 15 BC to 15 AD, is shown, each accompanied by a lion, smiting-groups-of-captives.

The walls of the chamber are covered with relief's showing various Gods and Goddesses, but the temple appears to have been principally dedicated to the Lion God Apezemak and is subsequently known as the Lion Temple. There are also the remains of-a-large-temple-dedicated-to-Amon.

Musawarat-El-Safra:

Ten miles of Wad Ben Nagaa lies the ruins of Musawarat El Safra picturesquely situated in a basin like valley. There are low enclosure walls, which appear to have, been built as pens for flocks and herds. A central building on a raised platform with little towers at the corners and a colonnade in front might be the King's principal divan, and the building connected with it by long covered passages and flights of steps would-probably-be-harem-quarters.

Ancient-Maroe-Area:

Around Begarawiya and Shendi: Meroe (Begarawiya) the area is a strong hold of temples and palaces, although much ruined, representing the Meroitic period (200 BC - 200 AD). Pyramid field of middle and late Meroitic (200 BC to 380 AD) is a remarkable-sight.

Significant-wild-species:Dinder National ParkTheDinder National Park is a homeland of the Savannah mammal's birds and vegetation's. Among the herbivores founded in the park are Reed buck, Bush buck, Water buck, Greater Kudu, Buffalo's, Warthog. Roanentelope, Porcupine, etc. carnivore's are Leopard, Spotted Hyena, Striped Hyena, wild dog, jacles,-several-cat,-cheetah,-lion...etc.

The-Red-Sea:The crystal sea is one of the richest in water life, coral reefs and adversity of marine life rarely founded in one location. The coastal line of the Red Sea bordering the Sudan is 750 km. and is

characterized as the ideal sea for snorkel's, divers and under water photographers. It is comfortably warm and visibility is better than in most places. The best time suitable for all activities in the Red Sea is from September-to-May.

Suakin: The old walled city in which various civilizations met and reconciled was described by the famous traveler Dr. Wulhelm Junker in 1875 as (a very daughter of the Red Sea surrounded by marine waters. The houses are the products of the deep being built of the Caroline limestone fished up from the bottom of the Sea.).

Resorts:

Arkawit: Summer and winter resort area known commonly as the evergreen paradise. Arkawit is located on a high plateau some 205 km. South West Port Sudan. It is a well developed Summer and Winter resort area sitting on a mountainous region of unspoiled grandeur with an altitude of 1200m. Above sea level.

Jebel-Marra: In Western Darfur State. Marramountain is 3300 m. The second highest in the country, with water falls, volcanic lakes and an outstanding scenic beauty.

Arusa: A tourist village 50 km. North Port Sudan. It is an alternative diving center equipped with all accommodation facilities.

4.2 The Higher Education System

Nearly all institutions of higher learning offer degree courses in environment and natural resources at the undergraduate and graduate levels. While it is acknowledged that encouraging advances have been made in the past decades in designing courses, almost all universities currently suffer from field and laboratory training resources. The quality of higher education has also gone down primarily due to budgetary constraints, and the isolation and lack of academic mobility due to the economic sanctions. Most textbooks are old and outdated. As a result, many university graduates would require additional worldly experience in order to be meaningfully engaged in natural resource management.

On the biodiversity research side, the situation is hardly encouraging. Research done is at best modest owing to the lack of funding. Thus, the higher education system finds itself in vicious circle where poor training is breeding poor researchers and trainers and that in turn is producing weak students.

5. THE IMPACT OF THE STRUCTURE OF GOVERNMENT ON NATURAL RESOURCE LEGISLATION AND MANAGEMENT

The structure of government up to 1960 was essentially central, with only few local governments units in selected rural and urban areas given power to raise revenue to fund the provision of basic services. Beginning 1960, several initiatives were taken towards decentralization.

5.1 The Federal System of government

In 1971, the Peoples' Local Government Act expanded the local government system established in 1951, by the creation of more provinces, districts within the provinces and urban and rural councils within the different districts. Further development took place in 1980 with the promulgation of the Regional Government Act that divided Sudan into regions, each with a legislative body and a regional government.

More devolution of the central government powers took place in 1992 with the launching of the Federal Government Act. The country was divided into twenty-six States. Each State was also divided into provinces. Provinces were further subdivided into localities. The prime objective of the federal system of government was to ensure the equitable sharing of power and resources and facilitates economic and social development.

Today, Sudan has fifteen states. Each State has a legislative body and a state government. Lower levels of government exist in each state.

The present day states are: Northern, River Nile, Khartoum, White Nile, Blue Nile, Sennar, Gezira, Northern Kordofan, Western Kordofan, Southern Kordofan, Northern Darfur, Western Darfur, Southern Darfur, Gedaref, Kassala, Red Sea.

5.2. Natural resources legislation, management and institutions

Matters relating to the exploitation of natural resources had been incorporated in the responsibilities and terms of reference of the central government departments. Each department has been given responsibility for the management of a single resource, i.e., forestry, wildlife, rangelands, water, agriculture, throughout the country. The gradual processes of decentralization and devolution of power seems to have very little impact on this basic set up as the sector-based legislation, professional practice and tradition continued.

5.2.1 Land tenure legislation and land use

The Land Settlement and Registration Act, issued in 1925, provided for individual rights and interests over land that included cultivation, pasture, woodcutting, and holding. In 1970, the government promulgated the Unregistered Land Act that bestowed ownership of any wasteland, forest or unregistered land on government. Private ownership of land is limited to the registered rights before the coming into force of the Unregistered Land Act of April 1970.

Unregistered land is almost 95% of the Sudan land area. Although the government has the formal ownership of the unregistered land, it has not been able to exercise effective control over land allocation and utilization.

The land allocation and judicial powers which provided a certain measure of control, regulation and conservation were taken from the native administration and vested in the local government officers and later in the state government. Neither level of government has the knowledge of the traditional use of neither land, nor the means for planning and control of land use. This resulted in uncontrolled expansion of mechanized farming wreaked havoc to the country's natural resources.

At present, Sudan has no a national land use policy, nor is there a legislation that deals with land use. Sudanese authorities believe that it is the absence of land use plan that is the cause of conflict between farmers and pastoralists over the use of natural resources.

Sector-based legislation that influenced land use was issued from time to time.

Examples are the forestry act 1989, crop control act 1972, food protection act 1973, pesticides act 1974, environmental health act 1975, wildlife and national reserves conservation act 1986, the seeds act 1990 and the land disposition and construction-planning act 1994.

The basic feature of Sudan legislation pertaining to environmental issues is that it is sector-based. The greatest proportion falls in the agriculture, forestry, fisheries, public health and animal resources. The notable exception is the pasture and range departmental sector. There has been no central legislation regulating the use of pasture, although recently, state legislations and local government orders defined demarcation of grazing routes and fire lines.

At the present time the line ministries and administrations with direct mandate on various aspects of the environment and natural resources are agriculture and irrigation, forests, animal resources, internal affairs, energy, mining, water resources, health and industry. Their mandate covers biological diversity as defined in the international convention.

The number of institutions, ministerial units, semi-state public corporations, with direct or indirect jurisdiction over biological diversity, has been put at ninety. Their functions range from planning and management, training and extension to research and data gathering.

More than 50% of these institutions have their environmental mandate backed by laws. However the law in question usually assigns responsibility to the minister or to a corporate body. By-laws and regulations then outline and detail terms of reference in accordance with the organizational structure within these bodies.

There is also dual affiliation. For example the department of wildlife is affiliated to both the ministry of internal affairs and the ministry of environment and forestry. Law governs the first relationship. The second is prescribed in the warrant establishing the ministry of environment and forestry.

At the state level after the launching of the federal system of government environmental matters and concerns became divided between the portfolios of the state ministries for agriculture and animal resources, health and engineering affairs.

The ministry of agriculture has responsibility over agriculture, forests, and the environment and animal resources. The mandate of the ministry of engineering affairs includes overseeing land and surveys, construction and housing, roads and public waters, transportation and communication, water resources and energy and electricity. The ministry of health is responsible for preventive and curative medicine.

Legislations dealing with natural resource management have several shortcomings. There is no co-ordination or interactive mechanism that brings these bodies together over a joint issue and common concern. There is also duplication of responsibility between federal and state institutions.

5.3 Key natural resource management and policy development institutions

5.3.1 Institutions for water resources management and policy

Matters pertaining to water have priority in Sudan's political and decision-making process. Today, much of this responsibility rests with the Ministry of Electricity and Dams that has parastatal liabilities on policy formulation and supervision of all water related activities. National Water Resources Council (NWRC), is normally a policy formulating and supervising body for all water related activities. The NWRC includes members from institutions responsible for water availability and use, notably the ministries of agriculture and irrigation, health, foreign affairs, finance, energy, legislation, research, training as well as users associations, for example, state governments, private sector and NGO's. The NWRC normally has the power to set up specialized committees within the Council or even Water Resources Councils at the level of one or more states affiliated to the NWRC.

More than 15 universities in Sudan have under-graduate course in water related fields. Some have even post-graduate courses e.g. the UNESCO Chair for Water Resources in Umdurman

Islamic University, the Institute for Irrigation Water Management of the University of Gezira and the post-graduate courses at the Universities of Khartoum and Sudan.

The Hydraulic Research Station in the Ministry of Irrigation deals with research in all aspects of water resources management. Some private consultancy offices and NGOs are actively working in the field of water replacing some of the foreign offices. A specialized committee in the NWRC and the Hydrology section in UNESCO Sudan are coordinating research and training work in the water domain. A lot of research work has been done especially in physical and mathematical modeling to simulate and optimize water management.

5.3.2 Institutions for forestry research and education

Forestry research in Sudan dates back to 1940s, but was formalized in 1962 with the establishment of Forest Research Center (FRC) at Soba. Research was closely connected to forestry activities in Sudan. It remained part of the Forestry Administration for many years, until it is joined to Agricultural Research Corporation, which is responsible for all the agricultural research activities.

Forestry education as part of higher education has undergone substantial institutional changes.

The latter included the establishment of 19 federal and state universities beside 24 private institutes of higher education. Whereas forestry education was available at degree and diploma levels in only five institutions before 1980s, now it is available in nine universities, with two full-fledged faculties: Faculty of Forestry - Khartoum University and Faculty of Forestry and Range /Sudan University for Science and Technology.

The Faculty of Forestry, Khartoum University was established as a department (Forestry Department) in the Faculty of Agriculture in 1975, and continued till it became the Faculty of Forestry in 1994. The Faculty consists of 4 sections: management, silviculture, protection and conservation, forestry products and industry.

The faculty qualifies students to get their undergraduate and postgraduate degrees in forestry science. It also provides short and long term training on forestry related subjects. Available resources include: teaching staff, forestry analytical lab, an Internet/computer unit, good communication and liaisons with international organizations, institute and research programs.

5.3.3 Institute of Environmental Studies (IES), University of Khartoum

The Institute of Environmental Studies (IES) was formally established in 1979, although it was created in 1972 following United Nations Conference on Human Environment in 1972 and subsequent call by the Arab League Educational Cultural and Scientific Organization (ALECSO) that universities should respond to environmental problems and challenges. Since then, the IES (the first in Africa and the Middle East) has pursued a program which blends (a) postgraduate education in environmental studies (b) short-term training in natural resources (c) research and consultancies in project design, environment impact assessment and education. IES executes projects funded by international organization e.g (i) Dry Land Husbandry project (OSSREA & EPOS) (ii) Environment Impact Assessment projects (UNEP, UNICEF, US-AID, CPECC UNSO) and

(iii) Acted as coordinators between Research Institutions and non-government organizations (NGOs). Project proposals are coordinated through the IES pertaining to the fields of coastal zone, arid lands, wetlands, meteorology, and urban planning.

IES offers under graduate and postgraduate degrees in environmental sciences. Available resources are: teaching staff (1 professor, 4 associate professors, 3 lecturers, lecturers from pertinent departments of the University of Khartoum, laboratories, environmental analytical lab, floating lab for freshwater ecosystem research, specialized library in environmental studies, Internet/computer unit and liaisons with international organizations, institute and research programs.

5.4 Forest National Corporation

The Forest National Corporation (FNC) is one of several institutions within the Ministry of

Environment and Forestry. It was first established in 1902 as Forest Department of the Ministry and is thus one of the oldest government institutions in the civil service. It has changed through the time affected by the political, socio-economic and environmental changes and development that took place in Sudan and worldwide. Its major functions are:

- Lay down the general policies for forests, the growing stock and development thereof, and make the rules and methods, which secure the good utilization of the stock and achieve full protection of the environment.
- Propose law, which achieve the implementation of the approved policies for the development of forests.
- Follow-up the implementation of the forests general policies and technically supervise all forests, at the country's level.
- Conduct studies and lay down the necessary plans for taking stock of forests, survey and development thereof, at the country level.

- Increase the reserved forest areas up to a minimum of 20% of the total area of the country (presently 3.2%).
- Intensify tree plantation, for the purpose of protection and production, and rally the people's efforts, in this respect.
- Develop the production of gum, especially Gum Arabic and care for the minor forest products.
- Coordinate the various bodies to implement forests' general policies and undertake research
- Levy or fees on forest produce in accordance with the law or as approved by the minister of in accordance with normal business practices.

Due to budgetary and organizational constraints, FNC today operates mostly at the federal level with limited capacity to enforce forest legislations and perform effectively the duties mentioned above.

5.5 Range and Pasture Administration

This Administration was first established in early 1950s as a section within the Ministry of Animal Wealth to carry out activities related to range conservation and management. These activities included; proper distribution of water resources to allow balanced utilization of grazing resources and production of fodder crops under irrigation. In 1973 it shifted to the Ministry of Co-operation and Rural Development, then, later in 1975 to the Ministry of Agriculture, as a general administration with three main divisions: rangeland, irrigated pasture and pastoral studies.

Many factors have affected the capacity of the administration to effectively handle its responsibilities. These include; lack of land-use plan, lack of laws that control grazing practices and protects pasture from being misused, lack of clear policy objectives and shortage of manpower and financial resources.

5.6 Ministry of Animal Resources

The first Ministry for Animal Resources was established after independence and continued till 1971 when it was unified with the Ministry of Agriculture and Natural Resources (MANR). It was separated again in 1986, then reunified in 1989 to finally be separated in 1996. This created a situation of institutional instability, which largely affected the performance, policies and management structure of the ministry.

Many of the corporations which used to be part of the Ministry of Animal Wealth were privatized in 1992 upon the creation of state governments e.g. Corporation for Livestock Marketing and the General Corporation for Animal Production. These arrangements shifted responsibility of direct technical supervision on production and marketing from the central ministry to the corresponding state ministries.

The key mandates of the Ministry of Animal Resources include:

- Formulation of Policies related to development of animal resources and production within the national policy framework.
- Planning and organization of scientific researches and applications for the development of animal resource sector.
- Organization of extension, veterinary services and animal health programs and development and maintenance of rangelands.
- Development of fisheries and aquatic lives sector and formulating necessary regulations controlling animal resource exploitation
- Supervision of animal and meat marketing programs in coordination with relevant authorities and management of national level programs on Veterinary services and quarantines.
- Training and capacity building of human resources in the field of animal resources management and development.
- Supervision of imports, exports and local manufacturing of inputs, machineries, vaccination and inoculation necessary for the sector in coordination with relevant institutions.
- Supervision of animal slaughterhouses, exports specifications, treatment and disposal of animal waste.

- Supervision of animal production, market performance, quality control and upgrading to stand market competition at local, regional and international markets

5.6.1 Wildlife Conservation General Administration (WCGA)

Established in 1902 by the colonial authorities, WCGA was part of the Game and Fisheries Department of the Ministry of Animal Resources. Today, it is administratively accountable to the

Ministry of Interior while technically it is accountable to the Ministry of Environment and Tourism.

The WCGA is entrusted with the conservation of wildlife in the Sudan. Wildlife includes also ecosystems and habitats where species are living. WCGA is also entrusted with the task of establishment and management of protected areas in Sudan. Among its main responsibilities are:

- Sustainable management and utilization of wildlife resources in the country.
- Origination of hunting (issuing licenses and setting by limits)
- Cropping of wildlife, trade in wildlife parts and live animals.
- Establishment of zoological gardens for wildlife public education.
- Control of wildlife damaging problems
- Management of marine national parks and protected areas

WCGA is the focal point for the Convention on International Trade in Threatened and Endangered Species (CITES), includes botanical or animal species.

One of the problems that WCGA faces is the lack of official link with the Fisheries Administration, Fisheries Research and Wildlife Research Center (WRC), which are all under the Ministry of Animal Resource.

5.6.2. Traditional (tribal) administration

Traditional (tribal) administration played important roles in the management of natural resources, administration of local affairs and maintenance of rural livelihoods. The 1932 Forest Ordinance employed these structures and put them in a legal order within the framework of the judicial and administrative systems. These laws together with the local customs and traditions made traditional administrations a powerful representation of the government at the local level and strong and powerful leader of local communities. Traditional leaders are mostly elected from the same families. Thus the holding was semi-hereditary one.

Until they were abolished in 1970, their responsibilities included:

- Land allocation and settlement of conflicts
- Protection of the common natural resources
- Organization of usage of natural resources
- Construction of fire lines
- Keeping order of security and organization of foreign tribes presence in their areas
- Definition of nomadic routes
- Organization of communal public activities e.g. pest and bush fire control
- Settlement of tribal disputes

The change from the tribal system to local government system created leadership gap. The link with communities, which the traditional leaders provided for example in the use and management of natural resources, was lost. Many Sudanese authorities argue that it is the abolition of traditional administration that accelerated land degradation and deforestation.

5.7 Non-Governmental Organizations (NGOs)

Like many developing countries, extended family system as well as voluntary and collective work characterizes the Sudanese society. A number of teamwork models (nafir, fazaa... etc) are old practices during harvests time or when someone is building a house or during emergency situation (fire outbreak at village or in fields).

But, organized forms of NGOs have become well known after 1980. Today, there are several legally registered and active NGOs in different fields of the environment and rural development. There are also some networks for coordination between NGOs e.g. the NGOs National Coordination Committee on Desertification (NCCD). The most relevant and active NGOs in natural resources are the Sudanese Environmental Conservation Society (SECS) and the Sudanese Social Forestry Society (SSFS), the Sudanese Association for Combating Climate Change (NWAR), and Babiker Badri Association for Women Studies.

5.8 Trends in biodiversity conservation

Current practices in Sudan suggest that policies relating to environmental protection, in general, are joint or concurrent responsibilities of the federal and state governments. Federal government has exclusive jurisdiction to legislate on matters relating to natural resources, mineral resources and subterranean wealth. Detailed regulations on environmental protection, however, are a state responsibility subject to federal planning and coordination. In case of conflict, federal jurisdiction over the environment and natural resources prevails over state jurisdiction.

The most conservation-oriented legislation has been the Wildlife and National Park Act (1987), the stated objectives of the Act are:

- Conservation of wildlife and protection of national parks and game areas in Sudan;
- Wise use of wildlife resources and its development;
- Implementation of the Sudan's commitment to the convention on International Trade in

Endangered Species of Wildlife Fauna and Flora (CITES) 1973;

- Providing information on wildlife resources and promote scientific research.
- Describing the procedure of establishing natural parks.

5.9 Sudan and the global environment conventions

Sudan is a party to the following global and regional multilateral environmental agreements (MEAs):

- Convention on Biological Diversity (CBD - 1992);
- Cartagena Protocol on Biosafety (2000);
- African-Eurasian Waterbird Agreement (AEWA - 1999);
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES - 1973);
- African Convention on the Conservation of Nature and Natural Resources (Africa Convention - 2003);
- Ramsar Convention on Wetlands (1971);
- t Convention Concerning the Protection of the World Cultural and Natural Heritage

(UNESCO WHC - 1972)

- United Nations Convention to Combat Desertification (UNCCD - 1994)
- United Nations Framework Convention on Climate Change (UNFCCC - 1994);
- Vienna Convention for the Protection of the Ozone Layer (1985) and the Montreal Protocol on Substances that Deplete the Ozone Layer (1987);
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989);
- Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement of Hazardous Wastes within Africa (1991);
- Stockholm Convention on Persistent Organic Pollutants (POPs - 2001);
- the Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998);
- United Nations Convention on the Law of the Seas (1982) and the Convention on the International Maritime Organization (1958); and
- Regional Convention for the Conservation of the Environment of the Red Sea and the Gulf of Aden (PERSGA - 1982).

The signing of the comprehensive peace agreement in January 2005 ended the civil war which lasted for more than two decades and left serious impact on the environment and development of the country. During the decade of the 1990(s) and following the Earth Summit, Sudan ratified several global environmental conventions and through funding availed from the Global Environmental Fund (GEF), Sudan formulated and adopted several strategies and action plans such as: National Action Plan to Combat Desertification, Sudan first National Communication under the United Nations Framework Convention on the Climate Change and National Biodiversity Strategy and Action Plan. However, due to lack of resources during the civil war era, the country was not able to assign resources for the implementation of these environmental strategies and action plans.

It is now widely accepted that environmental issues should be integrated in the recovery and rehabilitation process. There is a vicious circle linking environmental degradation, poverty and conflicts. One of the dimensions of Darfur crisis related to conflicts over national resources, exacerbated by climate change severity of drought and land degradation.

The Sudan National Capacity Self-Assessment (NCSA) Project is a UNDP-Sudan Government Project implemented by the Higher Council for Environmental and Natural Resources from Sept. 2005 to Sept. 2007. The NCSA project objectives are to identify national capacity constraints and priorities to meet the obligations included in the three Rio Conventions (Biodiversity Conservation, Climate Change and Desertification). The NCSA project managed through intensive consultative process to come up with stocktaking report, conduct thematic and crosscutting analysis and succeeded in producing capacity development action plan which is meant to solicit commitment to implement priority actions.

The NCSA process is to complement other national action plans such as Sudan Post-Conflict Environmental Assessment (PCEA) which was carried out by UNEP and launched by the Ministry of Environment and Physical Development (MEPD) on July 2007. The National Plan for Environmental Management (NPEM) in post-conflict Sudan sponsored by UNEP, EU and Nile TEAP and carried out by (HCENR) of (MEPD) and the Sudan Strategic Plan for the coming 25 years which is based on vision to build of united, safe, peaceful and developed Sudan Nation emphasizing justice, freedom, consultation and participation, unity, decent life of dignity and honor, and democracy.

The Sudan Strategic Plan includes a Five Year Action Plan aims at achieving balanced development, reducing poverty, make progress towards achieving Millennium Development Goals (MDGs), stressing public accountability, good governance and environment conservation. The Sudan strategic plan identified weaknesses included limited civil services institutional capacity and the need for institutional reform and capacity building and needs for strengthening partnership with private sector and civil society.

The serious need to address to environmental issues is reflected in the concurrent environmental actions and processes that are addressed by the country. The NCSA Action Plan is produced in the right time to be integrated with related ongoing initiatives in Sudan. All stakeholders are encouraged to facilitate the implementation of this action plan as a constructive step towards peace and sustainable development.

Funding supplied to Sudan in the period 2002 -2006 to support the implementation of MEAs was approximately USD 5 million in total. The 2001 Environment Act gives the HCENR the mandate to specify the channels assigned to implement the MEAs. In most cases, the HCENR has designated itself as the focal point. Many of the MEA support projects have a project coordinator hosted by the HCENR, and most activities are conducted at the federal level in Khartoum. Following the realignment of powers set out in the 2005 Interim Constitution, the national implementation mechanisms required by most MEAs will now fall largely under the responsibility of the states.

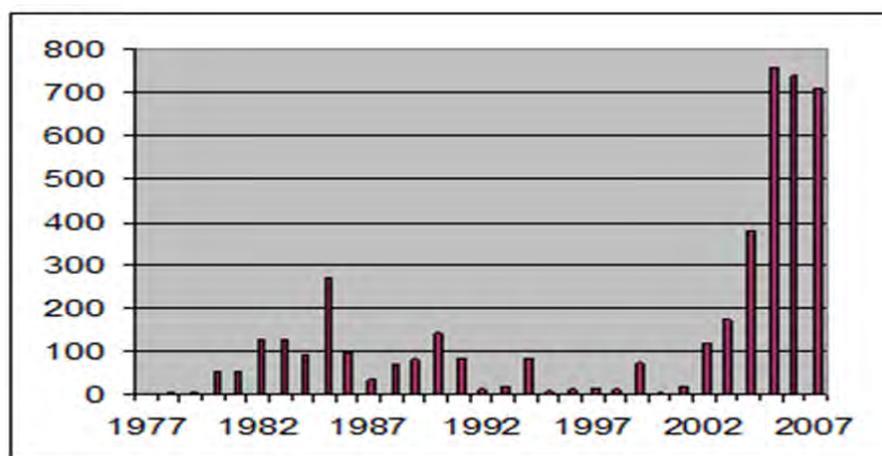
Aside from progress reporting, compliance with the agreements is variable, but overall at a low level.

6. SUDAN DEVELOPMENT TRAJECTORY

Sudan is among the least developed countries of the world. About 90 percent of the population is below the poverty line. Sudan economy had been under various IMF Structural Adjustment Programs for the past decades. In the early 1990s, the International Monetary Fund declared Sudan non-cooperative because of its nonpayment of arrears to the Fund. Despite the IMF decision, the Government embarked upon several initiatives that aimed at promoting economic growth and social transformation. In 1992 Sudan economy went into full swing liberalization. All commodity subsidies were removed together with import controls and pricing. Sales of public sector enterprises commenced immediately, while a countrywide decentralization process was initiated in 1995. The change from a regulated to deregulated economy was accompanied by severe economic hardship to the people. The decision was taken at a time of very strained Sudan relations at the regional and international level.

Since the 90s Sudan has not been able to regain the confidence and trust of its traditional western donors. Western aid and support for Sudan have dried out except in the humanitarian sectors, whereas development and concessional aid have all slowed considerably if not stopped completely. On the other hand, Chinese direct investment (FDI) and support in the oil and energy sectors were strengthened. Despite the sanctions and the huge external indebtedness, Sudan was able to attract foreign aid, in the form of direct investment and support in the oil and energy sectors. Since then, the Sudanese economy became one of the fastest growing in the world. The Nominal Gross Domestic Product (GDP) grew from US \$ 9.9 billion (IMF 1980) to US \$ 37 billion (IMF 2006); which led to an increase of growth rates from 7.1 % (2003) to 11.2 % (estimated for 2007) . The levels of foreign direct investment were among Africa's highest with over US \$3.5 billion in 2006.

FIG. 16: THE OFFICIAL UNITED STATES, MAIN DONOR, DEVELOPMENT ASSISTANCE (ODA) 1977-2007



Source: OECD

Since then and currently, the western aid system in Sudan is confined to promoting recovery and rehabilitation programs, stimulated by the signing of the CPA agreement in 2005 and encouraged by policy reforms, endeavoring to meet the humanitarian needs in the ongoing crisis in Darfur as well as other vulnerable populations in need of assistance.

Major steps have been taken within the framework of the National Comprehensive Strategy (1992-2002) programmes implementation with respect to encouragement of foreign direct investment (FDI) flows, that has dropped to only US \$ 0.7 million in 1996 before it sharply rose to US \$ 101.2 million in 1997, responding to those GDP growth rates. The country has undertaken some successful efforts to improve its economic relations with some Arab and Asian countries which later invested heavily in the oil sectors.

The following table depicts the size of foreign capital investment during the 1990s and its sectorial distribution.

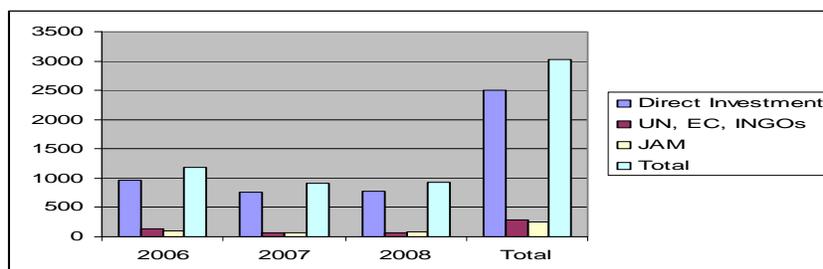
Table 12: Foreign Capital Inflows (1990-1999)

Type of economic Activity	Investment (In Foreign Currencies)				
	Sudanese currency (Millions S.D)	USDollars (Millions)	Saudi Riyals (Millions)	French Franks (Millions)	German Marks (Millions)
-Agriculture and agriculture Processing	1,3661	53,9	28	-	-
- Industry	1,0901	5,9	-	-	-
- Mining & Oil Explorations	-	3,513	-	10	-
- Transport	0,9900	105,4	500,6	-	45,5
Total	3,4462	3723,2	528.6	10	45,5

Source: Ministry of Finance

The sectors which attracted foreign borrowing and aid include oil production and related services sectors, and mining in the east and northern Sudan areas. Infrastructure projects, namely the Merowe dam, roads as well as industry and agriculture have also attracted investment and foreign funding. It can generally be argued that Arab funds and Arab bilateral lending have been the main sources of finance to the Sudan's borrowing, followed by China as the single most important trade and aid partner of the Sudan in the 1990s and the period between 2000-2005. China has been the biggest source of foreign aid, especially in the oil and oil-related sectors. Its share in foreign investment and trade is even bigger than the Arab funds and Arab bilateral lending when taken separately.

FIG.15: PLEDGED AID FLOWS FOR 2006-7-8



Source: Ministry of Finance

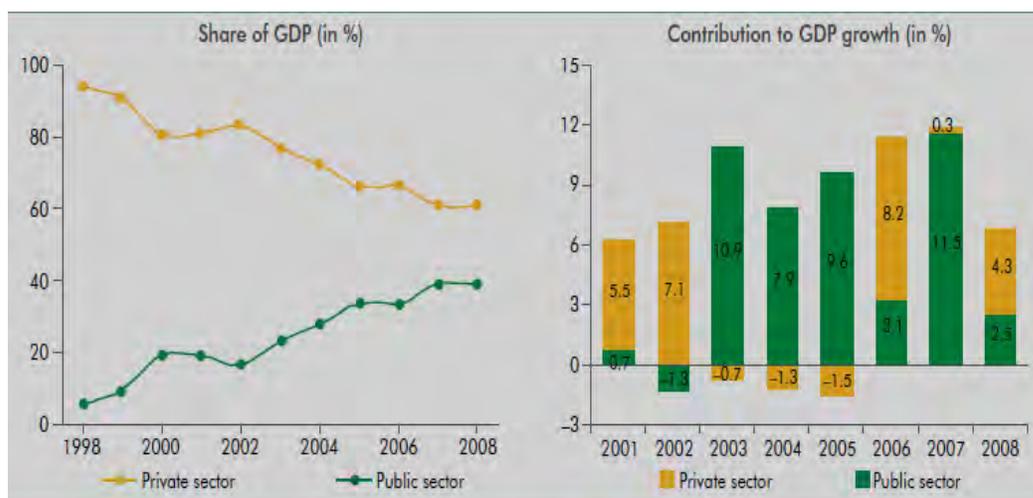
TABLE 12: PLEDGED FLOWS 2006-7-8

Donor	2006	2007	2008	Total
Direct Investment	957	761	784	2502
UN, EC, INGOs	131	75	75	281
JAM	103	71	78	252
Total	1191	907	937	3035

Source: Ministry of Finance

The major economic challenge to Sudan's growth prospects comes from its large and rapidly growing public sector, which has become an impediment to the development of a robust private sector. During the last ten years, the public sector's share in GDP has increased from 6 percent to nearly 40 percent (left panel, Figure 3). The public sector has also become the principal contributor to the growth process, while private sector growth has been considerably weaker and even negative in three of the last six years (right panel, Figure 3). This follows directly from the dominance of the oil sector—which is almost entirely owned and managed by the government—in the growth boom. Oil revenues have fueled a sharp increase in the investment plan of government and public enterprises, escalating the competition for scarce resources in the domestic economy, like bank credit, skilled labor and land. Given the lack of a level playing field between the public sector and private sector firms, the emergence of a domineering public sector has meant reduced growth prospects for the private sector.

FIGURE 18: SUDAN.'S GROWTH HAS BEEN DRIVEN LARGELY THROUGH THE EXPANSION OF ITS PUBLIC SECTOR



Source:

World Bank staff estimates from MoFNE data and various IMF staff reports.

Decision-makers and public opinion underestimate the roles of natural resources and their importance for socio-economic development and environmental protection; the investment budgets geared to natural resources conservation and development do not attach sufficient priority to, or allocate adequate economic motivation. Domestic markets and marketing channels for local natural resources products perform inadequately under those pressures. Abdel Magid and Badi (2008) stated that natural resources were subjected to heavy overexploitation for agriculture, felling for fuel and overgrazing to the extent that extensive stretches of land lie bare of vegetation. In the areas accessible from the capital city and Gezira such as White Nile and Northern Kordofan and Darfur are considered to be most affected due to factors of erosion. Certainly that the removal of trees and other types of vegetation will reduce rainfall and promote drought. In the absence of legislation enforcement, implementation of conservational action plans and management plans, marine and coastal ecosystems continues to face various kinds of threats. Community education programmes that highlight the impacts of coastal communities on reef ecology, including degradation, anchor damage, littering, waste disposal and souvenir collection play an important role in mitigating such impacts.

Efforts at agricultural reform are complicated by the existence of two systems of land ownership in Sudan; land ownership under customary law and land ownership under statutory law. Throughout Sudan, local competition for land and water resources among different groups has increased over the past 40 years. The 1970 land registration, whereby unregistered land, including tribal communities, was formally assumed by the State. This presented a major factor of conflict. Plans to develop the agricultural sector have had limited success in achieving their objective due to the low priority assigned to agriculture in allocation of resources, lack of political stability, and a top-down approach to development which reduced rural producers to policy-receivers. Recently, Sudan has taken a new and strategic direction to support agriculture, through The Agricultural Revival Program (ARP) of 2008-2011, which was further extended beyond 2011. It is designed to address past planning weaknesses, and was built on a wide consultative approach, under the supervision of the Vice President.

The CPA mandated the 2010 elections that entailed: national presidency and parliamentary chairs, the south Sudanese presidency, state governors, the southern parliament and state assemblies. The results showed re-instating of the Sudanese President, with major parties boycotting the elections after issuing accusations of irregularities. The elections coincided with the Pre-Trial Chamber I of the International Criminal Court (ICC), issuing a warrant for the arrest of the President of Sudan, for war crimes and crimes against humanity, linked to Darfur crisis.

The post CPA diverse electorate brought to the National Assembly, the Council of States, and the State Assemblies new blood and initiatives, merging their democratic agenda with those of the civic society, through capacity building sessions, consultations and lobbying activities. After the separation of south Sudan, that momentum remains alive and thriving, within those institutions, aspiring for new legitimate settings for realizing wider public consultation, effective stakeholder consultations, and grass-roots participation in decision-making.

The federal system and the decentralization process started in 1993, the states are further divided into provinces and localities, their main responsibilities include basic education, health services, and water supply. Most states and localities depend more on intergovernmental transfers than own revenue resources, due to imbalances in the distribution of natural resources. The states and localities receive grants and a share of Value Added Tariffs (VAT)-revenues. The rights of the states to collect own revenue are limited to fees, licenses, and land taxes.

The environmental legislation in Sudan was originally of sector based nature, dealing with land tenure, health, forestry, wildlife, fisheries, agriculture, livestock, public health, and closely connected to the structure of the government ministries, departments and parastatal corporations. The Higher Council for Environment and National Resources (HCENR) was founded in 1990, in response to the country's internal environmental challenges. The council's main role is coordination between the different ministries, which have protection roles of Sudan's resources, the manner of their development and their sustainable use. The consultative and research-based role of HCENR is further strengthened and realized through the minister of Environment and Tourism. The creation of the ministry is the response of Sudan Government to commitments arising from the United Nations Conference for Environment and Development (UNCED).

The World Bank advises Sudan fiscal planners to effectively manage volatility and promote a more reliable expenditure basis for priorities. And that Sudan's nascent private sector facing major risks, often beyond its control, to grow and diversify. Hence adopting a program to address the key constraints and focus on increasing economic certainty and predictability, lowering transaction costs and building basic infrastructure, and institutions that will help integrate its disparate markets.

Also states that Sudan as a post-conflict country, needs to improve access to life-sustaining infrastructure and social services. Ensuring access to a minimal basic level of infrastructure services and connectivity to support basic livelihoods of the population and reduce regional disparities. Stating that the large presence of government and state enterprises and its adverse impact on private investment needs to be curtailed. And that agriculture sector has historically provided over two-fifths of national GDP, employing the majority of the population and earning the bulk of the country's foreign exchange.

There is tremendous potential in the near term for the sector to boost diversification of the economy and to revitalize the rural areas. Achieving higher rural incomes and agricultural export growth will involve a significant change in the government's attitude towards the sector, especially with regard to policies meant to enable the private sector to play a greater role. Finally the World Bank specifies reforms for the sector, including transformation of traditional farming to generate increased production and income.

6.1 Darfur and the Three Areas

What was the largest country in Africa became two nations: The Republic of Sudan, and the newly independent Republic of South Sudan. Even after Southern Sudan independence, Sudan still remains one of the largest countries in Africa, facing highly complex development challenges and an uncertain future, but still key to the stability of both the nascent South Sudan, and the region as a whole. Having gone through several political momentums in recent years, such as Comprehensive Peace Agreement in 2005 and South Sudan's independence in July 2011, as well as Darfur Peace Agreement in 2006 and Doha Peace Agreement in July 2011, Sudan has yet embraced instability especially in its war-torn areas, Darfur in west and the Three Protocol Areas in its border with the South, now a new neighboring country. The authorities remain committed to enhancing the viability and stability of Sudan as the country embarks on a new era. Conflict mitigation is an integral component of those efforts, particularly in Darfur and the "Three Areas" of Abyei, Blue Nile, and Southern Kordofan.

Sudan continues to work with the international community in addressing the outstanding provisions of the CPA, to support democratic development, as well as openings for a transition from emergency assistance to development assistance, where conditions allow. Upon those fragile underdeveloped areas, having experienced the long-continued wars, lies the future of everlasting stability of the country as a whole.

The international community is providing life-saving assistance to meet immediate humanitarian needs in Southern Kordofan, Darfur, and other areas of Sudan while supporting longer-term recovery programs and Sudan's transition to peace and security. It has provided vital assistance to distribute emergency food aid and relief supplies and implement emergency and early recovery programs in a variety of sectors, including health; nutrition; water, sanitation, and hygiene; food security and agriculture; shelter and settlements; economic recovery and market systems; protection; and coordination.

Amongst actors of the international community, USAID has consistently been the world's largest donor of food assistance to Sudan. Since 2004, those affected by conflict in Darfur have comprised the majority of food aid beneficiaries in Sudan. In 2011, USAID responded quickly to assist tens of thousands of Sudanese displaced by conflict in Abyei and Southern Kordofan, in coordination with the international humanitarian community, including the United Nations. USAID works to strengthen Sudanese confidence and capacity to address the causes and consequences of political conflict, violence, and instability. USAID also supports community consensus-building through key reconciliation processes to mitigate potentially catalytic conflicts. In Darfur, USAID provides civil society and community organizations with early recovery assistance for peace-building activities and provides basic services. USAID continues to work with civil society and political parties to support key CPA political processes, to promote citizen participation. USAID also plans to remain engaged in post-CPA Sudan to support democratic development nationwide in partnership with Sudanese civil society.

In order to contribute to sustainable peace and development in the aforementioned areas in the long-term, in February 2009, Japan International Cooperation Agency (JICA) agreed to support improving basic services through human resource development in the area of basic human needs; water supply, maternal and child health and vocational training, as follows:

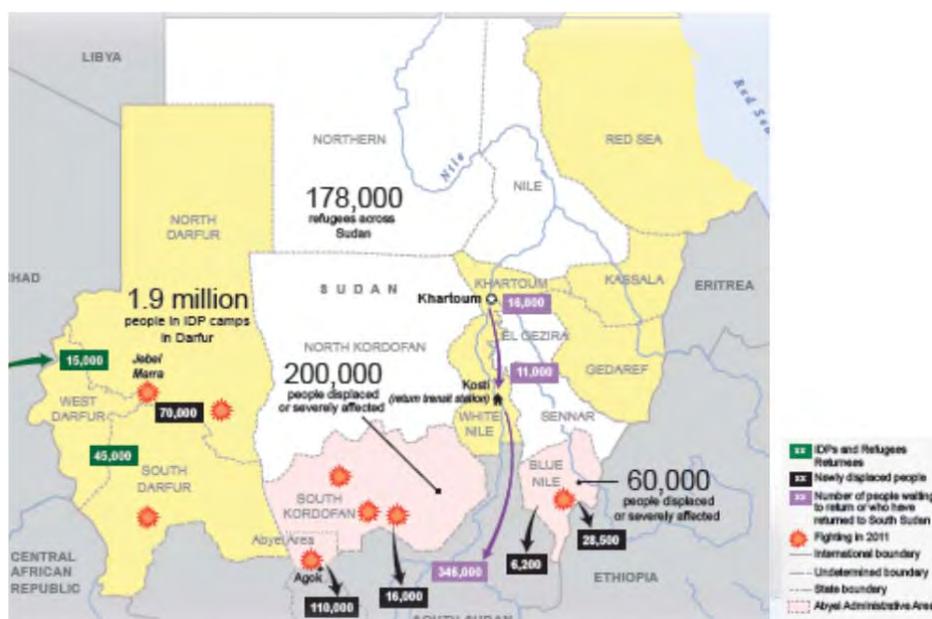
Record of Discussions signed on: February 01, 2009

Project period: June 2009 to May 2012

Counterpart : Higher Council for Decentralized Governance (Federal Level)

State Ministries of Finance, Local Governance, and relevant organizations (State/Policy Level), State Water Corporation, State Ministries of Health, Youth and Sport, Education (State/Implementing Level)

FIG19: SUDAN 2011 HUMANITARIAN SNAPSHOT



Sources: OCHA, UNHCR, Natural Earth, USGS.

In many ways, the Three Areas are a microcosm of Sudan's war as a whole. Abyei is partially Dinka populated, ethnically connected to both the greater Bahr El-Ghazal region and much of the SPLA leadership. The Nuba Mountains and Southern Blue Nile have majority Muslim populations, of African rather than Arab heritage. Many root causes of the broader conflict, such as religion, ethnicity, resource distribution, and political marginalisation, are present in the Three Areas.

The Protocol on the resolution of conflict in Southern Kordofan/Nuba Mountains and the Blue Nile States, and the Protocol to on the resolution of conflict in Abyey were both signed in Naivasha, Kenya, on 26 May 2004. There is a general consensus among Sudanese and non-Sudanese actors and observers that the Three Areas constitute the major potential threat to the peace process in Sudan. In all three areas conflict over land and natural resources is a major contributor to violence and political instability. The so far very limited focus of the project on these areas needs to be expanded and scaled up.

6.2 KEY ENVIRONMENTAL THREATS, OPPORTUNITIES AND SUGGESTED INTERVENTIONS

The review of the state of natural resource and its management presented above suggests that Sudan has experienced severe and continuous environmental degradation for the past few decades. Although the paucity of data on the nature, magnitude and causes of environmental degradation may not permit to determine precisely the driving forces behind the degradation and their relative contribution, economic policies pursued by successive governments top the list of factors. Because Sudan has a natural resource dependent economy, government investment, fiscal, monetary policies and strategies of development have direct bearing on the management and use of natural resources.

These policies have promoted mechanized agriculture and extensive farming practices of traditional agriculture. In response to the 1992 Earth Summit, several policy initiatives to protect the environment were also taken. However, with the war and civil strife in the South, Sudan's isolation from the world community and pervasive poverty, no significant progress was made in biodiversity conservation. All available data suggests that the response to the economic hardship took the form of indiscriminate forest

clearance and horizontal expansion of agriculture, the only coping mechanisms. Land degradation and desertification continued unabated in the 1990s.

Today, Sudan's state of natural resources can be characterized by severe land degradation deforestation, desertification, worsening poverty, soil nutrient loss, wetland loss and degradation and continuing regional conflicts. Changes in the natural environment are caused by a host of complex and intertwined human and non-human factors. It is thus difficult to distinguish between what is driving these changes and what is being driven, and establish clear cause/effect relationship both in space and time. For example, land degradation is caused by multiple economic, social, cultural, political and biophysical factors. These same factors cause deforestation, and deforestation is one of the major causes of land degradation. Then there is the issue of desertification, which is generally believed, albeit debatable, to be the cumulative effect of both land degradation and deforestation. What this paper has done is to identify and discuss each environmental threat from a variety of angles with the view to broadening policy options.

The Sudan National Biodiversity Strategy and Action Plan (SNBSAP) and the Sudan National Action Plan to Combat Desertification (SNAP) amongst others have identified the following as the key environmental threats: environmental changes; absence of land use planning; socio-economic factors; modern agriculture; overgrazing; biotic factors, fire; inadequate institutional capacities; war and civil strife; farmers' practices; legislation; economic distortion and failures. Building on this and distilling the key threats that emerged from the review presented above, this work has identified twelve key environmental threats. At the table below, those threats are presented, with relevant opportunities, and a list of suggested interventions.

6.2.1 Summary; Sudan Threats, Opportunities and Suggested Interventions

	Threats	Opportunities	Suggested Interventions
1	Lack of a National Plan for Environmental Management (NPEM) in post-conflict Sudan, under HCENR of GoS and its equivalent at the Government of National Unity (GONU), and by the Ministry of Environment, Wildlife Conservation and Tourism (MEWCT) of the Government of Southern Sudan (GOSS), also to involve donors	Building on political arrangements codified in the CPA - allowing coordinated activities, in line with federal/confederate governance systems, highlighting national and regional environmental issues, illustrating the shared vision of its stakeholders towards their resolution, and allowing informed political decision-making, definition of priority actions, commitment, and structural interventions to promote sustainable development.	A national plan can be achieved with firm and effective partnerships, reaching into line ministries of GoS and GoSS, international (USAID, EC, NTEAP, UNEP, and UNDP) and intergovernmental institutions, academia, NGOs and CBOs. Strengthening and expanding existing partnerships will be vital to progress of the NPEM <ul style="list-style-type: none"> - To favor political consideration and formal political approval of Support to enabling political climate; - Public awareness to favor application of NPEM; -Strengthen Higher Council or Environment and Natural - Liaison with equivalent structure in the GoSS; - Support strategic investment in both Sudans.
	Land degradation: - Horizontal expansion of mechanized rain fed cultivation to improve the	Efforts at land tenure reforms Conserving forest cover under international	-Support establishment of legal frameworks and governance structures, land access and tenure security, support rural development and formalization of land rights support for dispute resolution mechanisms and

2	<p>country food security; accordingly forestland is being cleared annually for agriculture and other purposes.</p> <p>- On the sandy soils of the Sudan, the shortening of the fallow period brought a negative impact by retarding the natural regeneration of the gum Arabic tree.</p>	<p>proposals for Reducing Emissions from Deforestation and Forest Degradation (REDD).</p> <p>FNC/WB Gum Arabic Development Project: Institutional Capacity Building and Support to Gum Arabic Producers Associations Gum Arabic Sector Reform and Support</p>	<p>forums</p> <p>-Support Sudan's formal requested to join the World Bank's initiative of Forest Carbon Partnership Facility to benefit from the REDD readiness phase</p> <p>Strengthening capacities of state and non-state stakeholders to support their effective participation in negotiating bilateral, regional and multilateral trade facilitation arrangements</p>
3	<p>Deforestation, Bio-diversity loss:</p> <p>-Dependence on biomass energy. As indicated earlier, combined with the horizontal expansion of agriculture, resulted in clearance of forest has rendered vast areas treeless in central and northern Sudan.</p> <p>- Food security and nutritional well-being of the entire rural communities depend heavily on natural resources.</p> <p>-Forestry resources monitoring and assessment</p> <p>- degraded forests reserves in gadarif and Kassala</p>	<p>-FNC established a national REDD+ unit to develop the framework for a REDD+ strategic plan, in collaboration with the UNDP and HCENR.</p> <p>-the Convention on Bio-diversity</p> <p>-Knowledge on multiple benefits of Forests(According to non-cash value to GDP)</p>	<p>-Assessment of the forest resources including the review and overview of forest inventory.</p> <p>-Forest classification according to the benefits and co-benefits of REDD+</p> <p>-Assessment of some plantations and activities around community forests</p> <p>-Conservation and development of wild life through enhancing care of the national reserves and establishment of new reserves and forest areas to protect the wild life and tourist villages with cooperation and coordination of respective authorities.</p> <p>-All access to genetic resources is in line with the Convention on Biological Diversity and its relevant provisions</p> <p>-Rights-based capacity for indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit-sharing</p> <p>-Maintaining and enhancing resilience of the components of biodiversity to adapt to climate change.</p>
	<p>Desertification:</p> <p>-The demands for more land to produce more food means shortening of the fallow or resting period in the rain fed agricultural. This in turn contributes to the gradual loss of soil fertility through the exhaustion of the soil.</p> <p>-Population growth is the</p>	<p>-Remote sensing and geographic information system techniques applied for assessment and mapping of desertification to support UNCCD</p> <p>Sudan National Action Plan (SNAP), bottom-up approach to combat desertification grants commitment and participation of the local</p>	<p>-Increasing the storage capacity of ground water through the construction of dams, terraces, and water harvesting techniques.</p> <p>-Development of forest cover and afforestation through dune fixation, shelterbelts, community forests, enclosures and greening of public utilities and rehabilitation of gum Arabic belt.</p> <p>-Establishment of early warning system to monitor and enhance the preparations for the drought spans.</p> <p>-Improvement and rehabilitation of degraded rangelands</p>

4	<p>cause of land degradation; it is rarely the primary one. There are other factors.</p> <p>-drought, deforestation and over-grazing</p>	<p>populations and communities.</p> <p>- several projects and programs with meaningful impact on the livelihoods of the affected populations.</p> <p>Key Stakeholders and Partners facilitate effective use of resources for combating desertification and the mitigation of drought and external donors.</p> <p>-Decentralized approach conducive to implementing the UNCCD</p>	<p>through reseeded, nurseries, enclosures, and rehabilitation of vegetation cover especially in the marginal areas between latitudes 10o and 18o N.</p> <p>-Enhancing energy security and improving access to energy services through development of Public-Private Renewable Energy Partnerships</p>
	<p>Climatic change:</p> <p>Biomass consumption, environmental degradation, leading to further deterioration and conflicts over meager resources</p>	<p>-UNFCCC, Energy Research Centre, UNDP sustainable energy project, REDD++,</p> <p>-Active Energy Committee at the National Assembly</p>	<p>-Development of legislations pro Green Economy, including Solar energy technologies, improved stoves, and introduction of LPG</p> <p>- Mainstreaming climate change into agricultural policies for achieving food security and poverty reduction</p> <p>-Development and provision of energy alternatives and optimizing energy use through use of biogas, solar and wind energy and utilizing of agricultural residues, molasses blocks, electricity and expanding use of improved stoves.</p> <p>-Strengthening national capacities in environment statistics and accounts -Strengthening national capacities to design and implement sustainable energy policies for the production and use of biofuel</p> <p>-Integrating climate change into national sustainable development strategies and plans</p>
5	<p>Soil nutrient loss:</p> <p>-Un controlled expansion of mechanized agriculture</p> <p>- Subsistence farming, shortening of the fallow</p> <p>- loss of soil fertility through the exhaustion of the soil</p> <p>-Forest resources degradation as grazing habitat for livestock and wildlife</p>	<p>-Consultation with local communities, indigenous people and civil society in readiness and REDD+ strategic plan;</p> <p>-Identification and applying of REDD+ guidelines</p>	<p>-Compilation of information and data on natural resources surveying, land use mapping and establishing information bank.</p> <p>-Support to Gum Arabic gardens</p> <p>- Successful use of agroforestry and community forestry</p> <p>-Collaboration of Range Department and FNC on improving grazing habitats to save the forests.</p>
	<p>Wetland loss and degradation:</p>	<p>1- Jongeli canal project postponed</p>	<p>-Protection of the Nile basin and its tributaries against gully and sand encroachment.</p>

6	-lack of awareness of the hydrological, economic, climatic and social benefits of wetlands, Absence of IWRM systems, and weak governance		-Encourage both Sudans dialogue on conservation of wetland ecosystems
7	Unsustainable agricultural practices: Weak conservational policies, stakeholder capacity, and land tenure reforms	The Green revival plan 2007-2011	-Concentration on vertical expansion of agricultural production to decrease pressure on natural resources through integrated research programs.
8	Over fishing, overgrazing: Weak policies, lack of effective supervisory control, and stakeholder engagement, traditional trends	PERSRGA, UNCCD, REDD+	International cooperation to develop a global monitoring system in national relevant policies
9	Water resources management: Deficient sustainable national planning, lack of IWRM systems	Regional agreements ratified Nile Basin and PERSEGA	Adopting IWRM and ICZM approaches
10	Pollution and pollutants: Lack of supervisory control, stakeholder engagement and research and development (R&D)	This National Implementation Plan on the POPs management and phase-out, together with the ratification of supporting conventions will gear Sudan very well into the international community in the POPs management and will further enable Sudan to participate in the technical cooperation, information exchange and dissemination.	Develop regional or sub-regional action plan of POPs management, and subsequently implement as part of its implementation plan, designed to identify, characterize and address the release of the chemicals An evaluation of current and projected releases, including the development and maintenance of source inventories and release estimates - Strengthening regional and national processes for formulating and implementing sustainable energy strategies that contribute the most to GHG emission reduction
	Poverty: -94% of Sudan's population is below the poverty line. Many of the poor people are in the rural areas, live in marginal lands and drought prone areas. -The poor have limited access to modern	-Sudan National Action Plan (SNAP), bottom-up approach to combat desertification -Microfinance unit established at the Bank of Sudan Economic Reform programs	-Enhancing trade competitiveness through the implementation of single-window facilities -Enhancing capacity of farmers to implement international standards for commercial agricultural products in order to improve their trade competitiveness -Promote and enhance poverty alleviation programs through encouraging alternative livelihoods, and enhancing the use of traditional and intermediate

11	<p>agricultural inputs and also to alternative biomass sources of energy.</p> <p>-heavy reliance on forest clearing to expand agricultural output.</p> <p>-historical and contemporary records of famines in Sudan is linked to environmentally degraded areas, particularly to droughts and crop failures, and outbreaks of diseases.</p> <p>-Forest-dependent communities increase the pressure on forests</p>	<p>-Oil development</p> <p>-Mesquite spreading all over the country</p>	<p>technologies and rural industries.</p> <p>-Establishing group solutions for local communities in marketing and fund mobilization.</p> <p>-Strengthening and activating policies and legislation and their executing mechanisms to protect the environment and natural resources.</p> <p>-reparation of comprehensive plans for drought preparedness, relief management in drought periods, self-preparation in the affected and prone areas, and ready programs to receive refugees and displaced.</p> <p>- Implications of macroeconomic policy, external shocks and and social protection systems for poverty, inequality and social vulnerability</p> <p>-Rehabilitation of forests through community agroforestry</p> <p>-Development of human and animal food uses of mesquite pods, with introduction of applied technology as value added.</p>
12	<p>Conflicts:</p> <p>- The horizontal expansion of agriculture affected the natural rangeland creating inter-communal tension and conflict between herders and cultivators.</p> <p>-Conflict is the rule rather than the exception with the available grazing land diminishing, particularly in greater Darfur.</p> <p>-Local disparities based on natural resources in relation to political borders of-set by the federal governance system</p> <p>- Ethnic, religious and social differences as elements</p>	<p>-The CPA, Darfur Peace Agreement (DPA) and East Peace Agreement (ESPA),</p> <p>-The three areas under continuous focus from the international community</p>	<p>- Conflict management capacity building, training and scientific research to support sector-al institutions, academic, NGOs, public organizations, trade unions and land committees in all affected local communities.</p> <p>-Retooling Global Development in Strengthening Coherence and Coordination of Local Development Policies</p> <p>-Strengthening capacities of state and non-state stakeholders to support their effective participation in negotiating peaceful co-existence and public consultation</p> <p>- Sustaining peace and stability through the continued implementation of the CPA, DPA and ESPA,</p> <p>-Safeguarding national sovereignty and security, on Abyei and the Three regions, continuing to build consensus and reconciliation, and maintaining good relations with the international community based on mutual interest.</p>
	<p>Social Cohesion:</p> <p>-Demographic changes, with Sudan's population growing at 2.7% per annum, having direct consequences on the environment through the growing demands for fuel wood and other.</p>	<p>-The CPA</p> <p>-Cessation of South Sudan</p> <p>- activities currently exist, but there is plenty of room for expansion,.</p>	<p>-Support decision making and policy formulation on foreign direct investment in the context of the Millennium Development Goals and the Monterrey Consensus</p> <p>-Strengthening national capacities to deal with international migration: Maximizing development benefits and minimizing negative impact</p> <p>- Building capacity of government and NGOs to promote implementation of the Convention on the</p>

	<p>-Internally displaced People (IDPs) and refugees from neighboring countries, displaced by war and drought for the last three decades, with negative impacts on the environment through indiscriminate clearing of trees for domestic energy and housing.</p> <p>-Brain drain., steady movement of labor from the Sudan to the , migration of able-bodied males labor is felt in the rural areas, the loss of trained manpower or the brain drain to the industrial countries.</p>		<p>Rights of Persons with Disabilities</p> <p>--Understanding potential economic impacts of climate change Enhancing Key Statistics and Indicators to Monitor Progress toward the Millennium Development Goals and Other Internationally Agreed Development Goals</p>
13	<p>Women development: Women subject to harmful tradition practices, tenure, rights, male dominance and burdens of poverty</p>	<p>Elections Quota for Women,</p> <p>Women education progress</p> <p>In most of the country especially rural areas women are the major collectors of fuel wood for energy</p>	<p>-Enhancing capacities to eradicate violence against women through networking of local knowledge communities</p> <p>Strengthening the capacity of rural women to utilize the market access opportunities provided by Duty Free Quota Free (DFQF) and enhancing value-added of their traditional products</p> <p>- Engaging indigenous women: local government capacity building through new technologies</p> <p>Enhancement of capacity building amongst rural women in Agro-forestry, non-wood forestry products, traditional medicine</p> <p>-Capacity building on improved stoves, solar cookers and appropriate rural technologies production</p>
14	<p>Governance:</p> <p>-Lack of support of political leadership and relevant stakeholders to conceive and implement significant interventions in the socioeconomic and environmental texture of both Sudans, contributing to its overall human development</p> <p>-weakened basic and</p>	<p>CPA, ElectionsThe period following the CPA, witnessed a serious political revival in Sudan, a situation which was brought into existence after fierce diplomatic efforts and hectic negotiations between the two main partners to Naivasha consensus. As a result of the active participation of the SPLM in the daily activities of the Government of National Unity</p>	<p>Strengthening national capacity for the integration of sustainable principles into development post conflict strategies</p> <p>-Public Private Partnership Alliance program for capacity building in infrastructure development and provision of basic services</p> <p>-Capacity-building of Government Officials in management of public-private partnerships for improved service delivery and infrastructure development</p> <p>-Promoting Rule of Law and Governance in the natural resource sector</p> <p>-Capacity Building of Control Authorities and Transport Operators to Improve Efficiency of Cross-border Transport between Landlocked and Transit</p>

	<p>higher-education sector has taken its toll by reducing the ability of education institutions to contribute to peace and development by graduating globally literate, well-adjusted scholars who can readily adapt to a variety of positions in both public service and civil society and who are prepared to work in Sudan's diverse regions beyond Khartoum.</p> <p>-Integration and revision of forest education in secondary and tertiary levels</p>	<p>(GONU), fundamental national issues were raised through the contribution of the Sudanese intellectuals and conservative politicians, who traditionally shied away from this role.</p>	<p>Developing Countries</p> <p>-Strengthen education sector in Sudan to contribute to peace and development by graduating globally literate, well-adjusted.</p> <p>-Support academics,, women and youth mobility programs to build modern, globally-oriented skills, especially for universities in Sudan's provincial areas. Student and faculty exchange programs could be made more accessible by special exceptions in current U.S. visa restrictions and sanctions regarding the Sudanese government.</p> <p>- Strengthening capacity to design and implement national development strategies Strengthening science, technology and innovation policies for development</p> <p>- Implementation of the constitutional and administrative structures of the federal system of governance, and establishment of effective institutions required within it</p>
15	<p>Education, Research and Development</p> <p>Lack of coordination between the different forestry education programs and research at the secondary and tertiary levels and the requirements of the Forestry National Corporation</p> <p>-Weak forestry technical education, drastically needed at the field</p>	<p>-Several secondary and tertiary forestry education systems well sustained</p> <p>-Technical education in Sudan in good shape</p> <p>-readiness for collaboration within the Forestry sector</p>	<p>-Joint, local, regional partnerships in research activities focusing on case studies on community agroforestry, poverty linkages, and the role of non-wood forest products.</p> <p>- Strengthening forestry technical education through introducing forestry education curriculum within the technical education systems.</p> <p>-Building State and National planning capacities in the forestry sector</p>

Source: Badri 2012

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ANNEX I: SCOPE OF WORK

I. OBJECTIVE

To hire a short-term institutionally contracted national staff to report directly to USAID for daily tasks, and to be supported administratively by Management Systems International. Specifically, the Environmental Specialist will conduct a country-wide assessment of biodiversity and tropical forestry conservation needs of northern Sudan and the Three Areas and related issues for the purposes of complying with Sections 117, 118, and 119 of the Foreign Assistance Act of 1961, as amended, and Agency guidance on country strategy development, under ADS 201.3.9.1, ADS 201.3.9.2, and ADS 204.

Based on this needs assessment, provide analysis of proposed actions under USAID/Sudan's new transitional strategy to identify how it contributes to the conservation needs identified. This Environmental Threats and Opportunity Assessment (ETOA) will also inform USAID/Sudan strategic planning, and provide a primary level of analysis on relevant proposed areas of programming, as well as address current Administrative and Congressional priorities, foremost, food insecurity, water resources management, global climate change and global health.

Specifically, FAA Sections 118 and 119 require that all country plans include:

1. An assessment of the actions necessary in that country to achieve conservation and sustainable management of tropical forests (118) and conserve biological diversity (119); and
2. Analysis of the extent to which current or proposed USAID actions meet those needs.

Congress recognized the importance of biological diversity as the foundation of all sustainable development, and as critical to support, not burden, USAID programs. The ETOA is developed as a tool for not only informing the strategy development process, but is valuable throughout its full implementation. It assists in the identification of possible environmental compliance issues (positive and negative) associated with newly designed programmatic activities, as well as opportunities for innovative use of earmarked funding (especially for biodiversity and tropical forestry conservation), and increased sustainability across development sectors. In alignment with USAID August 2010 operational reform priorities, and more recent Presidential Global Development Policy priorities, this ETOA will help foster USAID/Sudan's capacity to achieve high-impact development and make smart use of our limited resources, supporting our leadership role in building and delivering development assistance excellence.

II. BACKGROUND

Policies Governing Environmental Procedures

USAID environmental compliance is directed by U.S. policy and law. The Foreign Assistance Act (FAA) of 1961, Section 117, requires that the President take fully into account the impact of foreign assistance programs and projects on environment and natural resources (Section 117 (c)(1)).

Section 118 states that each country development strategy statement or other country plan prepared by the U.S. Agency for International Development shall include an analysis of (1) the actions necessary in that country to achieve conservation and sustainable management of tropical forests, and (2) the extent to which the actions proposed for support by the Agency meet the needs thus identified.

Section 119 of the FAA relates to Endangered Species. It states that —the preservation of animal and plant species through the regulation of the hunting and trade in endangered species, through limitations on the pollution of natural ecosystems and through the protection of wildlife habitats should be an important objective of the United States development assistance (FAA, Sec. 119 (a)). Furthermore it states, —Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of (1) the actions necessary in that country to conserve biological diversity and (2) the extent to which the actions proposed for support by the Agency meet the needs thus identified (FAA, Sec. 119 (d)).

USAID/Sudan is currently developing a Transitional Strategy for its assistance program in Sudan. To be in compliance with above, and for USAID Sudan to effectively determine potential threats and opportunities associated with the management of natural resources and environmental factors, an assessment is needed to inform Mission Planning. The purpose of this Consultancy is to provide USAID/Sudan and the Government of Sudan with information and analysis to help achieve broad-based, inclusive economic growth and participatory democratic governance.

III. STATEMENT OF WORK

A. Core Assignment.

The ICS Consultant shall perform the following assessment activities:

- Get acquainted with existing background information on Sudan such as the country's natural resources, geographical, ecological and biological specificities, current status of environment and biodiversity, institutional organization on entity and state level, key stakeholders and donors in environment and biodiversity, legislation related to the environment and biodiversity, and other relevant information required for the assessment.
- Communicate via email and telephone with donor organizations, NGOs, relevant government agencies, and other organizations that are knowledgeable about biodiversity and tropical forestry conservation, environmental management, and/or are implementing related noteworthy projects, and gather information locally. This may include implementing partners supporting activities related to agroforestry, extractive industries management, sustainable eco-tourism, climate change vulnerability, renewable energy, water resources management, conservation agriculture, and environmental/public health.
- Assess and summarize the needs for natural resource and environmental management, especially biodiversity and tropical forestry conservation, in Sudan based on key threats, and analysis of country, donor and NGO responses to meet these needs. Prepare a report on the status of biodiversity, tropical forestry, and other priority environmental conservation efforts in Sudan, and potential implications for USAID or other donor programming and monitoring which shall define the actions necessary for improved natural resource and environmental management.

B. Assessment of actions necessary in that country to achieve conservation and sustainable management of tropical forests and conserve biological diversity

1. The current status of biodiversity, tropical forests, and water resources in Sudan based on current and available information.
2. **Major ecosystem types**, highlighting important, unique aspects of the country's biodiversity, including important endemic species and their habitats.
3. Descriptions of **natural areas of critical importance** to biodiversity conservation, such as forests and wetlands critical for species reproduction, feeding or migration, if relevant. Particular attention should be given to critical environmental services and non-commercial services they provide (watershed protection, erosion control, soil, fuel wood, water conservation and amenity and recreation).
4. An **overview table and maps of the status and management of protected area system** in Sudan including: an inventory of all declared and proposed areas (national parks, wildlife reserves and refuges, forest reserves, sanctuaries, hunting preserves and other protected areas). The inventory will identify the institution responsible for the protection and management of each decreed area, its date of establishment, area, and the protection status of each (i.e., staff in place, management plan published, etc.). In addition to this summary of the current protection and management status of each protected area, an overview of the major threats and challenges facing protected areas in Sudan, and a brief summary of any recognized economic potential of these areas (including productive assets, environmental services, and tourism opportunities) should be provided.

5. An **overview table and maps of the status and management of critical biodiversity and forestry areas outside of protected areas** in Sudan including: an inventory of all declared and proposed areas (e.g., wetlands/freshwater sources, major catchment areas, agriculture ecosystems, etc.). The inventory will identify the institution responsible for the protection and management of each. In addition to this summary of the current protection and management status of each area, an overview of the major threats and challenges facing these areas in Sudan, and a brief summary of any recognized economic potential of such areas (including productive assets, environmental services, and tourism opportunities) should be provided.

6. Descriptions of **plant and animal species that are endangered or threatened** with extinction. Endangered species of particular social, economic or environmental importance should be highlighted and described, as should their habitats. Technical information resources such as the IUCN red list and their websites should be referenced for future Mission access as required. This section should not emphasize species counts, but look at the relation of endangered species and important habitat conservation areas and issues, and evaluate the pressure on those areas, including vulnerability to predicted changes in climate, and current efforts to mitigate pressures, including the participation and compliance with CITES and other international efforts.

7. Recent, current, and potential **primary threats to biodiversity**, whether they are ecological (i.e., climate change, fire, pests, etc.), related to human use (i.e., deforestation, resource extraction, agriculture, contamination, infrastructure development, oil and gas development, etc.), or institutional (i.e., failed policy, lack of enforcement, transparency, or accountability, and mismanagement, etc.) or transboundary issues, as appropriate. Special attention should be given to resource conflict issues, foremost land tenure. These should emerge from a general assessment of national policies and strategies and their effectiveness, issues related to institutional capacity and accountability, trade, private sector growth, participation in regional and international treaties, and the role of civil society.

8. **Conservation efforts, their scope and effectiveness.** This section also should include recent, current and planned activities by donor organizations that support natural resource and environmental conservation, identification of multilateral organizations, NGOs, universities, and other local organizations involved in conservation, and a general description of responsible government agencies. A general assessment of the effectiveness of donor coordination efforts, policies, institutions, capacity, and activities to achieve natural resource and environmental conservation should be included. Priority conservation needs that lack capacity (technical and management), good governance, donor or local support should be highlighted.

9. Analysis of the **current legislation related to the environment and biodiversity, including Sudan's National Development Plan** (or equivalent) This section should include identification of laws related to protection and management of biological resources and endangered species, as well as climate change, renewable energy, and water resource management, and land tenure and property rights issues as well. It should also point out any differences in laws that require further harmonization. This section should also review international treaties signed and ratified, as well as those that Sudan needs to sign in order to conserve and manage its biological resources more efficiently.

10. An overview of the major biodiversity and tropical forest conservation activities of the **commercial private sector** to identify ways to better foster private sector alliances. Of interest are the norms and standards followed by those commercial entities most engaged in management and use of Sudan's tropical forests and tracts in or near protected areas. Consideration of policies promoted by the key relevant governmental ministries should also be included.

11. A brief **analysis of climate change threats and impacts in Sudan**, current and near future. This includes impacts on development and conservation measures (agricultural production, disease prevention, etc.), as well as trends, data gaps and opportunities for carbon market financing mechanisms, and for potential linkages with USAID/Sudan programs and donor collaboration to address climate vulnerability.

12. A brief overview and recommendations for **global health related environmental issues and linkages**, such as population growth, medical waste, malaria prevention and pesticides like DDT, etc.

This includes environmental impacts from increased application of pesticides, biofuel production, biosafety or biotechnology (GMOs), invasive species, and use of charcoal cooking stoves, etc.

13. A brief synopsis of the status of oil and gas development in Sudan.

C. Analysis of the extent to which current or proposed USAID actions meet those needs.

1. An assessment of how USAID's program and proposed two-year transition strategy meets the needs for sound natural resource and environmental (especially biodiversity and tropical forestry) conservation, consistent with Mission program goals and objectives. The assessment shall include recommendations on where U.S. comparative advantages and capabilities are likely to have the greatest impact. These issues and recommendations should be prioritized to identify those requiring the most immediate attention.

2. An assessment of how the Government of Sudan and other donor development plans meet the needs for sound natural resource and environmental (especially biodiversity and tropical forestry) conservation, consistent with their goals and objectives, through development objectives other than environment.

3. A brief section examining opportunities for USAID/Sudan to expand interagency, intergovernmental, and international donor collaboration for increased aid effectiveness, especially in the areas of climate change, water resource management, food security, and health.

If any perceived areas of concern related to USAID's program and its contribution or impact arise during this assessment, the Contractor shall provide views and suggestions directly to the Mission Environmental Officer in a separate briefing.

D. Data collection

The Consultant is expected to mainly gather information and documentation within Khartoum-based institutions, and no field visits are expected.

Meet with USAID/Sudan to get a solid understanding of Mission program goals and objectives under its current Operational Plan; perspectives of this assignment and specific interests for the team, including advice and protocol on approaching USAID partners and host country organizations with respect to this assignment.

Gather and get acquainted with existing background information on Sudan such as the country's natural resources, geographical, ecological and biological specificities, current status of environment and biodiversity, institutional organization on entity and state level, key stakeholders and donors in environment and biodiversity, legislation related to the environment and biodiversity, and other relevant information required for the country assessment.

Interview key stakeholders or managers at selected government entities, donor organizations, NGO's and private sector in Khartoum. The Consultant will develop a list of people to be interviewed for concurrence by the Mission (Program Officer).

E. Illustrative ETOA Report Contents and Outline:

The report needs to provide (a) an analysis of the actions necessary in that country to achieve conservation and sustainable management of tropical forests (118) and conserve biological diversity (119); and (b) a sense as to the extent to which current or proposed USAID actions could meet those needs. An illustrative listing of the contents expected in the report includes:

Introduction, describing the biophysical/human/economic contexts, environmental laws, policy and institutions, overview of environmental programs and initiatives, and the purpose of the present review

An overview of the state of the natural resources, including forests and terrestrial biodiversity, aquatic ecosystems, and agricultural resources

An analysis of past and current initiatives in Sudan

Climate Change Vulnerability and Adaptation

Opportunities and entry points for USAID/Sudan, including integrated threats analysis, optimal results areas, analysis of legal requirements under the FAA, interventions of other donors, recommendations of environmental experts and recommendations of opportunities and entry points.

All references used and cited in the report, including Web URLs, people consulted, and their institutional affiliation, endangered and protected species and authors' biographical data. Other references such as the SOW for the analysis, other background or supporting material, including maps and photographs should be included. Copies of key document, maps and images, and copies of photographs obtained during the assessment should also be appended in a CDROM with electronic versions of written materials.

IV. REQUIRED EXPERTISE AND ANTICIPATED LEVEL OF EFFORT

The Consultant should have a combination of complementary technical skills and knowledge in biodiversity, forestry, natural resources management, institutional development, policy, and economics in order to address issues affecting Sudan.

The Consultant is required to have the following qualifications and abilities:

- Senior Level Natural Resources and Environmental Management Specialists with post-graduate qualifications in biology, zoology, forestry or closely related field in natural resource management (including water), land tenure and property rights or natural resource economics. Some knowledge of climate change mitigation and adaptation is desirable.

demonstrated experience in Sudan environmental law, the policy and legal frameworks governing environmental management and biodiversity/forestry conservation in Sudan and the analysis of relevant policies.

- Significant experience in integrating health, water, environment, population and poverty reduction issues is desirable.

Demonstrated expertise in assessing development programs for impacts on environment and tropical ecosystems.

Demonstrated expertise in the design and production of environmental impact assessments (EIA).

Based in Khartoum and able to conduct interviews with government officials, donor representatives and other stakeholders in or nearby Khartoum

V. DELIVERABLES

The main deliverable is an Assessment Report (20 to 40 pages without appendices, plus a 5-page Summary) for USAID/Sudan that examines the environmental threats and opportunities, the biodiversity and the tropical forests conservation and other management related issues and identifies contributions and/or potential contributions to meeting identified conservation needs by the Mission's operational plans. Other deliverables are the following:

Work plan/schedule within three working days of start date. While most of the work will consist of desk work, a number of government officials, donor representative and other stakeholders may be interviewed. The Consultant will make a list of proposed interviews for concurrence by the Mission within three days.

Oral debriefing within five working days after completion of the first draft. The Consultant shall meet with the Program Officer and selected staff at USAID/Sudan in Khartoum to provide them with a brief of the report findings. The exit brief shall be accompanied by a short written summary of initial key findings and recommendations.

Following a two week comment and review period, a revised final report incorporating all comments will be submitted within three weeks of desk work (one hard copy and an electronic copy).

MSI will support the consultant administratively and will not be engaged in the quality assurance of the report.

VI. TECHNICAL DIRECTION, MANAGEMENT AND COMMUNICATION

The Consultant will report to the USAID/Sudan Program Officer and the MSI COP. Due to difficulties in travel within the regions of Sudan targeted for this transition strategy, it is envisioned that the Consultants will carry out the assignment from Khartoum mainly as a desk exercise. USAID/Sudan will assist the Consultant in obtaining reference material that is not available in Khartoum through the USAID/Africa Bureau central Biodiversity Analysis and Technical Support (BATS) program.

USAID/Sudan anticipates this ETOA will be completed in approximately 7 weeks (3 weeks of desk work plus 1 week for revisions after a 2-week comments period).

The consultancy will be carried out within the period of approximately July 15, 2010 through September 15, 2011.

VII. SELECTED REFERENCE DOCUMENTS

Good reference places for literature on the environment in Sudan can be searched for at:

FRAME <http://www.frameweb.org/> and RMPortal <http://www.rmportal.net/a&submit=%C2%A0%C2%A0> , and CDIE <http://dec.usaid.gov> search Sudan and Environment.

Sudan Post-Conflict Environmental Assessment by UNEP (2007), funded by Sweden and the UK. It is a large (34 MB) report, to be found at <http://www.unep.org/sudan/>. It is accompanied by the Sudan Environmental Database is at http://sudanreport.unep.ch/sudan_website/.

USAID/Sudan.2003, 2007.Environmental Threats and Opportunities Assessment (FAA 118/9 Assessment), September 200x.<http://www.encapafrica.org/documents/biofor> .

The existing Sudan ETOAs (2003, 2007) do not do justice to the Three Areas, Darfur or the North. STEP did do an Oil sector Scoping Report in 2007.

USAID/Sudan Annual Report(s).

Information on the oil sector can be found in Wood Mackenzie (2007) and Cooper, J. & T. Catterson. (2007). Scoping Statement for the Programmatic Environmental Assessment of the Oil Exploration and Production Activities in Southern Sudan.

1 Evaluation 27

ANNEX II: WORK PLAN/SCHEDULE

Steps	Dates	Deliverable
1	23 rd Sept – 15 th Oct 2011	Desk work
2	4 th Oct-12 th Oct 2011	Interviews with government officials, donor representative and other stakeholders (**A list of key institutions in the field of Environmental management that will be contacted in Khartoum, below)
3	15 th October 2011	Completion of the first draft
	20 th October 2011	*Oral debriefing after completion of the first draft
	20 th October 2011	A short written summary of initial key findings and recommendations submitted at the debriefing time:
	20 th Oct-5 th Nov 2011	A two week comment and review period, following the debriefing and submitted summary
	20 th January 2012	A revised final report (an electronic copy) incorporating all comments submitted:

*The Consultant met with the Program Officer and selected staff at USAID/Sudan in Khartoum to provide them with a brief of the report findings: 20th October 2011

ANNEX III: A LIST OF KEY INSTITUTIONS/PERSONNEL IN THE FIELD OF ENVIRONMENTAL MANAGEMENT THAT WERE CONTACTED IN KHARTOUM

Higher Council for Environment & Natural Resources (HCENR) – P.O. Box 10488 Khartoum Sudan-
Tel: 249183781479-Fax:00249183787617

Secretary General/1 Dr. SaadEldin Ibrahim-00249912393249

Climate Change Project Coordinator/ Mr Ismail Flgizoli-Cell: 00249183877616

Coordinator Biodiversity Project-Dr. Khitma Awad-Tel:00249183871479

Head, Dindir National Park Project-Cell: Dr. MutasimbashierNimir-Tel: 00249187777160

Forest National Corporation-P. O. Box 658 Khartoum Sudan-Tel: 00249183-Fax:00249183472659

General Manager-Dr. Abd-ALAzimMirghani Ibrahim

Deputy Director General- Dr. Abd-Allah Jaifr: 00249911102030

Head, Technical Affairs Sectors-Dr. Salah Yousif Mohamed-Cell00249126245793

Afforestation Department: Dr.Sayda Ali Khalil-Cell: 00249922882329

Extension Information Department-Dr. FaizaSiddig Mohamed-Cel: 00249918218866

Ministry of Environment and forestry

Minister: Mr. AbdAlGadirHillal- Cell: 00249912303991

Secretary General: Dr. Mahjoub Hassan-Cell0912310284

Ministry of Water Resources

Director, Water Resources- Cell: Ibrahim Salih-Cell: 00249912329760

Remote Sensing Authority

Director- Dr. Amna Ahmed Hamid- Cell 00249912131604

University of Khartoum

Institute of Environmental Studies-University of Khartoum-P.O.Box 321 Khartoum Sudan-Tel:
002491837880903

Dean- ProfessorHashimElAtta, Director –Cell: 00249918383448-

UNESCO Chair of Desertification Studies-

Acting Director-Professor Ibrahim Ayid: 00249912465340

Forest Research Center (FRC)-

Director- Professor Mohamed MokhtarBalal Cell: 00249912948554

Ahfad University for Women

Director, Regional Institute of Gender, Diversity, Peace and Rights:00249999200565

Ministry of Agriculture & Forestry-) P.O.B0x 285 Khartoum Sudan-Tel: 0024918377774-
Fax:002499183770701-773771-

Director, Planning Administration-Mrs. Suad Ibrahim AbdAllah-Tel 00249183793804

Director, Land Use and Combating Desertification Administration-Dr.Nabil Ahmed Saad-Cell:
00249925396351

Ministry of Energy and Mining-P. O. Box 2649 Khartoum Sudan-Tel 00249183777554-Fax
00249183773663

State Minister-Engineer IshagBashier- Cell: 00249912308875

The Sudanese Petroleum Corporation, Energy and Mining

Director Environment-Cell: 00249912167610

Directorate for National Energy Affairs

Director for National Energy Affairs-Mrs. IgbalAlSadig-Cell: 00249912160372

Ministry of Finance and National Economy-Tel: 00249183780632-799550

Head, International Cooperation: Mr. Omar Hajam

Head, Training, International cooperation: Mrs. Asma Awad-Cell:00249122365825

The National Assembly (Parliament) Tel: 00249187559531

Head Energy and Mining Committee- Professor Mohamed Yousif- Cell: 00240012303390

The Energy and Mining Committee

The Council of States-Tell: 00249187477250-Fax: 00249187472578

Deputy speaker-Professor Ismail El haj musa-Cell: 00249912303339

Sudanese Environment Conservation Society (SECS)

President-Professor Shadad-Cell: 00249912359317

Sudanese Environmentalist Society

Vice President- Professor IzzatTaha-email: izattaha@yahoo.com

Sudanese Social Forestry Society

President Dr. TalaatAbdelMagid-Cell: 00249918110780

Babiker Badri Scientific association for Women Studies

President- Dr. TalaatabdAlMagid- Cell 00249918110780

Practical Action, Sudan

Country Director: Dr. Mohamed AlMajzoob-Cell: 00249183460419