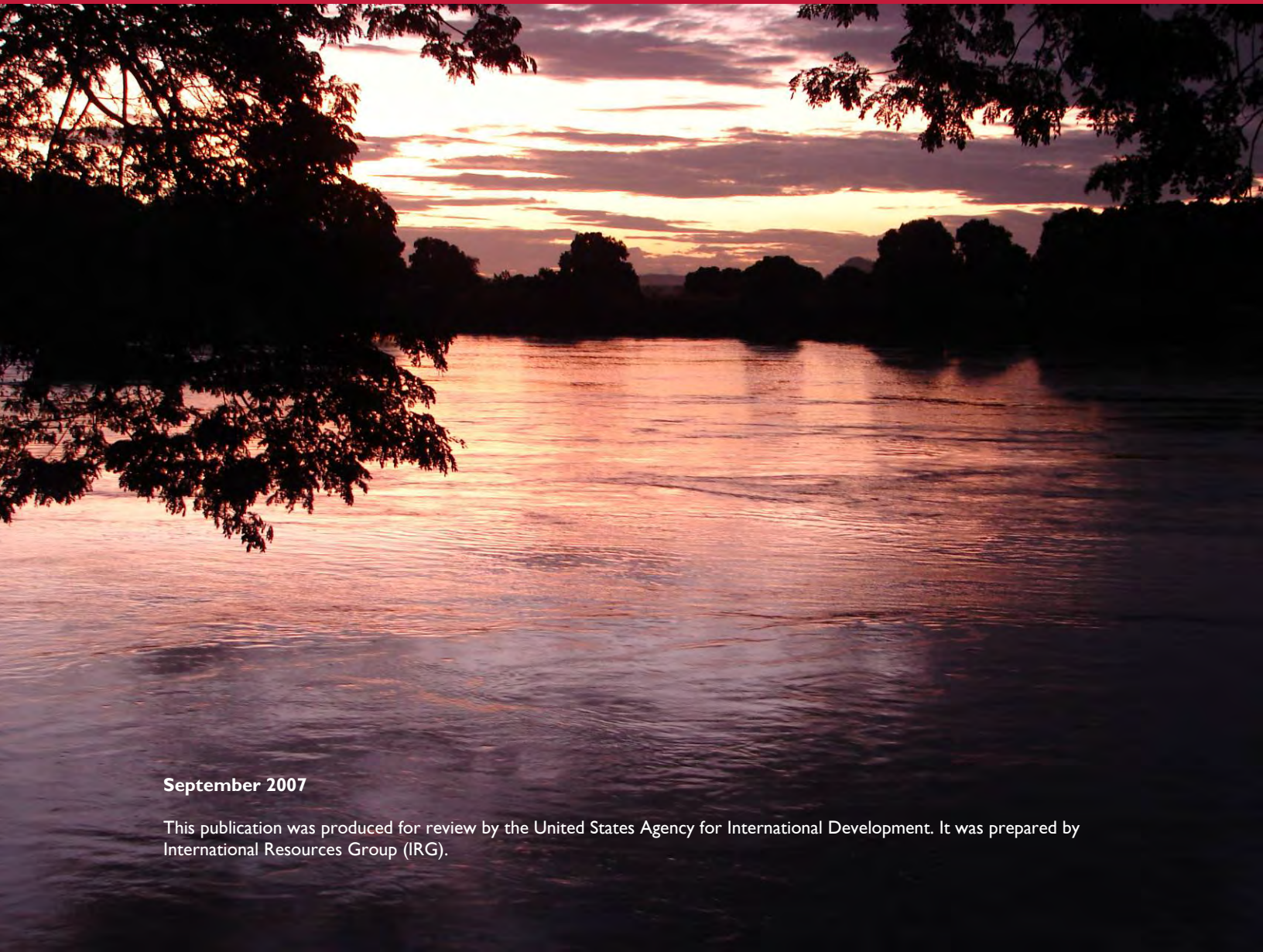




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SOUTHERN SUDAN ENVIRONMENTAL THREATS AND OPPORTUNITIES ASSESSMENT

BIODIVERSITY AND TROPICAL FOREST ASSESSMENT



September 2007

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COVER PHOTO

Sunrise along the Nile – Nothing epitomizes the environmental situation in Southern Sudan like the River Nile. Although it is a national treasure of great beauty and natural import, serving the needs of many for food and water, incipient pollution issues are threatening its integrity

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1211 Connecticut Avenue, NW, Suite 700

Washington, DC 20036

202-289-0100 Fax 202-289-7601

www.irgltd.com

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ACRONYMS

ADS	Automated Directive System
ATO	African Timber Organization
BEO	Bureau Environmental Officer (USAID)
CAR	Central African Republic
CBNRM	Community-Based Natural Resources Management
CITES	Convention on International Trade in Endangered Species
CPA	Comprehensive Peace Agreement
CSO	Community Service Organization
DRC	Democratic Republic of Congo
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ETC	Equatoria Teak Company
ETOA	Environmental Threats and Opportunities Assessment
EU	European Union
FAA	Foreign Assistance Act
FAO	Food and Agriculture Organization
FD	Forestry Directorate (MAF)
FFI	Flora and Fauna International
FNC	Forest National Corporation
FY	fiscal year
GIS	Geographical Information System
GONU	Government of National Unity
GOSS	Government of Southern Sudan
GRASP	Great Apes Survival Project
IDP	internally displaced people
IEE	Initial Environmental Examination
IFAW	International Fund for Animal Welfare
IPM	integrated pest management

IR	intermediate result
ITN	Insecticide-Treated Nets
ITTO	International Tropical Timber Organization
KFTC	Kagelu Forest Training Center
MAF	Ministry of Agriculture and Forestry
MEWCT	Ministry of Environment, Wildlife Conservation, and Tourism
MTDF	Multi-Donor Trust Fund
MTR	Ministry of Transport and Roads
NBSAP	National Biodiversity Strategy and Action Plan
NEAP	National Environmental Action Plan
NSWCO	New Sudan Wildlife Conservation Organization
PCEA	Post-Conflict Environmental Assessment
SIP	Sudan Infrastructure Project
SO	strategic objective
SPLA	Sudan People’s Liberation Army
SPLM	Sudan People’s Liberation Movement
SSARP	Southern Sudan Agricultural Revitalization Program
STEP	Sudan Transitional Environment Program
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNMIS	United Nations Mission in Sudan
UNOPS	United Nations Office for Project Services
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USFS	United States Forest Service
WCS	Wildlife Conservation Society

EXECUTIVE SUMMARY

Southern Sudan contains rich biodiversity resources, some of which are highly threatened. Due to the civil war, little natural resources data had been collected over the last 25 years. Recent efforts, such as the Wildlife Conservation Society (WCS) and Flora and Fauna International (FFI) aerial surveys, are beginning to fill data gaps. These population censuses have shown that significant wildlife still exists in Southern Sudan despite the years of war and lack of wildlife management and conservation.

Southern Sudan contains a range of ecological zones, providing habitat for the country's globally important biodiversity. The most commonly accepted classification of ecological zones of Sudan is the modified Harrison and Jackson (1958) classification. In this scheme, Southern Sudan contains six ecological zones: semi-desert, low rainfall woodland savannah, high rainfall woodland savannah, flood region, montane forest, and lowland tropical forest. The flood region includes the Sudd, considered the largest floodplain in Africa, and recently designated a Ramsar site. Southern Sudan currently has five national parks (plus one proposed), 11 game reserves (plus two proposed), three proposed nature conservation areas, and the Sudd Ramsar site, covering a total of 15.6 million hectares.

Southern Sudan also has extensive and diverse forest and woodland resources that provide timber, poles and firewood, food, oils, medicines, as well as habitat for much of Southern Sudan's wildlife. The United Nations Food and Agriculture Organization (FAO) report, *State of the World's Forests* (2007), provides forest cover data for Sudan as a whole, and determined that forest cover for the country had decreased, yet other studies looking at vegetation changes specifically in the south show that forest cover has actually increased there. The increase in forest cover in Southern Sudan is most likely due to a decrease in agricultural production and decline in commercial forest exploitation during the conflict years.

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 Southern Sudan to determine the actions necessary in Southern 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 analysis, the ETOA update team determined that the following are the key threats to Southern Sudan's biodiversity:

1. Limited policy and legislative framework for biodiversity conservation
2. Limited institutional capacity to manage natural resources
3. Slow progression of decentralization in the environment sector
4. Effects of development on wetlands, water resources, other sensitive areas, and on wildlife
5. Movement of people into Southern Sudan
6. Climate change

In addition, the ETOA update team determined that the following are the key threats to Southern Sudan's forest resources:

1. Commercial forest exploitation
2. Demand for construction materials, fuel wood, and charcoal

In response to the threats, the ETOA provides recommendations (elaborated in greater detail in the ETOA) to USAID for ways to strengthen its support of biodiversity and forest conservation, such as:

1. Continue and expand initiatives in policy and legislative development and capacity strengthening in the environment sector.
2. Provide support for protected area management in target areas with high biodiversity, which is under significant threat.
3. Promote decentralization of natural resources authority in line with GOSS intentions.
4. Expand current capacity strengthening efforts that target MEWCT's Directorate of Environmental Affairs staff.
5. Target activities that aim to reduce slash and burn agriculture to areas that are expected to receive high numbers of returnees, who will be practicing agriculture, and where significant biodiversity still exists.
6. Assist GOSS and local authorities to create a legalized and controlled bushmeat trade by promoting domestication of certain species; by providing licenses to a limited number of hunters; and by certifying enterprises that use domesticated sources of bushmeat or that are hunting in a sustainable manner.
7. Continue current capacity strengthening initiatives in the forestry sector, and expand to State Forest Departments and Forest Guards, who are on the "front lines" of the illegal trade in forest products.
8. Promote community forestry to help alleviate government's responsibility for forest management and enforcement, and to build community advocates for sustainable management of forests.
9. Support measures to develop certified construction material and charcoal enterprises, for which sources of wood can be traced and verified. .
10. Provide support for the establishment of community and privately owned woodlots that can meet part of the growing demand for wood and wood products.
11. Provide support for sustainable management of natural forests (to include community participation and benefit) to meet the growing demand for wood and wood products.

In addition, this ETOA analyzes the USAID Strategy Statement (2006-2008) for potential environmental impacts and provides recommendations to USAID to reduce threats. Environmental threats that may result from the USAID strategy are in the agriculture, infrastructure, and health sectors.

I. INTRODUCTION

This Environmental Threats and Opportunities Assessment (ETOA) for Southern Sudan was conducted in accordance with the Foreign Assistance Act (FAA) of the United States, Sections 118 and 119, as amended, which state:

FAA Sec 118 (e) Country Analysis Requirements. 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 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.

FAA Sec 119 (d) Country Analysis Requirements. 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.

According to FAA Section 117 “Environment and Natural Resources,” it is mandatory for operating units to implement their programs with an aim to maintain (and restore) natural resources upon which economic growth depends, and to consider the impact of their activities on the environment. The legal requirements of FAA 117 are reflected in USAID’s Automated Directive System, Chapter 204 and in 22 CFR 216, USAID Environmental Procedures, which is meant to “ensure that environmental factors and values are integrated in A.I.D. decision making processes.”

FAA Sections 118 and 119 are specific legal requirements of all USAID operating unit strategic plans. FAA 117, as codified in USAID’s Environmental Procedures, is also a legal requirement, which, when implemented during strategy preparation, allows USAID operating units to consider environmental impacts at the strategy stage.

Tropical Forestry and Biodiversity (FAA 118 & 119) Analyses: Lessons Learned and Best Practices from Recent USAID Experience (2005) states that, based on USAID guidance, some missions have chosen to combine the mandatory FAA 118/9 analyses with an early, strategy level environmental review—a preview into the potential environmental impacts at the strategy level (FAA 117). This strategy level review can provide guidance in the preparation of more detailed Initial Environmental Examinations (IEE) at a later stage. USAID/Sudan has decided to take this approach, combining the analyses described in FAAs 117, 118, and 119 into an Environmental Threats and Opportunities Assessment (ETOA). **Annex A** contains the most recent USAID FAA 117/8/9 guidance.

This ETOA has been prepared based on the USAID/Sudan Strategy Statement 2006-2008, prepared December 2005. An ETOA was not submitted at the time the Strategy Statement was prepared.

USAID now uses the Operational Plan, which provides a framework for a Mission’s performance monitoring plan, and describes activities the Mission is implementing in the fiscal year covered by the plan. In the context of the ETOA, the Operational Plan is used to identify USAID actions that support biodiversity needs identified in the ETOA analysis. At the time this ETOA was prepared, USAID/Sudan’s Operational Plan was not available to the ETOA update team. However, the ETOA team used the USAID website and other online sources to establish USAID activities that support biodiversity conservation.

I.1 TEAM MEMBERS AND METHODOLOGY

Annex B contains the ETOA SOW. The Core ETOA Team was made up of:

- ETOA Team Leader, Thomas Catterson, Sudan Transitional Environment Program (STEP) Team Leader
- Karen Menczer, consultant to STEP
- Sean White, Senior Forestry Advisor to STEP

Team members from the Government of Southern Sudan (GOSS) Ministry of Environment, Wildlife Conservation, and Tourism (MEWCT) staff were:

- Cecilia Mogga, Directorate of Environmental Affairs, Senior Inspector for Pollution Control
- Nickson Faustino Lawrence, Directorate of Environmental Affairs, Assistant Inspector for Flora and Fauna

Annex C contains biographical sketches of the team members.

Members of the ETOA Team took two field trips:

June 18 to 23 in the Rumbek, Lakes States area including:	June 24 to 29 in Western Equatoria State, including:
Rumbek	Kagelu Forest Training Center (KFTC)
Yirol/Adiar	Yei River County
Tonj/Wau	Yambio

The Lakes States field trip focused on (1) urban issues in the two small Southern Sudan cities of Rumbek and Wau, and in the small town of Tonj, where we discussed current status and future plans for clean water provision and sanitation, and visited sites where solid waste was dumped indiscriminately on the land; and (2) wildlife and protected area issues. In Rumbek, Wau, Yirol, and Tonj, we met with Wildlife Forces staff. In Rumbek, we discussed the nearby Southern National Park, and in Tonj, the nearby Shambe National Park. We also met with fisheries staff to discuss fisheries issues at Shambe, a fishing center.

The Western Equatoria State field trip focused on (1) urban issues in the towns of Yei and Yambio, and as above, we discussed the current situation and future plans in the water and sanitation sector; (2) forestry issues at the Kagelu Forest Training Center (KFTC) and in a roundtable with Ministry of Agriculture and Forestry (MAF) staff in Yei; and (3) wildlife issues in Yei and Yambio, where we met with staff of the Wildlife Forces.

In addition, to meetings in the field, we attended meetings in Juba. **Annex D** contains a list of contacts we met with during the preparation of this ETOA. Documents we reviewed are listed in Section 9.0, “References Used and Cited.”

The Team used the original ETOA, prepared in 2003, to guide our questions and the issues on which we focused in our fieldwork and meetings. This update primarily draws on material from recent reports, prepared since the original ETOA: the National Environment Action Plan—NEAP (Mohamed 2007), the Southern Sudan Livelihoods Profile (SSCCSE 2006), the Sudan Post-Conflict Environmental Assessment, (UNEP 2007, among others.

I.2 PURPOSE OF THIS ETOA UPDATE

The original ETOA was submitted to USAID in March 2003. This is the first update since the original.

Since 2003, our understanding of Southern Sudan’s environmental threats and opportunities has deepened, mainly because of work that STEP has undertaken, and because of the in-country presence of STEP technical

experts. Now, some of the most significant environmental concerns involve limited institutional capacities and potential impacts from the return of internally displaced people (IDP) and refugees (Environmental threats are discussed in detail in Section 7)

USAID/Sudan's FY 2007 Operational Plan has already programmed funds for FY 2007; this ETOA is meant to influence funding for FY 2008 and beyond. It can also be used by other organizations, including the GOSS, to help identify environmental opportunities and priorities for interventions.

Unless it provides additional information critical for ETOA analyses, the revised ETOA will not duplicate material presented in the original 2003 ETOA. This 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.

1.3 A NOTE ON DATA AVAILABILITY FOR SOUTHERN SUDAN

Most reports on the environment sector discuss Sudan as a whole rather than provide separate information for 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, data and findings may be skewed, and Southern Sudan's environmental resources, priorities, threats, and opportunities may get short shrift, in favor of the north's issues and priorities. Since reports that are specific to Southern Sudan are still rare, we provide some information for the country as a whole, and when this is the case, we note it in this ETOA.

Some examples of national level reports that give skewed pictures of the situation in the South are:

- The NEAP (2007) was written to apply to the north and south. However, it has little relevance for the south. The MEWCT acknowledges this, and is currently working on an Environmental Management Plan (EMP) for Southern Sudan. The EMP will use relevant sections from the NEAP plus other information generated by southern environmental professionals to develop action items for the south. The EMP for Southern Sudan was not available at the time we prepared this ETOA.
- Sudan's submission of the "Third National Report on the Implementation of the Convention on Biological Diversity" in 2006 was prepared by the Ministry of Environment and Physical Development and The Higher Council for Environment and Natural Resources, part of the Government of Sudan (North). The report states that "the recent biodiversity countrywide assessment undertaken by the National Biodiversity Strategy and Action Plan (NBSAP) Project even though not very comprehensive, constituted a benchmark and base of information for the different ecosystems, habitats and species." The NBSAP was considered a major effort towards biodiversity conservation in Sudan, yet the resulting strategy had some gaps. Namely, that due to the civil war, the biodiversity assessments for the southern region were carried out as desk work.
- The United Nations Food and Agriculture Organization (FAO) report, *State of the World's Forests* (2007) provides data on forest cover for Sudan as a whole and shows an annual reduction reduction in forest cover for the country as a whole. However remote sensing based analysis of vegetation cover carried out by Ahmed and Warrag (2005) actually shows an increase in vegetation density in the south over the period of the war. We can therefore conclude that while forest cover in the country as a whole declined, it actually increased in the south. The status of forest cover in Southern Sudan is discussed in greater detail in Section 2.4.

2. DESCRIPTION OF SOUTHERN SUDAN

2.1 GOVERNANCE AND ADMINISTRATIVE UNITS

The 2005 signing of the Comprehensive Peace Agreement (CPA) by the Sudan People's Liberation Movement (SPLM) and the Government of Sudan brought an end to Africa's longest running conflict. The parties to the CPA agreed on a government structure that established a Government of National Unity (GONU) and the autonomous GOSS. The GONU is comprised of the members of the National Congress, SPLM, and other northern and southern political forces. The GOSS governs Southern Sudan, and provides a link with the GONU. The CPA establishes "one country, two systems" in which the GOSS and GONU essentially share roles and responsibilities.

Southern Sudan is divided into ten states:

- Lakes
- Central Equatoria
- Eastern Equatoria
- Western Equatoria
- Upper Nile
- Jonglei
- Western Upper Nile
- Warrap
- Northern Bahr el Ghazal
- Western Bahr el Ghazal

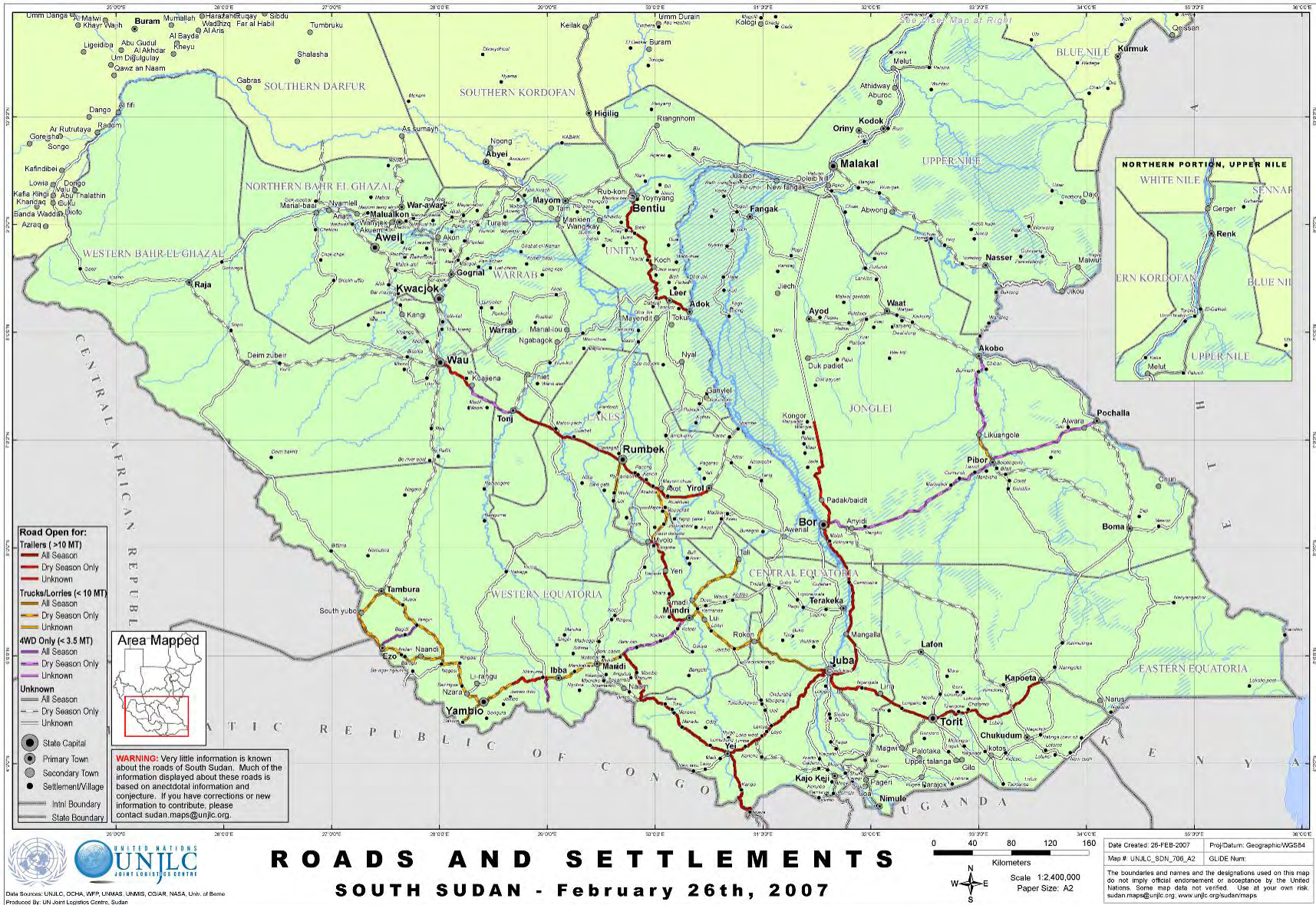
The Executive Branch of the State Government is headed by the Governor and is composed of the Governor, the Governor's advisors, and the State Ministers. Governors are accountable to the President of Southern Sudan, while the State Ministers are accountable to the Governor.

Local government consists of the County, Payam, and Boma. A "Payam" is equivalent to a district. A "Boma" is the smallest unit of local government. Local government is charged with promoting self-governance and enhancing the participation of people and communities in maintaining law and order and promoting democratic, transparent, and accountable government.

2.2 PHYSICAL DESCRIPTION

Location. Sudan is the largest country in Africa, measuring approximately 2.5 million km², and extending from latitude 3 ½ degrees N to 23 degrees N and from longitude 21 ¾ degrees E to 38 ½ degrees E. Southern Sudan makes up about one-third of the total land area of Sudan, covering about 640,000 km² (www.fao.org). Figure 1 shows the location of Sudan.

Figure I. Location Map of Southern Sudan



Population. According to the Livelihoods Profile (2006), with the last population census conducted in 1983, and over two decades of conflict in the interim, population figures in Sudan (and especially Southern Sudan) are the subject of debate. In 1983, the census figures estimated Sudan's total population at close to 20 million people, with 80 to 85% settled in rural areas. Recent population estimates for Southern Sudan (1998–2004) are mostly extrapolations and vary widely from three million to eight million.

Climate. Altitudes in Southern Sudan range from 600 to 3000 meters above sea level. The following information on Southern Sudan's climate is from the Livelihoods Profile (2006): Most of Southern Sudan has a sub-humid climate. Rainfall is favourable, with Western Equatoria and highland parts of Eastern Equatoria receiving 1,200 to 2,200 mm of rainfall annually. The lowland areas of Eastern Equatoria, Jonglei, Upper Nile, and Bahr el Ghazal receive between 700 and 1,300 mm of rainfall annually. The south-eastern tip of Eastern Equatoria receives the least rainfall, about 200 mm annually.

Temperatures in Southern Sudan are typically above 25°C and can rise above 35°C, particularly during the dry season, which lasts from January to April. For pastoralists, the hot, dry conditions trigger seasonal human and livestock migration to more permanent water sources (the *toic*), which serve as dry season grazing pasture, and for some ethnic groups, such as the Dinka, they also serve as fishing grounds.

At the onset of the main rains (April to June), people and cattle return to upland wet areas. Seasonal movements are less pronounced in the more agricultural zones such as the Hills and Mountains Zone (see Figure 8), and almost non-existent in the exclusively agricultural Greenbelt Zone. These two zones have two rainy seasons, April to July and August to December. However, there is evidence that rainfall is decreasing, and this is likely a result of climate change (discussed in Section 7.0).

Soils. According to Van Noordwijk (1984) the soils of Sudan can be categorized into five main groups, related to landform and climate. This categorization applies to Sudan as a whole, but the five soil types described by van Noordwijk are all found in Southern Sudan (the ETOA update team was unable to locate a soil map):

1. Various desert soils, formed by the action of wind and a dry climate. Salt crusts and rounded stones and pebbles may occur on the surface. Important groundwater resources are found under these formations.
2. Stabilized dune soils (Goz) formed during periods of a drier climate in recent geological history. When moister conditions returned, vegetation stabilized the dunes. These sandy soils are poor in nutrients and their humus content is low, but they are very permeable and because of the fine sand may have relatively high water availability during dry seasons. These soils partly overlay the Umm Ruwaba formation (see *Wetland and Water Resources*, below), formed in the Tertiary and Quaternary period.
3. Dark cracking clays, which are also known as “black cotton soils,” are mainly found in floodplains and deposited by the Nile and its branches, but some may have been formed on the spot from basalt rock formations. These soils crack deep and wide when dried out. They seal off when wetted, making the surface impermeable, so that flooding occurs during the rainy season. This presents a problem for construction during rainy seasons because vehicles and other machinery may be unable to pass and can become mired in the black cotton soil. The Umm Ruwaba formation comes to the surface in the area where these soils are found.
4. Non-cracking clays, occur scattered, and cover only a very small land area. Their hard, smooth surface makes them highly impermeable.
5. Red loam and ironstone soils occur mainly in areas where annual rainfall exceeds 800 mm and where drainage of excess water is possible. Water can easily infiltrate into these soils and water availability for vegetation is good as long as the loamy topsoil is intact. When, due to erosion, the subsoil becomes exposed to the sun, a hard ‘iron pan’ can form, and rainwater is unable to infiltrate.

Wetlands and Water Resources. Southern Sudan's major water resources are the Nile (White and Blue Nile), its tributaries, and aquifers. A large part of Southern Sudan is covered by wetlands, usually grouped together and

called the Sudd, Arabic for “barrier.” The Sudd is the inland delta of the White Nile, and is made up of lakes, swamps, marshes, and extensive floodplains (*toic*). The Sudd has been proclaimed a Ramsar site, conferring a status of global importance to this wetland. Section 2.3.2 contains a description of the Sudd.

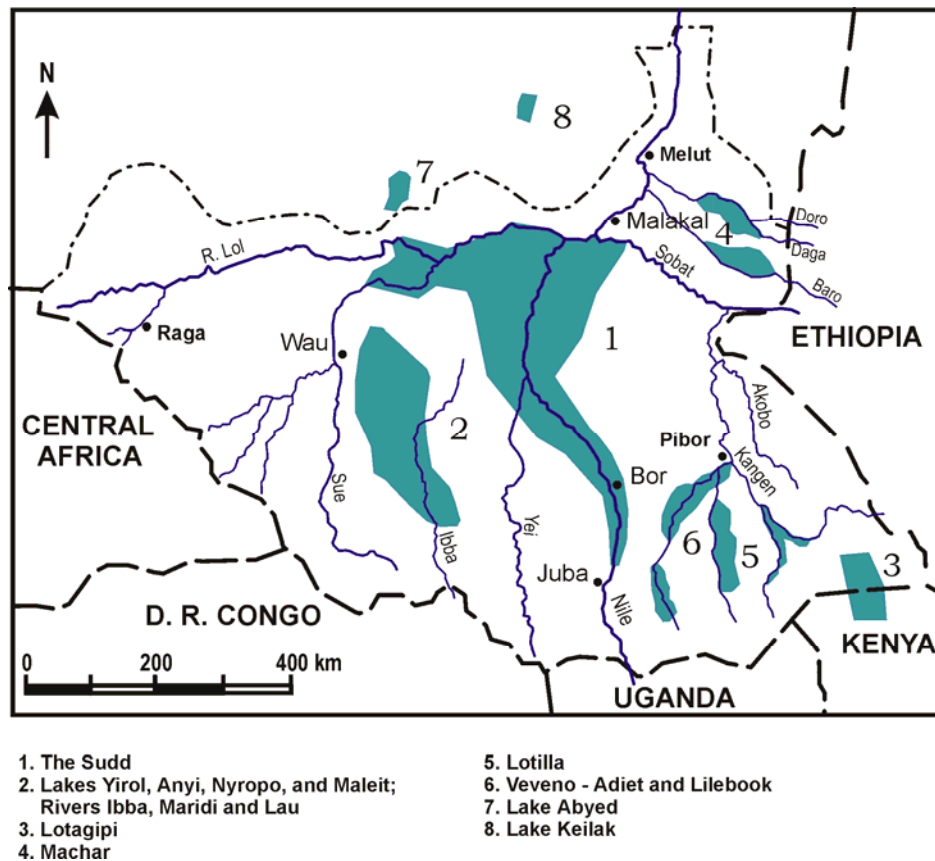
There are many other wetland systems throughout Southern Sudan, some quite extensive. The 2003 ETOA included a table with major and minor wetlands. Wetlands in Southern Sudan are only protected if they are part of national parks, game reserves, or forest reserves. This leaves many of Southern Sudan’s wetlands at risk. Threats to wetlands are discussed in Section 7.0.

Southern Sudan’s groundwater resources are found in the Um Ruwaba Formation. This formation is recharged by seasonal rainfall and river flooding. The extent of the aquifer is currently unknown (Mohamed, 2007).

According to the NEAP (Mohamed, 2007), Southern Sudan has substantial water resources, but they are unevenly distributed across the region and vary considerably from year to year. Water demand for domestic and productive uses has been growing rapidly, and that trend is expected to continue, placing even greater pressure on water availability.

Southern Sudan’s major surface water resources are shown in Figure 2.

Figure 2. Southern Sudan’s Surface Water Resources



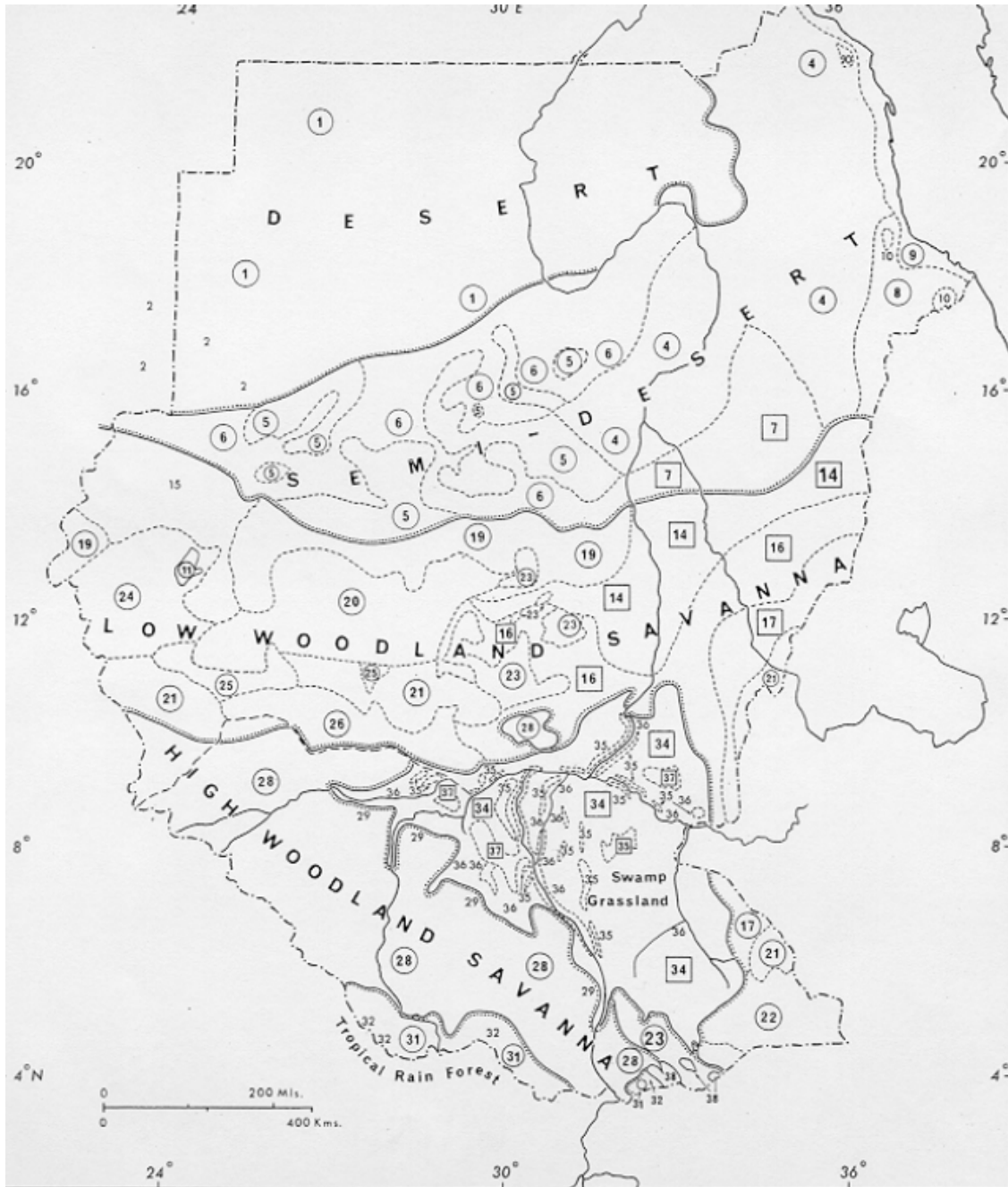
2.3 BIOLOGICAL RESOURCES

2.3.1 ECOLOGICAL ZONES

For Sudan as a whole, Harrison and Jackson (1958) described five major ecological zones based on floristic composition, rainfall, and soil types. The ecological classification now most commonly used is a modified

version (Table 1) of Harrison and Jackson's classification, which delineates six major divisions and a number of subdivisions. Forest and woodland zones are described within the broader ecological classifications. The Harrison and Jackson classification, as modified, includes Northern and Southern Sudan. Figure 3 shows the location of these zones.

Figure 3. Harrison and Jackson Ecological Zones of Sudan



According to Harrison and Jackson's classification, Southern Sudan is classified as savannah woodland (high and low rainfall), flood region, montane zone, and semi-desert. Savannah woodland is sub-divided into low rainfall savannah and high rainfall savannah. Low rainfall savannah occurs mainly in the north and is only represented in the south by a small area in the northern parts of Upper Nile State. High rainfall savannah covers most of Southern Sudan with the exception of the floodplain around the Nile and the montane region

of Didinga and Imatong Mountains. High rainfall savannah woodland is further divided into two sub-zones, savannah woodland and savannah woodland recently derived from rainforest.

Table 1. Sudan's Ecological Zones based on Harrison and Jackson 1958

Major division	Subdivision	Area km ²
1. Desert zone. Rainfall 0-75 mm		726,000
2. Semi-desert zone: Rainfall 75-300 mm	<i>Acacia tortillis</i> – <i>Maerua crassifolia</i> desert scrub	187,000
	Semi desert grassland on clay	104,000
	Semi desert grassland on sand	86,000
	<i>Acacia mellifera</i> - <i>Commiphora</i> desert scrub	86,000
	<i>Acacia glaucophylla</i> – <i>Acacia etbaica</i> scrub	31,000
	Total, semi-desert zone	494,000
3. Low rainfall woodland savannah zone. Rainfall 400-800 mm. Divided into three sub zones according to soil types – clay, sand and special areas.	Sub-zone 1. Low rainfall woodland savannah on clay soils (includes Blue Nile, White Nile Sennar, S.gedarif, S.darfur, S.Kordofan, N.Bahr el Ghazal)	
	<i>Acacia mellifera</i> thornland on dark cracking clays	96,000
	<i>Acacia mellifera</i> thornland on soils formed in situ with <i>Commiphora</i> and <i>Bascia</i>	119,000
	<i>Acacia seyal</i> – <i>Balanites</i> savannah woodland	
	<i>Anogeissus</i> - <i>Combretum</i> savannah woodland	49,000
	Total, sub-zone 1	264,000
	Sub-zone 2. Low rainfall woodland savannah on Sand (includes Kordofan, Darfur, White Nile East Kassala)	
	<i>Acacia sayel</i> savannah woodland	65,000
	<i>Combretum kordofanum</i> – <i>Albizzia</i>	86,000
	<i>Terminalia</i> – <i>Sclerocarya</i> – <i>Anogeissus</i> – <i>Prosopis</i>	65,000
	Total, sub-zone 2	216,000
	Subzone 3. Special areas -	
	Toposa area in East Equatoria	36,000
	Hill Catenas in Ingersana area of Blue Nile, Nuba Mts and W.Darfur hills	70,000
	Baggara catena in S.Darfur and Atmur areas	18,000
Ragaba catena	34,000	
Total, sub-zone 3	158,000	
	Total low rainfall woodland savannah	628,000
4. High rainfall woodland savannah zone Rainfall 900-1300 mm. Divided into two sub zones based on how the forest developed ecologically	Sub-zone 1. Savanna woodland – most of Nuba Mts, S.Darfur, S.Kordofan, Equatoria, Upr Nile, and Bahr el Ghazal.. Species dominated by <i>Anogeissus-Khaya-Isberlinia</i>	311,000
	Sub-zone 2. Woodland savanna recently derived from rainforest – includes East Equatoria and S.Bahr el Ghazal gallery forest	36,000
	Total, high rainfall woodland savannah	347,000
5. Flood region (also called "grassland swamp")	Sudd and Toic areas in Upper Nile Over 350 plant species have been identified in the Sudd.	57,000
6. Montane zone	Dongatona and Didinga Hills, Imatong Mts Red Sea Hills, and Jebel Mara	6,500
	TOTAL AREA	2,258,500

(Source: Sudan Country Study on Biodiversity. Bashir, 2001)

2.3.2 BIOLOGICAL DIVERSITY

Sudan has a rich biodiversity, and this is reflected in the number of mammalian orders: out of 13 mammalian orders in Africa, 12 occur in Sudan (Northern and Southern) (UNEP, 2007). The following is a description, by ecological zone, of the biodiversity found in Southern Sudan. This information is derived from the PCEA (UNEP, 2007), Moyini (in draft, 2007), and the NEAP (2007).

1. **The Savannah Region** (zones 3 and 4 from Table 1) is divided into low rainfall woodland savannah zone and high rainfall woodland savannah zone.

Woodland savannah is the largest ecological region in Southern Sudan. Low rainfall woodland savannah occurs in a large swath along the northern part of Southern Sudan. High rainfall woodland savannah stretches diagonally from the northwest of Southern Sudan along the Central African Republic (CAR), the Democratic Republic of Congo (DRC), and the Ugandan borders in Western and Central Equatoria.

Common large mammals of the woodland savannah include elephant (*Loxodonta africana africana* and *L. cyclotis*), hippopotamus (*Hippopotamus amphibious*), waterbuck (*Kobus defasa*), bushbuck, oribi, duiker, Uganda kob (*Kobus kob*), warthog (*Phacocoerus ethiopicus*), hartebeest (*Alcelaphus sp.*), giant eland (*Tragelaphus derbianus*), buffalo (*Syncerus caffer*), and various species of primates. A rich diversity of avifauna, reptiles, amphibians, and invertebrates also occurs here. Protected areas in the woodland savannah are Southern, Nimule, and Lantoto National Parks, and Ashana, Chelkou, Boro, Juba, and Numatina Game Reserves.

2. **The Flood Region** (zone 5 from Table 1) includes the Sudd and *toic*. The Sudd covers approximately 57,000 km²; however, the actual size of the wetland varies enormously (see Figure 4). The Sudd is one of the largest floodplains in Africa (http://www.worldwildlife.org/wildworld/profiles/terrestrial/at/at0905_full.html). It is also reportedly one of the largest tropical wetlands in the world (http://www.ramsar.org/wn/w.n.sudan_sudd.htm). The largest areas of Sudd are found along the Bahr el Ghazal, where the Bahr el Jebel and Bahr el Zeraf in Upper Nile and Jonglei come together. Given the extent and importance of this wetland, there is little reliable ecological information available.

Recently, the Sudd was declared a Ramsar site, the designation for wetlands of global significance. Ramsar designation is conferred upon wetland ecosystems that are globally-recognized “hotspots” for biodiversity. These “biodiversity hotspots” are designated because they contain critical habitat for endemics and for endangered species of flora and fauna or contain other globally important biodiversity.

The central core of the Sudd swamps is dominated by papyrus sedge (*Cyperus papyrus*). The core is bordered by cattails (*Typha dominguensis*), the dominant vegetation that covers about three quarters of the total swamp. The introduced water hyacinth (*Eichornia crassipes*) forms a fringe along river channels and lakes in the Sudd, and often forms a barrier in the rivers, canals, and lakes of the Sudd. This barrier can be so thick that boats may be prevented from moving through it.

The Sudd is an important breeding area for Nile ecosystem fish species and is the largest potential source of freshwater fish in Southern Sudan (http://www.photius.com/countries/sudan/economy/sudan_economy_fisheries.html). There are over 100 species of fish in the Sudd alone, including 31 siluroids, 16 characoids, 14 cyprinoids, 11 mormyrids, 8 cichlids and 7 cyprinodontids (Howell, et. al. 1988 in Itto et. al. 2000). The commercially important fish are Nile perch (*Lates niloticus*), Bagrid catfishes (*Bagrus bayad* and *B. docmac*), Nile tilapia (*Oreochromis niloticus*), carp (*Labeo spp*), Binny carp (*Barbus binny*), elephant-snout fish (*Mormyrus spp*), stubs (*Distichodus spp*), tigerfish (*Hydrocyon spp*) and characins (*Alestes spp*) (for wet salting) (http://www.fao.org/fi/website/FIRetrieveAction.do?dom=countrysector&xml=FI-CP_SD.xml&lang=en). Estimates state that the Sudd could provide 100,000 to 300,000 tons annually on a sustained basis (http://www.photius.com/countries/sudan/economy/sudan_economy_fisheries.html), however, accurate statistics on actual production have been unavailable since 1991. Much of the Sudd’s aquatic biodiversity could be affected by the infestation of invasive alien plant species, such as water hyacinth.

Figure 4. Sudd Swamps East of Rumbek

Recently declared an international Ramsar site, the Sudd is one of the largest wetland areas in Sub-Saharan Africa and an important buffer to the hydrological pattern of the River Nile. It also harbors, as has been recently determined, vast numbers of the remanent wildlife populations for which Southern Sudan was famous fewer than three decades ago.



Photo: Tom Catterson

Wildlife includes the threatened hippopotamus (*Hippotamus amphibius*), the near-threatened sitatunga (*Tragelaphus spekeki*), the endemic Nile lechwe (*Kobus megaceros*), and globally endangered species such as elephant (*Loxodonta africana*) and leopard (*Panthera pardus*). All white-eared kob (*Kobus kob leucotis*) and tiang (*Damaliscus lunatus tiang*) migrations pass through this zone.

Sudd ecosystems harbor Nile crocodile (*Crocodylus niloticus*), African rock python (*Python sebae*), other species of snakes and amphibians. Birds of international and regional conservation importance inhabit the Sudd, such as the endangered white pelican (*Pelecanus onocrotalus*), which flies over 2000 km from Eastern Europe and Asia to reach the Sudd's floodplains. The black-crowned crane (*Balearica pavonina*) designated "vulnerable" by IUCN is also found there. The Sudd floodplains support the largest population of shoebill stork (*Balaeniceps rex*) in Africa, with an estimated population of 5000 (http://www.worldwildlife.org/wildworld/profiles/terrestrial/at/at0905_full.html). Also, the white stork (*Ciconia ciconia*), black tern (*Chlidonias nigra*), and saddlebill stork (*Ephippiorhynchus senegalensis*) are found there.

Toic are areas subject to seasonal flooding by spill-water from rivers and watercourses where the soil retains sufficient moisture throughout the dry season to support grasses. The dominant species of grass depends on the soils and hydrological conditions. *Toic*, although not a separate ecological zone, is of special importance for dry season grazing by both livestock and wildlife, and is critical in the lives of Southern Sudan's pastoralists.

Areas designated for protection in this zone are the Sudd (a Ramsar Site), Lake No (proposed) and Lake Ambadi Conservation Areas (proposed), Boma and Badinglo National Parks, and Kidepo and Fanikang Game Reserves.

3. In the **Montane Forest zone** (zone 6, Table 1) rainfall increases with altitude, until at 2,600 meters, it is about 2,500 mm annually. The *Podocarpus* forest belt occurs in this high rainfall belt, above which, rains decrease and frosts occur (Sommerlatte and Sommerlatte, 1990 in Moyini, 2007). Soils range from shallow skeletal soils on the escarpment to deep brown loam soils, which are fairly acidic, on moderately sloping hillsides and valleys.

According to the PCEA (UNEP, 2007), the wooded highlands of the Nuba Mountains historically held large populations of wildlife, but the war led to a massive decline in numbers of animals. Historical data for this zone note that wildlife included bushpig (*Potamochoerus porcus*), bushbuck (*Tragelaphus scriptus*), Harvey's duiker (*Cephalophus harveyi*), blue duiker (*Cephalophus monticola*), buffalo (*Syncerus caffer*), black and white colobus (*Colobus guereza*) and other primates. Carnivores included leopard (*Panthera pardus*), serval (*Felis serval*), caracal (*Felis caracal*) and spotted hyena (*Crocuta crocuta*).

Also according to the PCEA (UNEP, 2007), the Imatong and Jebel Gumbiri mountain ranges, especially the wetter areas in the far south, support thick montane forest. Blue duiker and bushbuck are key species of the Imatong (UNEP, 2007). Historically, the Imatong Mountains had very rich birdlife including a number of species not found elsewhere in Sudan (Jackson and Owen, 1950 in Moyini, 2007). But there is very little up-to-date information available on wildlife that occur in these mountain ranges.

The only PA in this ecoregion is the proposed Imatong Forest Reserve.

4. Southern Sudan also has **semi-desert regions** (zone 2, Table 1) in the extreme southeast in and around the Ilemi Triangle where the average annual rainfall is 300 to 500 mm. Semi-desert zone vegetation is characterized by patches of open short grasslands with acacia bush land (Nikolaus, 1989 in Moyini, 2007). Depending on the annual rainfall, which is unpredictable, the groundcover is generally poor. The area is an extension of the northeastern Kenya semi-arid zone and shares much of the fauna and flora from that region. Wildlife found in this region includes oryx (*Oryx beisa*), Grant's gazelle (*Gazella grantii*), and dikdik (*Madoqua kirkii*).

No areas in this ecoregion have been designated for protection.

5. **Lowland forest** (not included in Table 1) is confined to a few scattered small areas in the southwest near the CAR, the DRC, and the Ugandan borders and the foothills of the Imatong Mountains. This zone is characterized by mean annual rainfall above 1600 mm. It represents the northernmost extension of the Congo Basin forests, and includes small areas on the Aloma Plateau near Yei, the Azza Forest in Maridi County and the Yambio area, and some areas at the foothills of the Imatong Mountains (Caldecott and Miles, 2005 in Moyini, 2007). The threatened eastern chimpanzee (*Pan troglodytes schweinfurthii*) and elephants (*Loxodonta africana* and *L. cyclotis*) are found here. Historically, the bongo (*Boocercus eurycerus*), forest buffalo (*Syncerus caffer nanus*), giant forest hog (*Hylochoerus meinertzhageni*), red river hog (*Potamochoerus porcus*), and a number of forest monkeys (Hillman, 1983 in Moyini, 2007) occurred here. There is little data available on existing wildlife, but there are reports of elephants moving from Congo into Southern Sudan, and there is an active illegal chimpanzee trade in this area.

Other lowland forests are found in the Loti, Talanga and Labone areas in the State of Eastern Equatoria.

2.3.3 SOUTHERN SUDAN'S BIODIVERSITY: CURRENT SITUATION

Data for Southern Sudan is limited. Due to the conflict, little natural resources data has been collected in the last 25 years. Some recent efforts aim to fill the gaps. The most important of these was undertaken by Wildlife Conservation Society (WCS) and Flora and Fauna International (FFI), discussed below. While these 2007 aerial censuses are helping to fill data gaps, population censuses are costly, labor-intensive, and time consuming. It is unlikely that Southern Sudan's dearth of data will be remedied soon.

Besides limited data on the larger, more charismatic animals, data is also deficient on plant diversity, avifauna, reptiles, amphibians, and fisheries. For example, Itto (2000) states that there is inadequate information on Southern Sudan's fishery resources to make rational policy decisions and to set regulations on resource

exploitation. The ETOA update team could find very little up-to-date information on the aquatic resources of Southern Sudan. We were also unable to locate a complete list of endemic plants and wildlife.

Much of Southern Sudan's wildlife is found outside of protected areas. According to Salter (2006), a number of Southern Sudan's wildlife populations (notably white-eared kob and tiang, but including several other species) undertake seasonal migrations outside protected areas. Even if adequately protected in national parks and game reserves [which is currently not the case], these species are vulnerable to hunting pressure and habitat loss when traveling outside protected areas. The existence of large wildlife populations outside of protected areas was confirmed by the WCS-FFI aerial censuses. .

The WCS-FFI aerial surveys are drawing new and much needed attention to the wildlife of Southern Sudan. Moyini (2007) cites important natural phenomena that occur in Southern Sudan, such as migrations of tiang, white-eared kob, and elephant. The recent WCS aerial survey corroborates the continued existence of these migrations. While the WCS report on the aerial surveys was not yet available at the time this ETOA was prepared, a [New York Times](#) article on the census states that, "wildlife biologists have long known that its grasslands, woodlands and swamps were home to elephants, zebras, giraffes and other animals. Before the civil war, an estimated 900,000 white-eared kob had been seen migrating there, but in 1983 wildlife research ground to a halt with the outbreak of civil war" (Zimmer, 2007). In January 2007, Southern Sudan's first aerial survey in 25 years found that migrating herds still existed. On the first day, the census team flew over Boma National Park, where they saw thousands of white-eared kob. They estimated a population of 1.3 million kob, tiang, and gazelle (Zimmer, 2007).

The aerial census also found that wildlife is thriving in other parts of Southern Sudan, where elephants, ostriches, lions, leopards, hippos, and buffalo were spotted. Oryx, thought to be extinct, were also seen. But, as the [New York Times](#) article states, some species are faring badly (Zimmer, 2007). No zebra were found at any of the survey sites in Southern Sudan, although in 1982, scientists estimated that 20,000 were living in Boma National Park alone.

The aerial survey noted that in the western part of Southern Sudan, wildlife had been more affected than in other regions. For example, in 1981, about 60,000 buffalo lived in Southern National Park, but the survey team found none there now. The WCS team ascribed this to the western region being more accessible than the rest of Southern Sudan, where the Nile and the Sudd served as a barrier against poachers. The team also found that migrating animals fared better than non-migrating.

While the WCS team found no buffalo in Southern National Park or the Sudd during seven hours of flying, a FFI survey team encountered 400 elephants in the Sudd, plus Nile lechwe and a few buffalo (R. Lamprey, pers comm).

These initial surveys indicate that much of Southern Sudan's terrestrial biodiversity is intact (see Figure 5). But that does not lessen the existing threats (described in Section 7). Rather, it underscores that conservation/development organizations and the GOSS should pay greater attention to these threats since critical wildlife species are still at risk.

Figure 5. Elephants in the Sudd

Until quite recently, the existence of large herds of elephants in the Sudd was merely a rumor. Their presence has now been confirmed and plans are underway to protect them including studying the possibility of expanding some of the existing national parks, like the Shambe National Park east of Rumbek.



Photo: Tom Catterson

2.3.4 ENDANGERED, RARE, AND ENDEMIC SPECIES

The following list (<http://www.animalinfo.org/country/sudan.htm>) includes all mammals which occur in Sudan and are rated as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) in the [2004 IUCN Red List of Threatened Animals](#).

Critically Endangered:	Endangered:	Vulnerable:
<ul style="list-style-type: none"> • Addax (<i>Addax nasomaculatus</i>) • African wild ass (<i>Equus africanus</i>) • Burton's gerbil (<i>Gerbillus burtoni</i>). (endemic to Sudan.) • Four-spotted gerbil (<i>Gerbillus quadrimaculatus</i>) (endemic to Sudan.) • Lowe's gerbil (<i>Gerbillus lowei</i>) (endemic to Sudan) • Principal gerbil (<i>Gerbillus principulus</i>) (endemic to Sudan.) 	<ul style="list-style-type: none"> • Chimpanzee (<i>Pan troglodytes</i>) • Dama gazelle (<i>Gazella dama</i>) • Giant African Water Shrew (<i>Potamogale velox</i>) • Grevy's zebra (<i>Equus grevyi</i>) • Nubian ibex (<i>Capra nubiana</i>) • Slender-horned gazelle (<i>Gazella leptoceros</i>) • Wild dog (<i>Lycaon pictus</i>) 	<ul style="list-style-type: none"> • African elephant (<i>Loxodonta africana</i>) • Barbary sheep (<i>Ammotragus lervia</i>) • Cheetah (<i>Acinonyx jubatus</i>) • Desert pipistrelle (Bat) (<i>Pipistrellus ariel</i>) • Dorcas gazelle (<i>Gazella dorcas</i>) • Dugong (<i>Dugong dugon</i>) • Large-eared free-tailed bat (<i>Otomops martiensseni</i>) • Lesser horseshoe bat (<i>Rhinolophus hipposideros</i>) • Lion (<i>Panthera leo</i>) • Red-fronted gazelle (<i>Gazella ruffrongs</i>) • Soemmerring's gazelle (<i>Gazella soemmerringii</i>) • Spotted-necked otter (<i>Lutra maculicollis</i>) • Tomb bat (<i>Taphozous hamiltoni</i>)

The ETOA update team could find no information available on animals other than mammals that are endangered or information on endangered plants. Also, this list does not include white and black rhinos, which several wildlife professionals and Wildlife Forces staff to whom the ETOA update team spoke, claimed are still found in Southern Sudan (G. Gurguri, pers. comm., Yei Wildlife Forces staff, pers. comm.).

Endemism in Southern Sudan is considered high, and examples include Nile lechwe, white-eared kob, and spotted ground thrush in the Imatong Mountains and Loti forest (Moyini, 2007). However, the ETOA Team could find no up-to-date and complete list of endemic species in Southern Sudan, so is unable to corroborate reports of the rich endemism in Southern Sudan. Most reports on Sudan’s biodiversity resources list only a few examples of endemics, such as the above.

2.3.5 PROTECTED AREAS

Status of Protected Areas. In Southern Sudan, there are currently five national parks (plus one proposed), 11 game reserves (plus two proposed), one Ramsar-listed wetland, and three proposed nature conservation areas, covering a total of 15.6 million hectares (Salter, 2006). Approximately 13.7% of Southern Sudan’s total land area of 640,000 km² is comprised of national parks, game reserves, nature conservation areas, and a Ramsar wetland (Salter, 2006). Forest reserves, considered protected areas in Southern Sudan, are discussed separately in Section 2.4, and are not included in this estimate.

The protected areas of Southern Sudan are listed in Table 2, and shown in Figure 6. Since the original ETOA, the Sudd has been designated a Ramsar site, a designation that does not bring formal protection, but raises its global visibility and makes it eligible for externally-sourced grant funding.

Table 2. Conservation Areas in Southern Sudan

Game Reserves	Area (ha)	Date Established
Ashana	90,000	1 Jan 1939
Bengangai	17,000	1 Jan 1939
Bire Kpatuos	500,000	1 Jan 1939
Boro	150,000	proposed
Chelkou	550,000	1 Jan 1939
Ez Zaraf	970,000	1 Jan 1939
Fanikang	48,000	1 Jan 1939
Juba	20,000	1 Jan 1939
Kidepo	120,000	1 Jan 1975
Mashra	450,000	proposed
Mbarizunga	1000	1 Jan 1939
Mongalia	7500	1 Jan 1939
Numatina	210,000	1 Jan 1939
Total Game Reserve Area	3,133,500	
National Parks	Area (ha)	Date Established
Badinglo	1,650,000	1 Jan 1986
Boma	2,280,000	1 Jan 1986
Lantoto	76,000	proposed
Nimule	41,000	1 Jan 1954
Shambe	62,000	1 Jan 1985
Southern	2,300,000	1 Jan 1939
Total National Park Area	6,409,000	

Because of the conflict, Southern Sudan's national parks and reserves were not formally protected over the past two decades. During this period, many protected areas in East Africa have benefited from an increased worldwide interest in biodiversity, from donor funding that has targeted critically important, at-risk biodiversity, and from a surge in ecotourism. But Southern Sudan's protected areas received no such support during the conflict years. Now, boundaries need to be re-defined and demarcated, infrastructure needs to be built or repaired, and protected area management capacity needs to be strengthened. Southern Sudan will have to identify its niche in the tourism market since, as in most other African countries, tourism revenue will be relied on to provide financial resources for the protected area system.

2.3.6 INTERNATIONAL CONVENTIONS/TREATIES

The following are the main environmental treaties and conventions to which the Government of Sudan is a party and the year they were ratified (UNEP, 2007):

- The United Nations Framework Convention on Climate Change (1993)
- UN Convention to Combat Desertification (1995)
- Convention on Biological Diversity (1995)
- Stockholm Convention on Persistent Organic Pollutants
- Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes in Africa
- Convention on Wetlands of International Importance: Ramsar Convention (1971)
- Convention on International Trade in Threatened and Endangered Species of Wild Fauna and Flora, CITES (1973)
- Montreal Protocol on Substances that Deplete the Ozone Layer (1987)
- Kyoto Protocol (1977)
- Biosafety Protocol (1999)
- The Great Apes Survival Project (GRASP) Partnership (2005): This was not included in the NEAP, but added here since Southern Sudan's chimpanzee population is a key biodiversity resource under threat. The GRASP Partnership encompasses the 23 great ape range states in equatorial Africa and south-east Asia. The Partnership aims to lift the threat of imminent extinction facing most populations of great apes. Its mission is to conserve great apes in their natural habitats and to make sure that where apes and people interact, their interactions are mutually positive and sustainable" (GRASP, 2005).

International treaties that Sudan has entered into are managed at the GONU level. For CITES and Ramsar in particular, this creates some confusion for the management of sites and issues in Southern Sudan (UNEP, 2007).

2.4 KEY FOREST RESOURCES: STATUS OF FORESTS AND FOREST COVER

Southern Sudan has extensive and diverse forest and woodland resources that provide food, oils, medicines, timber, poles and firewood, as well as habitat for much of Southern Sudan's wildlife. The original ETOA (2003) discusses shea oil and the importance of wild edible foods in the diets of Southern Sudanese.

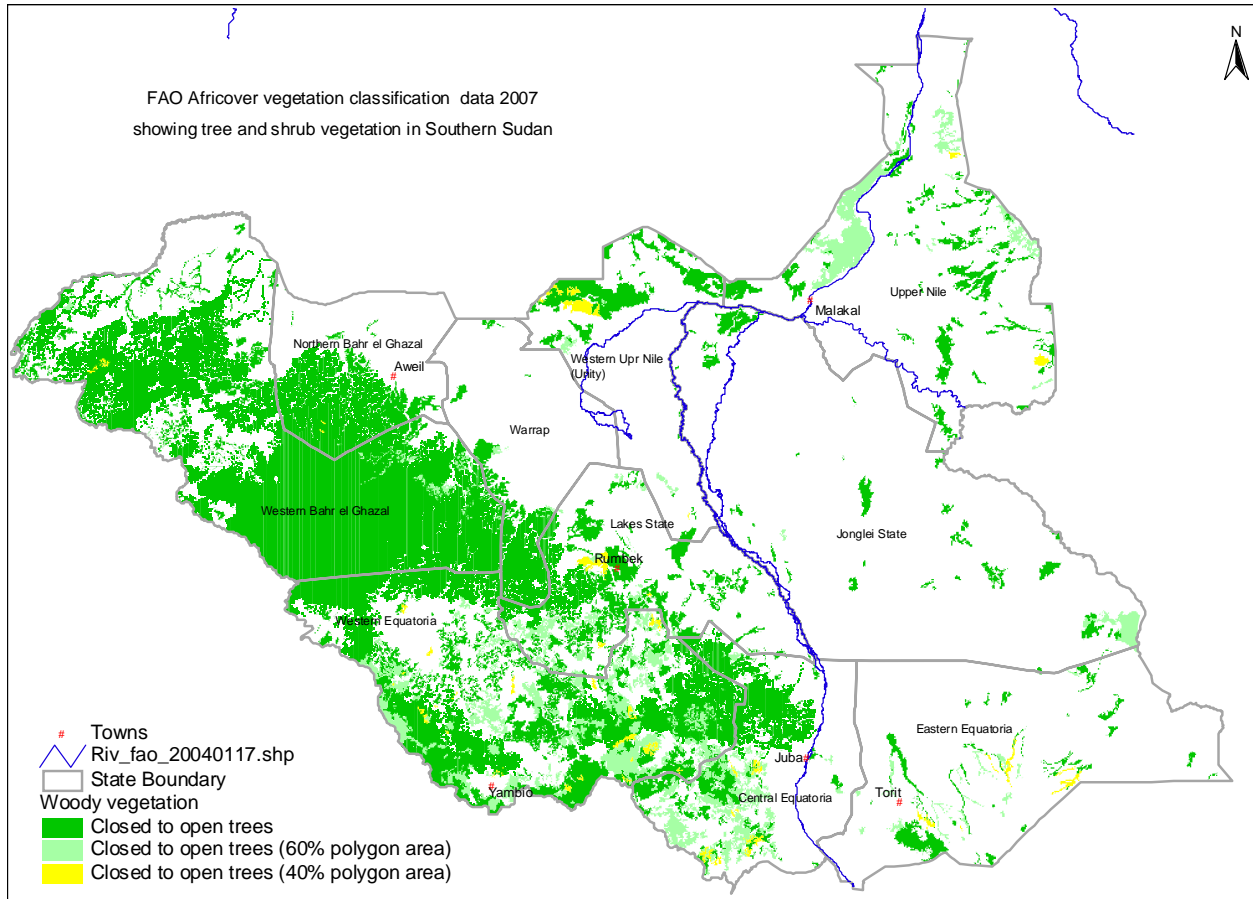
Forest ecosystems are generally robust, yet in some areas they have been degraded by decades of uncontrolled fire, uncontrolled grazing, and over-cutting of more desirable species (Lomuro, 2006). Forest types and characteristics are covered in detail in the original ETOA.

2.4.1 FOREST COVER

The FAO Africover project recently mapped vegetation in Sudan using remote sensing data. Due to insecurity, the vegetation mapping was done without ground truthing and so the resulting maps contain errors in classification which need to be rectified. However, the Africover vegetation maps are probably the best source of information at present on the status of forest vegetation in Southern Sudan.

Figure 7 shows areas classified as “closed to open trees” and “closed to open shrubs.” The area of closed to open trees is 22.87 million hectares and the area of closed to open shrubs is 33.78 million hectares giving a total forest area in Sudan as a whole of 56.65 million hectares.

Figure 7. Map of Forest in Sudan using Africover Data



Another source of forest data in Sudan is the annual FAO *State of the World's Forests* report. The most recent report, produced in 2007, gives forestry data for Sudan for 2005 based on data provided by the Forest National Corporation (FNC) in Khartoum. The data is presented for the country as a whole and it is not possible to extract specific information for the south. The *State of the World's Forests* report of 2007 shows a total forest area of 67,546,000 hectares (compared to Africover's 56,650,000 hectares) for Sudan as a whole (Table 3). The difference between the FAO Africover data and that presented by FAO *State of the World's Forests* could be due to several factors such as differences in definition of what constitutes forest. The basis for the data provided to FAO by FNC in Khartoum is not known, but the recently completed Africover vegetation mapping exercise probably provides a more accurate estimate of the extent of forest in Sudan.

Table 3. Forest Area 2005 and Area Change in Sudan

Total Forest area	% land area	Area per capita	Forest Plantations	Annual Change rate			
				1990-2000		2000 – 2005	
67,546,000 ha	28.4%	2.0 ha	5,404,000 ha	-589,000	-0.8%	-589,000	-0.8%

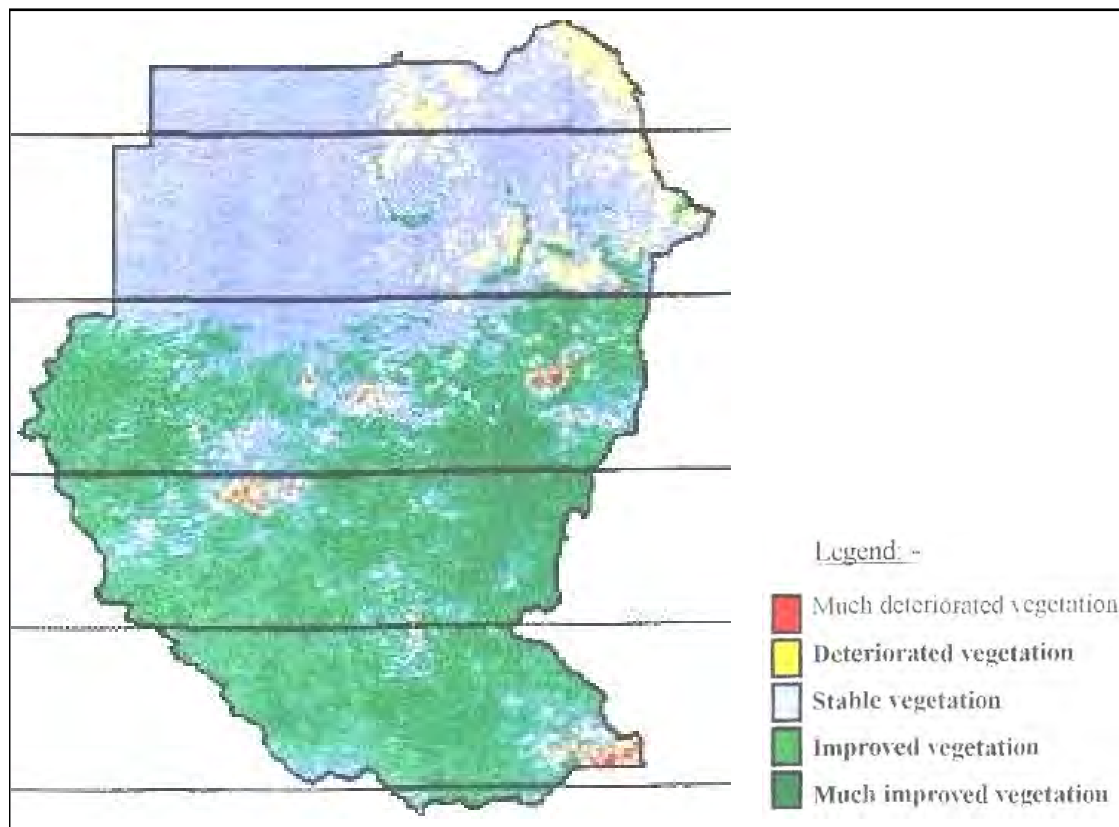
Source: FAO State of the Worlds Forests 2007

An important statistic provided in the *State of the World's Forest* report is the annual decline of 0.8% in the area of forest in Sudan. Several studies over many years have reported advancing desertification in the center of the country and the decline in forest cover is most likely due to this phenomenon.

A recent study reported in Sudan Silva in 2005 confirmed this trend (Ahmed and Warrag, 2005). That study analyzed vegetation change in Sudan over the period 1982 to 1999 using Landsat imagery and compared current vegetation with the 1958 Harrison and Jackson vegetation classification. The analysis showed “the area north of latitude 16 degrees has changed to desert while that between latitudes 12 N and 16 N changed from low rainfall savanna to desert and semi- desert.” However, a significant finding of the study was that the vegetation difference analysis shows “improved” or “much improved” vegetation cover in the south during the period 1982 to 1999 (see Figure 8).

The study did not speculate on the reasons for the improved vegetation cover in the south. During the period 1982-99, agricultural production declined drastically due to the war. In addition, commercial forest exploitation came to a standstill apart from harvesting in the teak plantations in central Equatoria and in Western Bahr el Gazal. It is likely that these two factors were mainly responsible for the increase in vegetation density in the south.

Figure 8. Sudan MVC-NDVI Difference Analysis Between 1982 and 1999



Source: Ahmed and Warrag, 2005

2.4.2 FOREST RESERVES

The forest resources in Southern Sudan occur mainly in the High Rainfall Woodland Savannah Zone, which covers most of Southern Sudan with the exception of the floodplain around the Nile and the Montane Zone of Didinga and Imatong Mountains. As described in Section 2.3.2, the High Rainfall Savannah Woodland Zone is classified into two sub-zones. Forest types in these two zones are described below.

a) Savannah Woodland. A survey of this forest type carried out in 1984 in Western Bahr el Ghazal reported various associations of species including Vuba (*Isobertinia doka*), Mahogany (*Khaya senegalensis*), Bu (*Daniellia oliveri*), Pai (*Afzelia africana*), Abu suruj (*Prosopis africana*), Abu Suruj Dakar (*Amblygonocarpus andogensia*), Abino (*Burkea Africana*), Darot (*Terminalia avicennioides*) and Abu Habil (*Lannea kerstingii*) Poulin and Ltee, 1984). During a recent visit to these forest areas in Western Bahr el Ghazal, the Director General of Forests and his staff stated to STEP personnel and GOSS MAF/FD staff that the natural forests in Western Bahr el Ghazal had not been exploited during the war and are in good condition. The forests in Northern Bahr el Ghazal however, were subject to some harvesting of mahogany which was transported to the north.

b) Savannah Woodland Recently Derived from Rain Forest. This sub-type occurs in higher rainfall areas (>1300mm) along the Congo border and some small patches of rainforest in other areas. The dominant species are *Celtis zenkeri*, *Chrysophyllum albidum*, *Mildbraediendron excelsum* and *Holoptelea grandis* (Ibrahim and Badi, 2006). Other common species are *Terminalia glaucescens*, *Albizia zygia*, *Combretum binderianum*, *Bridelia scleroneuroides*, and *Dombeya quinqueseta* (Ibrahim and Badi, 2006).

The montane zone occurs in the Didinga and Imatong Mountains. The climax vegetation includes *Syngium gerrardii*, *Olea hochstetteri*, *Podocarpus milanjanus*, and *Juniperus procera*. This area remains insecure and no recent assessment of the forests has been carried out. The extent and condition of these forests is not known at present.

The list of forest reserves in Southern Sudan shown in Table 4 is was compiled by the FNC in 1999.

Table 4. Gazetted Forest Reserves

	Feddans	Ha		Feddans	Ha
Central Equatoria Forest Reserves			Upr Nile, Jonglei and Unity States Forest Reserves		
Mongalla	1,134	459	Zar-zur C.R	3,874	1,568
Girikidi	20,680	8,368	Tawfigia	2,365	957
Kadule	335	136	Atar C.R	238	96
Lulubo North	10,768	4,357	Sobat (A)	156	63
Lulubo South (Lokitiri)	10,200	4,127	Sobat (B)	3,224	1,305
Jebel Korok (Juba)	250	101	Sobat (C)	4,170	1,687
Kajo keji	4,660	1,886	Malakal West	250	101
Kagelu	2,305	933	Khor-wol	12,800	5,179
Korobe	5,055	2,045	Renk C.R	234	95
Loka West	54,078	21,881	Abu Khries	3,356	1,358
Momory	220	89	Ahmed Agaha	1,242	503
Kajiko South	13,340	5,398	Kodok C.R	123	50
Kajiko North	11,678	4,725	Wad Akona	627	254
Green Belt Yei	312	126	Goz-Rom	234	95
Rajaf East	10	4	Khor Tumbak	22,500	9,104
Total	135,025	54,634	Diel	254	103

	Feddans	Ha		Feddans	Ha
Eastern Equatoria Forest Reserves			Khash Khash	4,880	1,975
Torit town	655	265	Nsgdiar PR	27,100	10,965
Katire teak	31	13	Bir	59,499	24,075
Imeila	3,150	1,275	Bong PR	7,748	3,135
Imatong/Gilo	304,207	123,090	Total	154,874	62,666
Vukadi	75	30	Western Bahr el Ghazal Forest Reserves		
Kereppi	500	202	Nyin-Akok	8,485	3,433
Parjok	56	23	Khor-Grinty	8,285	3,352
Lorwa	176	71	Tonj No.1	3,225	1,305
Shakole	2,447	990	Kuajena	10,869	4,398
Magwi	16	6	Khor-Abong	11,888	4,810
Palwar	182	74	Nyalero	17,300	7,000
Total	311,495	126,038	Dokorongo	4,100	1,659
Western Equatoria Forest Reserves			Namatina	610,236	246,916
Asanza.C.	497	201	Gette	5,289	2,140
Yabongo.C.	843	341	Ngohalima & Akanda	10,645	4,307
Yatta.C.	19,500	7,890	Wau town	2,970	1,202
Nzara	10,020	4,054	Pongo Nuer	3,200	1,295
Magada	5,564	2,251	Gette extension	4,800	1,942
Yabua	10,189	4,123	Total	701,292	283,760
Mbari-zunga	19,900	8,052	Lakes		
Simbi	17,700	7,162	Karich	13,350	5,402
Ringasi	6,700	2,711	Pacong	4,930	1,995
Nangondi		0	Palual	14,185	5,740
Marangu	13,550	5,483	Rumbek town	2,195	888
Azza	1,763	713	Cumcok & Mayen Atot	1,250	506
Zaria	41,774	16,903	Malek	8,200	3,318
Embe	8,270	3,346	Total	44,110	17,848
Maridi town	395	160	Northern Bahr el Gazal Forest Reserves		
Zumbi	14,774	5,978	Nyala	32,000	12,948
Bangangai		0	Pongo Aweil	32,000	12,948
Riwa- 1		0	Total	64,000	25,896
Riwa- 2		0			
Total	171,439	69,368			
Grand Total Feddans = 1,582,235			Grand Total Hectares = 640,211		

(Source: Forest National Corporation, 1999. Note One feddan is equivalent to 1.038 acres or 0.42 ha.)

2.4.3 NATURAL FOREST MANAGEMENT

Due to the conflict, natural forests in Southern Sudan have been relatively undisturbed since the early 1980s. All the major sawmills closed down and commercial harvesting was reduced to relatively minor exploitation by chainsaw milling or mobile sawmills. There has been no active protection or other forest management activities due to the inability of the Forestry staff to operate. As commercial production of hardwood timber

resumes after the war, a priority issue for the forest authorities is to ensure that its operations are in line with current international standards of sustainable forest management. Figure 9 shows the savannah forests of the Boma Plateau.

Figure 9. The Savannah Forests of the Boma Plateau

Much of the extensive natural forest cover of Southern Sudan is made up of savannah forests. These forests offer a multiplicity of products, some timber resources and provide invaluable environmental services critical to land capability in the country. Their protection and management is one of the most significant opportunities for the forestry sector.



Photo: Tom Catterson

The International Tropical Timber Organization (ITTO) has developed a set of internationally agreed upon standards for the sustainable management of natural tropical forests, and assists member countries to adapt those criteria and indicators to local circumstances. The African Timber Organisation (ATO) is an intergovernmental organization with 14 member countries which between them contain over 75% of the natural forests on the continent. One of its major objectives is to promote the production and trade of African timber within the framework of sustainable forest management. ATO has collaborated with ITTO to develop standards for sustainable management of African tropical forests. These standards can provide a good basis for sustainable natural forest management in Southern Sudan (ATO/ITTO, 2003).

2.4.4 FOREST PLANTATIONS: EXTENT AND CONDITION

Forest plantations in Southern Sudan consist mainly of teak in Central and Western Equatoria and in Western and Northern Bahr el Ghazal States. In addition, there are plantations of softwoods in the Imatong Mountains of unknown extent and smaller areas of other species planted as green belts around major towns but these have mostly disappeared during the war.

The teak plantations in Central Equatoria and those in Central and Northern Bahr El Ghazal were exploited during the war and are currently in a degraded condition. Those in Western Equatoria were not accessible by road and so are relatively untouched. None of the plantations received management or silvicultural treatment during the war.

Maps and inventory data on the forest reserves and plantations were lost during the war and therefore, data on the area and status of the plantations are limited. STEP is currently assisting the GOSS MAF-FD to compile map data and assess the status and condition of the plantations.

In 2004, the USAID-funded Southern Sudan Agricultural Revitalization Program (SSARP) set out to map all the teak plantations using Landsat imagery (Abeya, 2004). Thirteen plantations were found and mapped (an example of one of the plantation maps produced Yaboa, is shown below). In early 2007, the Equatoria Teak Company (ETC) used Quickbird satellite imagery to map 11 plantations in Western Equatoria including five plantations that had been missed during the SSARP mapping exercise in 2004. The total area of teak plantation mapped amounts to 7,680 hectares.

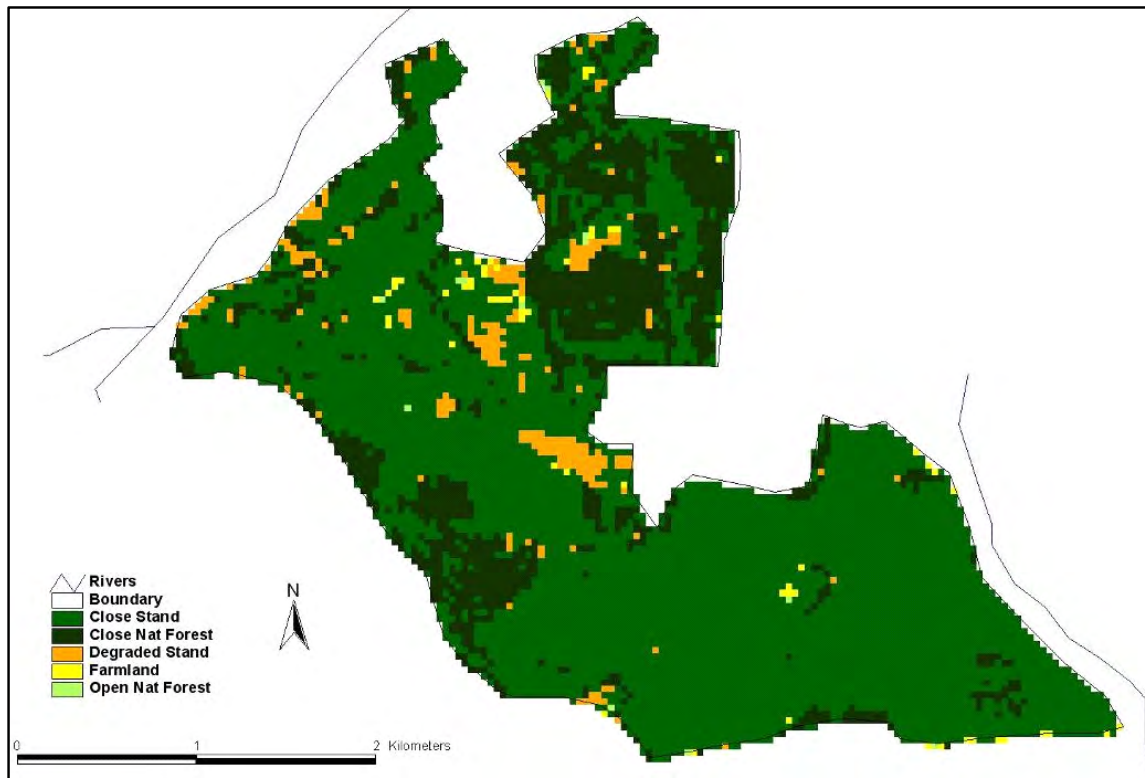
The teak plantations in Western and Northern Bahr el Ghazal have not yet been mapped. Official statistics show the area of those plantations amounts to 15,796 hectares but the true area is likely to be a fraction of that figure. Those plantations which have not yet been mapped are listed in columns 3 and 4 below

Table 5. Estimates of Area in Forest Plantation

Forest plantations (mapped by SSARP or by ETC or both)	Current best estimate of teak in has	Forest plantations (not yet mapped; data from FD statistics not confirmed)	Area of plantation in hectares
Nangondi	492	Ngohalima & Akanda	2,825
Yaboa (Nzara)	701	Nyini Akok	1,457
Mbarizanga	386	Khor Grinty	1,449
Yabongo	233	Gette	1,376
Asanza	234	Khor Abong (Busere)	764
Yatta	357	Tonj No.1	1,305
Zaria	181	Dokorong	1,327
Ringasi	35	Nyalero	1,327
Magaba	23	Kuajina	1,327
Marangu	24	Namatina	1,327
Bangangai	36	Kpanza	202
Embe	111	Pongo Nuer	554
Kegulu	1,204	Pongo Aweil	554
Loka	1,972	Total	15,796
Yei Council Teak	158		
Mommory	238		
Kajiko North	977		
Korobe Hill	318		
Total	7,680		

Figure 10 shows Yaboa plantation mapped by SSARP in 2004 using Landsat imagery. The area of teak calculated by SSARP was 707 hectares.

Figure 10. Yaboa Plantation as Mapped by SSARP, 2004



Forest plantation management. During the war the plantations in Central Equatoria were exploited by concessionaires. The teak trade caused tension and conflict between those involved - concessionaires, local communities, local authorities, Forestry authorities and the SPLA/M. Public confidence in the institutions responsible for regulating the trade was low. After setting up the GOSS in early 2006, one of the first measures taken by the MAF was to cancel existing teak harvesting concessions and initiate a program to reform forest concessions and revenue collection systems and to improve regulation of the timber trade.

The plantations in Central Equatoria are currently in a degraded state with most of the best quality teak logs removed by concessionaires. Most of the plantations in Bahr el Ghazal are in a similar condition due to heavy exploitation by northern soldiers during the war. The best option for those degraded plantations is to clearfell and regenerate. The plantations in Western Equatoria are generally fully stocked but due to lack of thinning they are slow growing and relatively small in size, but they are of good quality due to the slow growth rate.

2.5 OTHER IMPORTANT RESOURCES

2.5.1 “URBAN” ISSUES: WATER AND SANITATION

Most of Sudan’s population is rural, but exact figures on the rural-urban breakdown are not available. The PCEA (UNEP, 2007) estimates that approximately 70% of the population of Sudan lives in rural areas, and 30% in towns and cities. Given that Southern Sudan is more rural than the north, the rural population in the south is likely higher than 70%.

Data on the size of the urban centers in Southern Sudan is scarce and unreliable, and in part, this is because of recent movements of IDPs and refugees into urban areas. Following the January 2005 signing of the CPA, IDPs and refugees began returning to their home areas in Southern Sudan. Up to the end of 2006, the PCEA estimates that approximately 300,000 people have returned. The largest towns are Juba (estimated at 250,000 in 2005), Rumbek, Wau, Bor, Yei, and Malakal.

The main issue for Southern Sudan regarding urbanization is that much of the growth is unplanned and unmanaged. And this has consequences for biodiversity (as well as for human health and well-being). As the original ETOA predicted, there has been an obvious and unavoidable spike in natural resources use as IDPs and refugees return to their former homelands and attempt to re-establish their livelihoods. Demand for building materials, charcoal and firewood, increases with the increasing population. In addition, demand for bushmeat is expected to increase—the ETOA update team was repeatedly told that bushmeat hunting is under control now (although this is questionable given that the sources are often responsible for controlling hunting of wildlife) but with increasing numbers of people returning, they expect to have difficulty controlling hunting in the future (M.K. Nyendeng, pers. comm. and S.J. Payiti, pers. comm.)

Besides impacting natural resource use, the original ETOA noted that the size of towns could increase to the point that water and sanitation demands could stress current systems. The ETOA's prediction regarding these demands has also proven correct—the infrastructure needed to handle the increased waste being produced is inadequate. Most waste is now indiscriminately dumped on the land and in waters. Dumping of solid and liquid waste is contaminating surface and groundwater. Aquatic and avian resources are at risk, and people and wildlife that rely on these as a food source are also at risk. Human health is compromised since water sources are being contaminated, and by disease-spreading insects that thrive on the piles of garbage dumped across the urban landscape.

The original ETOA noted that there is little information on water and sanitation infrastructure and needs, and recommended a detailed study on this to determine how to address environmental health concerns. Meanwhile, populations, especially in urban areas, continue to grow and there has been little infrastructure improvement to handle the increasing numbers.

For example, in Juba, the ETOA update team visited a site outside of the city where Juba's garbage is dumped indiscriminately on the land (see Figures 11 and 12). In Juba, there is no designated and managed site available for solid waste disposal. In Wau, Rumbek, and Yei, officials stated that people burn their rubbish and the garbage that is not burned is trucked outside of town, and dumped on the land. Liquid waste may be pumped from latrines and dumped on the land or in watercourses outside of town. In these cities and towns, there were no other options available for waste disposal. In the context of biodiversity, the widespread contamination of land and water is a concern for aquatic resources and for wildlife that relies on aquatic ecosystems for food.

Figure 11. Illegal Dumping in Streambeds

Dry streambeds are often used for dumping: The great majority of local inhabitants of Juba do not have any garbage service and many used the stream beds that traverse the city as dumping areas. Once the rain comes, this mass of solid waste is washed into the adjacent Nile. Regrettably, many other residents of Juba still use these surface water bodies for water supply and/or as bathrooms, explaining in part the high incidence of cholera at certain times of the year.



Photo: Tom Catterson

Figure 12. Illegal Dumping along the Yei Road

The lack of a solid waste facility in Juba Town has prompted lots of illegal dumping along the road just west of the checkpoint on the Yei Road. USAID and others with leadership from STEP are planning on building a solid waste facility, a first for the country and a needed environmental victory for the Government of Southern Sudan.



Photo: Tom Catterson

2.5.2 LAND USE AND AGRICULTURE

The FAO country report for 2004 states that the agriculture sector is the main source of sustained growth and the backbone of Sudan's economy in terms of contribution to the gross domestic product (GDP). However, Southern Sudan's economy is currently in a state of flux due to the emergence of the oil industry (the GOSS, for the first time, received oil revenue in 2006) and the distortions created by significant amounts of donor aid. In addition, recent returnees have not yet gotten established in the agriculture sector or in other economic sectors. Currently, the precise contribution of agriculture to Southern Sudan's economy is difficult to determine and is dependent on many unknown variables. Regardless, agriculture is currently, and is expected to remain important for Southern Sudan's economy, culture, and livelihoods of its people.

The Livelihoods Profile (2006) states that Southern Sudan's traditional livelihood systems are a combination of cattle rearing, crop production, fishing, wild food collection, hunting, and trade. The type, extent, and significance of impacts to biodiversity and forests vary depending on the region and the livelihoods.

Figure 13 illustrates the livelihood zones in Southern Sudan, as mapped by the Livelihoods Profile (2006). In summary, the zones and the livelihoods are:

Greenbelt Zone: Households in the wetter south-western areas of the Greenbelt Zone rely almost exclusively on agriculture to meet their food needs. Surplus production is common.

Arid Zone: In the Arid Zone, in the southeastern tip of the country, a nearly pure form of pastoralism is common and there is almost exclusive reliance on livestock and livestock trade for food. There are seasonal migrations in this area for water and pasture.

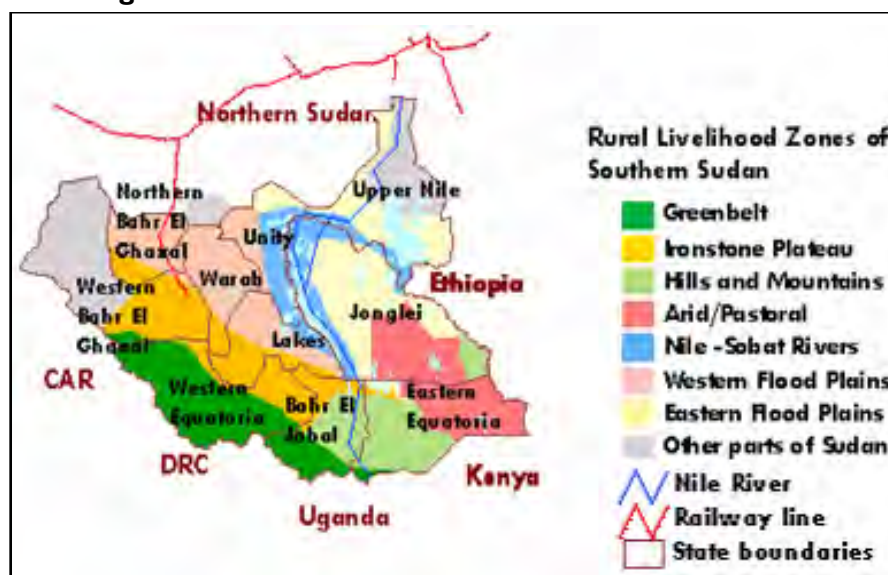
The Hills and Mountains Zone: The main livelihood here is a combination of agriculture and pastoralism, and reliance on cattle, trade and root crops increases in difficult years.

Western and Eastern Food Plain Zones: In the Western Flood Plain Zone, livestock and agriculture, supplemented by fish and wild foods, are the main food sources. The Eastern Flood Plains Zone is similar, but with an additional option of game hunting.

Ironstone Plateau Zone: Households in the Ironstone Plateau Zone are heavily dependent on crop production and are well placed to access surpluses in the neighbouring Greenbelt.

Nile and Sobat Rivers Zone: Apart from crops and livestock, wild foods and fish contribute significantly in the Nile and Sobat Rivers Zone. Fish and wild foods are collected in varying quantities depending on the season and the location.

Figure 13. Rural Livelihood Zones of Southern Sudan



Source: Livelihoods Profile 2006

According to the PCEA, mechanized agriculture in Southern Sudan is largely confined to the clay plains in the high rainfall savannah belt and in Upper Nile. But as stated in the original ETOA, for the most part, agriculture in Southern Sudan is not mechanized and little has been done to upgrade or modernize farming practices. This is still the case four years after the original ETOA was produced.

The draft Agriculture and Forest Policy Framework proposes several key strategies and approaches, including: Irrigation Agriculture and Reclamation of Swamps for Commercial Production. This is described as follows:

“Sudan is also endowed with vast areas of swamplands that could be developed into large scale irrigated agriculture in cash crops such as rice, sesame, oil palm, vegetables, fruit trees, cotton, etc. Since maize is becoming one of the main staple foods of Southern Sudan, MAF would also consider irrigation schemes for this crop. By attracting the private sector from within and/or outside Southern Sudan, MAF needs only to facilitate these large irrigation investments. Its large bodies of water (rivers, streams and lakes) could also be used for small-scale irrigation operated by households, associations, cooperatives and village groups.”

If the MAF decides to pursue this course, there should be close collaboration with the MEWCT's Directorate of Environmental Affairs to ensure environmental impacts are considered prior to moving forward with any such investment scheme. STEP has strengthened MEWCT capacity in environmental impact assessment, which should help the Directorate of Environmental Affairs play a useful role in this process.

With the increasing population of Southern Sudan, expansion of agricultural area could impact biodiversity resources. Slash and burn agriculture remains common among agriculturalists in Southern Sudan. With no government or private sector extension service in Southern Sudan, it is difficult to change existing behaviors about shifting agriculture and to introduce improved practices. According to the *Agriculture and Forest Policy Framework*, "because of the absence of any coordinated agricultural support services in rural parts of Southern Sudan, farmers are still dependent on isolated pockets of input supply and agricultural extension through donors and NGOs under emergency and humanitarian programs." Measures that could promote better practices, such as using inputs (especially fertilizers) and more modern farming methods (spacing, improved seed, integrated pest management, etc.) are still unavailable to much of Southern Sudan's rural population.

Figure 14. Example of Traditional Dinka Barn

Wood use by returning IDPs: *There can be little denying that the returning IDPs will use a lot of wood to re-establish their homesteads. Herewith an example of a Dinka barn or "Luak" of which many are being built to shelter the livestock herds common among the displaced Dinka returning to their homelands. The number of trees and shrubs that must be cut and collected for constructing these luaks is enormous and will clearly lead to deforestation. Fortunately, as these IDPs have been away for a long time, some for more than a decade, the savannah forests have regenerated and can supply these needs.*



Photo: Tom Catterson

3. INSTITUTIONAL AND LEGAL FRAMEWORK

The *Interim Constitution of Southern Sudan, 2005* Section 44, showcases the important place that Southern Sudan's environment has in the lives of its citizens. It states that citizens have "...the right to a clean and healthy environment... [and to have that right] protected for the benefit of present and future generations, through reasonable legislative action and other measures that:

- (a) prevent pollution and ecological degradation;
- (b) promote conservation; and
- (c) secure ecologically sustainable development and use of natural resources while promoting rational economic and social development so as to protect genetic stability and biodiversity of Southern Sudan."

The following sections describe the institutions that oversee and manage and policies that govern Southern Sudan's natural resources.

3.1 INSTITUTIONAL FRAMEWORK: ENVIRONMENT, WILDLIFE, AND NATIONAL PARKS

The MEWCT, the main GOSS ministry charged with conservation and environmental protection, is made up of four Directorates with the following principal functions:

(1) Directorate of Environmental Affairs: Establishes environment policy and impact monitoring procedures for the GOSS. The Directorate's responsibilities include promoting EIA capabilities among GOSS ministries; developing sector level screening processes to identify activities where environmental assessment is likely to be required; developing tools for monitoring environmental impacts; and overseeing waste management. The Directorate functions as a national "Environmental Protection Agency" or "National Environmental Management Authority," although unlike in most East African countries, it is not independent, but is within the MEWCT.

MEWCT's intention is to place environmental expertise in targeted GOSS and State ministries that deal with issues involving natural resources, and whose activities could affect the environment.

(2) Directorate of Wildlife Conservation: The 2005 Interim National Constitution places management of Southern Sudan's wildlife under the authority of the GOSS. The Wildlife Conservation Directorate's responsibilities include surveying, mapping, and demarcating boundaries of national parks and game reserves; working with communities around national parks to encourage participation in enforcement and management of the parks; updating the data on wildlife resources in national parks; controlling illegal activities such as hunting and setting bushfires in national parks; and otherwise managing the park system. GOSS intends that Wildlife Forces, assigned at State level, will have responsibility for wildlife outside protected areas, while the MEWCT will have responsibility for wildlife inside protected areas.

(3) Directorate of Tourism: Promotes tourism as an income earning opportunity, in particular as related to nature tourism. This Directorate focuses on promoting private sector investment in tourism and promoting Southern Sudan as a tourist destination. It is nominally in charge of tourism infrastructure, both within the protected area system (such as the Lodge in Nimule National Park currently being rehabilitated under a "build and operate" contract with the private sector) and GOSS-owned hotels in Juba, Wau, and Malakal.

(4) Directorate of Finance and Administration: Manages day-to-day operations and support systems for the Ministry.

3.2 POLICY FRAMEWORK

Environmental Policy Framework. Currently there is no Environmental Policy for Southern Sudan. STEP is providing support to help establish a policy that is expected to follow best practices from other countries. At the time this ETOA update was prepared, the policy was in rough draft form, and will need to go through several iterations and public comment, incorporating input from the MEWCT and other ministries, as well as possibly from NGOs and others in the private sector.

There are good examples from Southern Sudan's neighbors and elsewhere in Africa, of environmental policies that work. The key for Southern Sudan will be implementation, which will require clear responsibilities of the MEWCT and line ministries, and decentralization at least to State level, with trained and equipped staff. In addition, the most successful national environmental policies incorporate public participation by encouraging a strong role for the NGO-advocacy community and for a free and open press.

Wildlife Policy Framework. Currently, the MEWCT is developing a *Wildlife and Protected Area Policy*, from which a new set of legislation will be developed to cover wildlife and protected areas. International Fund for Animal Welfare (IFAW) supported workshops to bring together stakeholders in the wildlife sector to help produce and review the policy. The participatory process being undertaken (some of which the ETOA team participated in), using expertise from other East African countries bodes well for this policy development process and the resulting policy. The proposed policy was in draft at the time this ETOA was prepared.

With USAID support, several laws (for biodiversity conservation, forestry, as well as in other sectors) were enacted during 2003. Laws developed at that time, specifically covering wildlife and protected areas, are *The Wildlife Conservation and National Parks Act, 2003* and *The Wildlife Forces Act, 2003*. These are SPLM laws and their current status is unclear. Regardless, these laws are already outdated, and revisions and updated laws are needed.

For example, colleagues from the Directorate of Wildlife Conservation have already indicated that they plan to ban all hunting in Southern Sudan, and therefore, references to hunting in the *Wildlife Conservation and National Parks Act* will need to be revised. Also, the Act is not in line with best practice or with other wildlife legislation in East Africa governing parks and wildlife. For example, there is no legislation on community conservation, co-management, and community-based natural resource management (CBNRM), and there is no legislation that explicitly addresses wildlife outside protected areas.

The *Wildlife Forces Act, 2003* describes the duties and responsibilities of military forces deployed to protect wildlife and protected areas. The essence of this law is being implemented with the deployment of former game guards and ex-combatants as Wildlife Forces. The *Wildlife Forces Act* is also a SPLM law that needs to be revised and updated.

None of the protected areas have current management plans, and there is no existing guidance on the development of protected area management plans. Southern Sudan will be able to draw from rich experience in East Africa to establish guidelines for developing protected area management plans.

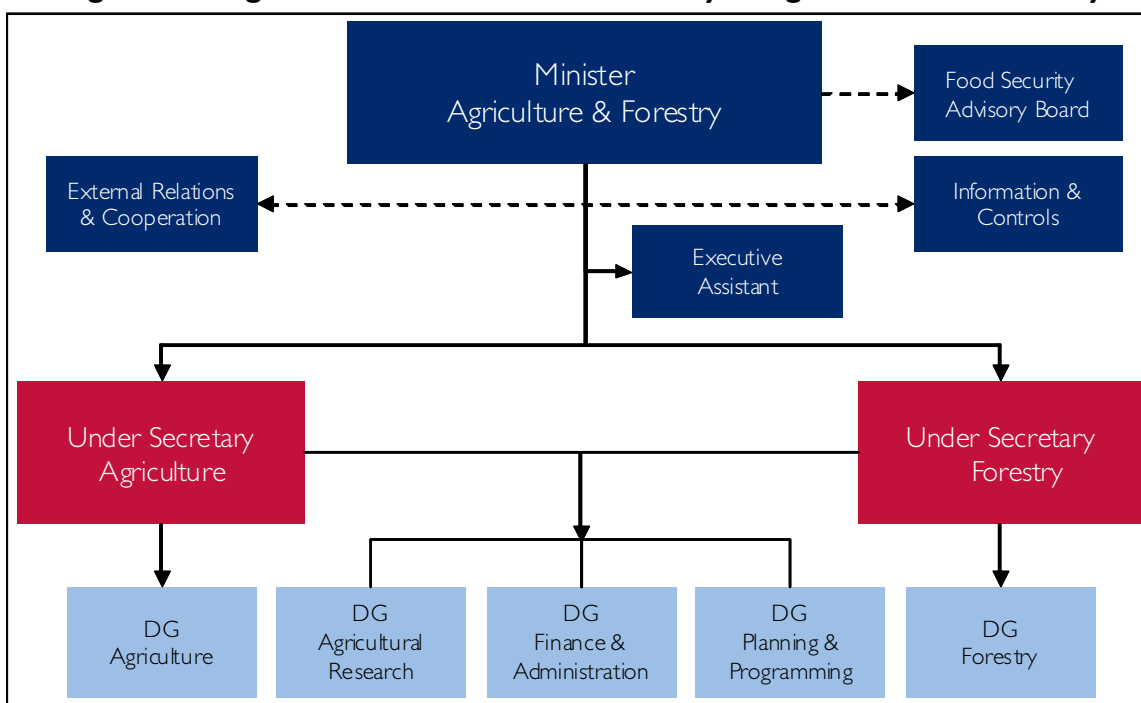
3.3 INSTITUTIONAL AND LEGAL FRAMEWORK: FORESTRY

3.3.1 INSTITUTIONAL FRAMEWORK

The forest management and regulatory institution is the Forestry Directorate (FD) under the GOSS MAF. The lead administration position is the Under Secretary for Forestry and the Director General for Forestry is the lead technical officer. Each of the ten States has its own Forest Department. The GOSS level FD is responsible for managing Central Forest Reserves and the State level Forest Departments are responsible for managing Provincial Forest Reserves. The GOSS level has other roles such as policy development, regulation,

provision of technical oversight, and technical staff management. Figure 13 shows the MAF organization chart.

Figure 15. Organizational Chart for the Ministry of Agriculture and Forestry



In the draft *Agriculture and Forest Policy Framework*, Lomuro (2006) states that the MAF-FD's core strategy will be one of support and enabling rather than direction and policing, although in some critical areas, forest policing will be required. The FD will assist state level Forest Departments to develop forest policies, strategies and regulations. Continued strengthening to build the FD's institutional capacity, such as that already provided by the USDA, European Union, and USAID will be needed to fulfill this strategy aim.

The capacity of the Forest Departments both at GOSS and State levels is low. This is acknowledged by the GOSS and State, and therefore, staff training is a high priority, as is acquiring expert technical assistance when necessary, and equipment.

3.3.2 POLICY FRAMEWORK

The first draft of the new forestry policy was produced in June 2006 and has been under discussion since then. The policy is in line with best practice in sustainable forest management and is based on guiding principles that include sustainable development, poverty eradication, equity, and community involvement. To date the draft policy has had little input from the States or from other sources outside the GOSS MAF-FD. The current draft includes commitment to community involvement in forest management and expansion of planted forests, and encourages private sector involvement in plantation expansion and management of the existing plantation resources.

The *Forestry Commission Act of 2003* is among the Acts that were produced in 2003 with USAID support, yet stakeholders were not involved in the production, and it was not implemented. The *Forests Act of 1989* is the law that still governs the management and conservation of forests in Sudan. This law was produced by the north, and is not in line with the new policy in the south. A new Forestry Act will be required to implement Southern Sudan's new forestry policy.

3.4 INSTITUTIONAL AND LEGAL FRAMEWORK: AGRICULTURE

3.4.1 INSTITUTIONAL FRAMEWORK

The MAF formulates agriculture policies and sets the direction for agricultural development in Southern Sudan. The MAF has three main goals related to the agriculture sector: achieve food self-sufficiency by 2011; reduce incidence of poverty by 30 % in 2011; and contribute to increased GDP by 25 % in 2011¹.

Agricultural services are being decentralized and responsibilities are, in part, devolved to State MAF-Agriculture Departments. As mentioned above, there are no government or private sector extension services other than those provided by individual projects, which are donor-funded.

3.4.2 LEGAL FRAMEWORK

From the draft *Agriculture and Forestry Policy Framework*, the following are the MAF's key strategies and approaches in the agriculture sector:

- (1) Agricultural Intensification:** increase the productivity of land and labor, conserve soil fertility and protect natural resources for sustainable use. Intensification requires investments in input supply including agricultural credit, research and extension services, marketing services and rural infrastructure.
- (2) Irrigation Agriculture and Reclamation of Swamps for Commercial Production:** swamps could be developed into large scale irrigated agriculture for cash crops such as rice, sesame, oil palm, vegetables, fruit trees, cotton, etc. Southern Sudan's large bodies of water (rivers, streams and lakes) could also be used for small-scale irrigation operated by households, associations, cooperatives, and village groups.
- (3) Revitalizing the Traditional Cash/Export Crops:** revitalize traditional export crops by improving management, introducing new technologies, rehabilitating and improving infrastructure, bringing adequate and appropriate inputs including high yielding cultivars, and strengthening input and output marketing. Possible export crops include coffee, tea, cotton, nuts, mango, sugarcane, etc.
- (4) Conservation and Rational Use of Natural Resources:** mobilize resources including communities and community leaders, village chiefs, village groups, farmer associations, NGOs, and the private sector for the rehabilitation, regeneration, protection and rational use of natural resources mainly forests, water resources, pastures, and wildlife. For household agriculture systems, integrating crops and livestock and agroforestry/forestry should be promoted.
- (5) Mobilization and Allocation of Resources including Human, Financial and Material to MAF Headquarters and Local Agriculture and Forestry Bureaus:** In pursuing the agricultural growth strategy, the MAF will need to justify the need for a large amount of support from the Government and donor partners.

3.5 INSTITUTIONAL AND LEGAL FRAMEWORK: WATER

Water resources are under the jurisdiction of several ministries: the GOSS Ministry of Water Resources and Irrigation, Ministry of Housing, Infrastructure and Public Utilities, and for rural water supply, the Ministry of Rural Development and Cooperatives. According to the Natural Resources and Rural Development Sector Draft Budget Sector Plan, 2008-2010 (July 2007), priorities in the rural water sector are the following:

- Develop Rural Water Policy guidelines and standards for all levels of Government
- Technical and financial support for State-level development of rural water supply (boreholes)
- Assess human resources requirements in State Directorates of Rural Water and capacity development

¹ The year 2011 is when the interim governments established under the CPA expire, and a referendum will be held to decide if Sudan will be one country or divided into two countries.

- Develop rural water information system (database, monitoring, and evaluation)
- Raise awareness on water resource management & hygiene in rural areas

The GOSS is in the process of developing a water policy for Southern Sudan. The policy is still in draft but is expected to address sustainable development, capacity building, institutional development, research, environmental effects, and regional cooperation.

4. DONOR, NGO, AND GOSS PROGRAMS AND ACTIVITIES IN THE ENVIRONMENT SECTOR

4.1 DONOR AND NGO PROGRAMS AND ACTIVITIES

The USAID Operational Plan (2007, in draft) states that between 2005 and 2006, the number of institutions engaged in environment and natural resources issues increased from zero to five; but as of 2007, USAID and UNEP are the only donors working directly in the environment sector. Donors interested in the environment sector coordinate through the joint donor-GOSS Natural Resources Budget Sector Working Group.

Some initiatives in the environment sector that have been implemented or are being considered are:

- UNEP: Conducted a Post-Conflict EA. UNEP also provided supplies, such as computers and phones to the MEWCT, and is supporting the MEWCT's Environmental Information Center.
- Geographical Information System (GIS) data center: GOSS is interested in creating a GIS data center to house data and expertise. Funding has not yet been identified.
- The World Bank: The World Bank-managed Multi-Donor Task Force (MDTF) is establishing a socio-environmental safeguard mechanism to review development activities.
- IFAW: supported stakeholder workshops to provide input into Southern Sudan's wildlife policy.
- WCS and FFI: carried out aerial surveys of wildlife populations to update wildlife data from the 1980s, which had been collected during the hiatus in between the civil wars.

In the forestry sector, the following initiatives are being considered:

- The World Bank: MDTF funding for a wide ranging support program was due to come on line in 2007 but has been delayed and it is unclear when the program will begin. The program is designed to support training, capital assets and infrastructure, and pilot projects in community forestry and agroforestry.
- NORAD: support to the forestry sector is expected to begin in 2007 focusing on resource assessment and mapping, inventory, capacity building in remote sensing and GIS, promotion of private forestry and pilot projects in agroforestry and community forestry.

Support in the water, sanitation, and urban/town planning sectors includes:

- The United Nations Development Programme (UNDP) has set up an Urban Management Programme (2006-2009) to provide broad policy and technical support to urban area governments.
- UN Habitat is conducting assessments and capacity building in urban planning for Southern Sudan.
- The Nile Basin Initiative: The ten Nile Basin countries are part of the Nile Basin Initiative, which aims to develop and implement a shared vision "to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile Basin water resources." The Program combines capacity building and concrete investments at local levels. Example activities that have been or currently are being implemented include: the Nile Transboundary Environmental Action Plan; Nile Basin

regional power trade; efficient water use for agricultural production; and water resources planning and management.

Some initiatives in the fisheries sector include:

- The FAO/UNDP Fisheries Training Project located at Malakal for Southern Sudan capacity building.
- The Household Food Security Project (within the UN Consolidated Appeal for Southern Sudan) distributed fishing twine and hooks for displaced people and returnees from war-affected areas in and around Juba, Wau, and Malakal.
- FAO has conducted missions to evaluate fisheries and for setting up the legal framework for fisheries management.

4.2 GOSS PROGRAMS AND ACTIVITIES

According to the Natural Resources and Rural Development Sector “Draft Budget Sector Plan, 2008-2010 (July 2007), the following are GOSS priorities in wildlife and tourism:

- Anti-poaching and law enforcement campaign
- Wildlife population surveys
- Develop Protected Areas and Tourist Centers
- Develop capacity of wildlife and tourism staff

The following are GOSS priorities in the environmental and land management sector:

- Develop land policies and land laws
- Mediate and arbitrate on land disputes
- Develop environmental policies and laws, and impact monitoring procedures for MEWCT use
- Environmental profiling and research by MEWCT
- Raise environmental awareness (development of an environmental information center) by MEWCT
- Build capacity of environment staff (MEWCT)

The following are GOSS priorities in the agriculture and forestry sector (MAF):

- Develop policies and institutional frameworks for agriculture and forestry program
- Support agricultural and forestry extension services in the States
- Support plantation, wood and non-wood production development
- Agriculture and forestry research and training
- Crop production and protection

In the land use planning sector, in 2005, the GOSS launched an urban development initiative to be implemented in the ten State capitals. Infrastructure improvements are to cover water and sanitation, roads and drainage, power supply, and government buildings. The Juba civil works contracts, funded partly through the MDTF, were awarded in 2006 and the work is in progress. Financing for the other State capitals is yet to be identified.

5. USAID STRATEGY FOR SUDAN

USAID/Sudan prepared the current strategy statement, which runs from 2006-2008, in December 2005. The strategy is designed to address threats to the success of the CPA: political will to implement the CPA; potential for resumption of conflict in Three Areas (Southern Kordofan, Blue Nile States, and Abyei); weak institutional capacity of the GOSS; continued South-South tensions; and high expectations of the peace dividend.

USAID's strategy has two Strategic Objectives (SO) and one Program Support Objective:

- Strategic Objective No. 9, Avert and Resolve Conflict
- Strategic Objective No. 10, Promote Stability, Recovery and Democratic Reform
- Program Support Objective No. 11

The following is a brief summary of the SOs, Intermediate Results (IR), and the Program Support Objective with a concentration on those IRs that have an impact, positive or negative, on biodiversity and forest conservation and the environment.

- **SO 9 Avert and Resolve Conflict.** To avert and resolve conflict between North and South and to help create a more secure environment for the return of IDPs, refugees, and ex-combatants, this SO supports implementation of the power- and wealth-sharing protocols and the protocols pertaining to the Three Areas.
 - **IR 9.1:** Support Implementation of the CPA at the GONU Level.
 - **IR 9.2:** South-South Tension Reduced. Support institutional development of CSOs that promote women and marginalized groups; civic education messages of peace building, tolerance, and anti-corruption; and the resolution of core issues, such as access to natural resources and meeting expectations of peace dividends (potential environmental effects.)
 - **IR 9.3:** Implementation of the Protocols for the Three Areas Advanced.
- **SO 10 Promote Stability, Recovery, and Democratic Reform.** The GOSS must establish core governance structures, strengthen urban areas, reintegrate people affected by conflict, and develop an electoral system that will be conducive for free and fair elections.
 - **IR 10.1:** Core Institutional Structures for an Effective, Transparent, and Accountable GOSS Developed. Training for the new GOSS civil service will focus on topics of leadership, public management, financial management, accounting, and computer literacy in an effort to strengthen the skills that are needed for maintaining an honest and transparent government (potential environmental effects.)
 - **IR 10.2:** Selected Urban Areas Strengthened (initial focus on Juba, Wau, and Malakal). Contribute to an enabling urban environment where citizens and their representative Community Service Organizations (CSO) rely on effective local government to oversee accountable management of infrastructure and public services and ensure that basic social service are available, that income-generating opportunities are increased, and jobs are created (potential environmental effects.)
 - **IR 10.3:** An Electoral System Conducive for Free and Fair Elections Established.

- **IR 10.4:** Persons Affected by Conflict Reintegrated. Invest in essential services and community infrastructure to stabilize the vast war-affected rural areas of the South and the Three Areas where most IDPs and refugees are expected. Services such as clean water, primary health care, education, and food security will be provided through a community-based approach serving both resident communities and returning IDPs and refugees (potential environmental effects.)

Program Support Objective supports cross-cutting activities that help achieve results under the new strategy and enhance management of mission resources, including mechanisms for capacity building, monitoring and evaluation, audits and special studies, logistics, program management, and administrative support.

6. USAID INTERVENTIONS IN THE ENVIRONMENT SECTOR

The Sudan Transitional Environment Program is USAID's main instrument for providing support in the environment sector. STEP provides institutional strengthening for the MEWCT and other Southern Sudanese environmental professionals, and to this end has:

- Provided training courses in environmental impact assessment (EIA);
- Led Study Tours to provide lessons on developing and managing the institutional framework of a national environmental protection organization;
- Worked in the oil exploration and production sector to build GOSS capacity for analyzing and addressing environmental issues in the oil sector; and is helping decision makers to make clear decisions. STEP prepared an "Oil Exploration and Production Scoping Statement," to set the stage for a programmatic environmental assessment of oil exploration and production.
- Conducted scoping and a Programmatic EA for Road Rehabilitation activities, which served as a model for public participation and impact evaluation and monitoring; and developed a method for incorporating environmental mitigation measures into bidding and contract documents.
- Conducted a wildlife sector assessment to place priorities on various actions to be implemented by the MEWCT.
- Assisted the MEWCT to establish an institutional framework for environmental policy and impact monitoring under the aegis of a Directorate of Environmental Affairs.

STEP's Team Leader provides ongoing technical assistance to the MEWCT on technical and administrative issues and provides other ministries with information they need to make informed decisions when those decisions may affect the environment.

STEP's forestry activities are aimed at capacity building for improved governance in the forestry sector. The forestry component includes: support for technical forestry training at the KFTC; data collection on forest resources to provide information for planning; review and redesign of systems for concessions and timber sales; and training on criteria and indicators for sustainable forest management and chain of custody tracking.

STEP is marshalling donor support to develop a solid waste facility on the outskirts of Juba Town with initial support from the United Nations Mission in Sudan (UNMIS) that would also handle Juba's waste stream now being randomly and illegally dumped along the Yei Road. Donors will likely provide technical assistance to raise awareness of the existence of the dumping site, the requirements for its use, and management (fee collection, bylaws, etc.).

USAID supports the "Strategic Participatory Town Planning" project implemented by Creative Associates. This effort, beginning in September 2005, focused on ten towns where strategic town planning activities were implemented. The project is creating capacity at the local government level to demonstrate effective local and national governance by using town planning to address an array of issues such as land tenure, land use, land compensation, zoning, resource identification, allocation and management, and public infrastructure guidelines. Creative Associates had previously implemented a pilot project in Rumbek to develop local governance skills through a participatory and consensus-based process to determine how the local communities want their towns to grow and established a road map to achieve the goals.

6.1 ENVIRONMENTAL EFFECTS OF USAID'S STRATEGY

The following is a brief review of potential environmental effects, both positive and negative, of USAID's current strategy.

IR 9.2: South-South Tension Reduced is resolving core issues, such as access to natural resources. This is likely to have a positive effect since uncertainty of tenure affects how populations manage their land and resources.

IR 10.1: Core Institutional Structures for an Effective, Transparent, and Accountable GOSS is providing training in public management, financial management, accounting, and computer literacy. This will have a positive effect since the MEWCT's capacity to manage and budget is limited, and with improved skills, MEWCT staff will be able to put their case forth for reasonable budgets to cover their priority activities.

IR 10.2: Selected Urban Areas Strengthened (initial focus on Juba, Wau, and Malakal) is contributing to an enabling urban environment in which local government oversees and is accountable for management of infrastructure and public services. USAID is providing support for improved planning of urban and rural areas through the "Strategic Participatory Town Planning" activity which assists the GOSS in its efforts to respond effectively to returning population and reintegration issues. Improved planning will help mitigate potential environmental impacts from urbanization as returnees settle in cities and towns. This will have a positive environmental effect.

IR 10.4: Persons Affected by Conflict Reintegrated is investing in essential services and community infrastructure to stabilize the vast war-affected rural areas of the South and the Three Areas where most IDPs and refugees are expected. The Sudan Infrastructure Project (SIP), which rehabilitates roads, bridges, and ports, and other infrastructure (air fields, offices, etc.) contributes to this IR, and has the potential to cause significant adverse environmental impacts.

Health initiatives (IR 10.4) include promoting the use of insecticide-treated nets (ITNs) and HIV/AIDS prevention. Use of ITNs can result in risks to human health and the environment if not used and disposed of properly. A more significant concern is whether the nets are treated with insecticides on-site rather than received already-impregnated. If nets are treated on-site, then insecticide use, storage and disposal is a concern for human health and the environment. For HIV/AIDS support, if interventions involve construction or rehabilitation of clinics or other facilities that handle medical waste, environmental effects may result.

In the agriculture sector, if agricultural production activities include support for pesticide use, a PERSUAP will be needed. In addition, if there is a potential for USAID agriculture production activities to result in encroachment of agricultural land into sensitive areas, forests, or areas that may harbor important biodiversity, an in-depth environmental review would be needed.

SO 10 is the only SO that may result in significant adverse impacts. Recommendations to mitigate these potential effects can be found in Section 6.1.

7. KEY THREATS TO BIODIVERSITY AND FORESTS

The following are the key threats to biodiversity and forests, as perceived by the ETOA update team. These threats were formulated from meetings with environment sector professionals, field visits, document review, and from assessing the situation since preparation of the original ETOA.

7.1 KEY THREATS TO BIODIVERSITY RESOURCES

(1) Limited policy and legislative framework for biodiversity conservation. As described above, several policies and regulations, involving biodiversity conservation, have been promulgated, but most have not been implemented, and they are now outdated. Authorities with jurisdiction to manage and protect biodiversity resources have no up-to-date legal framework to rely on for enforcement or to prosecute illegal activities.

Legislation no longer reflects the current reality in Southern Sudan. For example, legislation still allows for hunting of certain wildlife species, yet no controls are in place to regulate this, and there is insufficient data population numbers.

In addition to being outdated, the existing legal framework for biodiversity conservation is weak. The policies and legislation that exist are geared to a “command and control” approach, with little reliance on civil society as partners in natural resources management and biodiversity conservation. Given the weak capacity at GOSS and State levels (see threat 2, below), local stakeholders and talent should be co-opted to assist governmental organizations in decision making and management of natural resources. Yet, the existing biodiversity legislation fails to provide for CBNRM, co-management, shared revenue or other measures that would help build community proponents and provide local assistance for the management, oversight, and monitoring of biodiversity conservation.

East, west, and southern Africa can provide models for Southern Sudan to create a more modern and widely accepted solution to “command and control.” Thereby, Southern Sudan can avoid some of the mistakes made by its neighbors in their early attempts at “top-down” approaches to biodiversity conservation.

(2) Limited institutional capacity to manage natural resources. Institutions (MEWCT, MAF-FD, and State level agencies) charged with biodiversity (including forest) conservation are still in nascent stages of development. Supplies, equipment, and numbers of well-trained staff are inadequate to cover such a large and diverse country. This is the case at GOSS and at local levels.

Many reports point to the limited capacity, especially the limited number of well-trained personnel in the MEWCT and MAF as the main constraint to sustainable resource management in Southern Sudan. The ETOA update team’s site visits and interviews confirmed this threat to biodiversity conservation.

There are a number of significant challenges to institutional development, among them, the slow pace of staff appointments. The MEWCT and MAF organizational structures were developed soon after the GOSS was created. And soon after the Ministries were set up, senior staff were appointed. However, staff appointments below the level of Director General have not yet been made although a number of officers are operating in an acting capacity.

Another institutional challenge is the lack of a clear understanding of the relative roles of State and GOSS levels. Poor communication between the two levels has contributed to this.

Intensive training is also a challenge, given the time and financial resources required to adequately train personnel in the GOSS and State ministries.

Because of limited institutional capacity, illegal and unsustainable practices continue—mainly poaching (large and small scale) and unsustainable harvesting of fisheries and timber.

Given the new findings from the WCS and FFI aerial surveys, ensuring adequate capacity in the wildlife sector is even more critical. As described above, diverse, and even some unexpected wildlife resources, were identified during these surveys in the Sudd, in Boma and Southern National Parks, and the Jonglei region.

The GOSS is fully aware of the critical biodiversity within their borders, and is gearing up to increase capacity (human and financial resources). For example, the Directorate of Wildlife Conservation is buoying capacity by deploying former wildlife staff (employed before and during the war) along with former SPLA soldiers and members of other armed forces, throughout Southern Sudan to serve as Wildlife Forces. Over 10,000 former SPLA soldiers and non-combatants are expected to be deployed to the Wildlife Forces. Some of these were actually pre-war wildlife staff and have been trained in the wildlife field; however the majority of Wildlife Forces staff have not been trained in conservation and related subjects. In addition, salaries for Wildlife Forces staff would absorb the modest budget allocated to the Directorate of Wildlife Conservation (Salter, 2006). If Wildlife Forces are not paid, they will likely rely on wildlife as a food source, and could become a threat to wildlife rather than a deterrent to poaching.

The ETOA update team visited Wildlife Forces staff operating in towns around Shambe, Southern, and Lantoto National Parks, and around some Game Reserves, and found that the Wildlife Forces are deficient in capacity. Wildlife Forces the ETOA update team met with in Yirol, Tonj, Yambio, and Yei, stated they lacked supplies and equipment and trained staff. Vehicles, fuel, radios, and tents are in short supply according to those the ETOA update team interviewed. Some of the Wildlife Forces staff had no office, but only a desk under a mango tree.

Poaching on a commercial level continues to be a problem for which the weak institutions are no match. The ETOA update team was told of “well-armed raiders” and poaching of elephants in Southern Sudan along the border with the DRC (Wau Wildlife Forces staff, pers. comm. and Yei Wildlife Forces staff, pers. comm.). The Yei Wildlife Forces told the ETOA update team that when Wildlife Forces went to hunt for the poachers, they found 25 tusks. There are also many cases of chimpanzees, monkeys, and other wildlife species captured to sell as bushmeat or for the pet trade. The ETOA update team witnessed monkeys at the Yei Wildlife Forces office (taken by Wildlife Forces from poachers) and chimpanzees in Yambio (illegally captured to “exhibit” at the Yambio Wildlife Forces office).

Controlling poaching at the local level has been addressed by some Wildlife Forces staff, including in Wau and Yambio, where the bushmeat markets have gone underground or are much smaller than before Wildlife Forces were deployed. However, a participant at a KFTC roundtable meeting echoed a statement the ETOA update team heard often, “the population is addicted to bushmeat.”

The fishery resource is also threatened by limited capacity to manage the resource. Fisheries are threatened because unsustainable and illegal practices continue without oversight by governmental authorities, or without a program in place for community oversight of the resource. For example, the use of poison in river lagoons in some parts of Ekuatoria and the use of explosives in the fishing industry can have devastating effects on fish populations, yet these practices continue (Yirol Wildlife Forces staff pers comm...)

Also, in the forestry sector, because of limited institutional capacity to manage and protect resources, illicit activities continue unchecked. There are 12 trained foresters, and no functioning forest guards (MAF roundtable, pers. comm.) in West Ekuatoria State, a state with critical forest resources, especially teak and mahogany. In the Upper Nile and Southern Kordofan large quantities of fuelwood and charcoal go to the Khartoum market but the Forestry staff do not have the capacity to regulate the trade and monitor the flow.

Given the limited institutional capacity in the wildlife, fisheries, and forestry sectors, there are some positive reports:

- The Wau GOSS Wildlife Office put an end to the bushmeat market in Wau, and arrested people for poaching. The Brigadier General in charge of the WAU Wildlife Forces deployed his officers on the road to stop the game meat from coming into the area. He plans to give local leaders incentives to patrol for poachers.
- Some things work well when left to local governments to decide. For example, in Yirol, the Forestry office and Wildlife Forces work as one unit. This was not a State or a GOSS decision, but a decision that the local office came to based on their experience.
- Fisheries staff in Yirol do not allow the use of fine nets so that the young can escape to reproduce. Fisheries staff in Yirol stated that they give these conditions (net size) to the fishermen, and the fishermen comply. It is mainly voluntary, but fisheries staff conduct inspections.
- In Tonj, there is a local policy that if anyone is caught killing an animal, a penalty is given. They are using local policy, not GOSS policies, which they were uncertain of.

(3) Decentralization in the environment sector is progressing slowly. There is no decentralization policy, and without an overall policy to guide devolution of natural resources management authority to State and local levels, roles and jurisdiction remain unclear.

For example, devolution of authority over wildlife is unclear. In Yirol, a high level Wildlife Forces staff member asked, “what are the State responsibilities for wildlife and what are GOSS responsibilities?”

The new Forestry Policy states that GOSS will manage Central Forest Reserves and states will manage what was previously known as Provincial Forest Reserves. However, it is unclear which of the Forest Reserves are considered Central and which are considered Provincial.

Devolution of authority for responsibilities in the environment sector has not yet taken place. Several State level staff mentioned that they have no environment officers, and that they need this expertise to help protect the environment.

The lack of a decentralization framework results in several problems at local levels. At one meeting the ETOA update team attended, we found that State officials were unsure who was responsible for providing salaries and they were unsure which of their staff was employed by GOSS and which by the State.

As discussed in threats #1 and #2 above, for such a large and diverse country, decentralization of authority over natural resources decision making and management, and clear delineations of roles and responsibilities are critical. Just as important is ensuring that local staff and other local partners are well-trained to take on their roles.

(4) Effects of development on wetlands, water resources, other sensitive areas, and on wildlife. Now that over two decades of conflict have ended, Southern Sudan is repairing damaged infrastructure, constructing new infrastructure, and is focused on developing the country. There is pressure to use Southern Sudan’s natural resources to finance urban and rural development schemes that will help alleviate poverty.

Over the years, a number of projects have modified the flow of critical wetlands. For example, the incomplete Jonglei Canal, started in 1980, was intended to divert water downstream from the White Nile around the Sudd swamps. This diversion would prevent much of the evaporative loss of water that occurs in the Sudd, and it would allow this water to be used for irrigation, or other purposes downstream. However, this would also cause the Sudd wetland and associated floodplains to shrink dramatically. The likelihood is very low that this project will move forward, but if ever completed the canal would have significant environmental impacts on the Sudd. The Juba-Malakal road is now following the route of the canal, and this could also result in significant impacts, given the rich biodiversity found and the migrations that take place in the Sudd.

The Bor Road/Dyke project and other ongoing and planned road rehabilitation projects could have significant impacts on Southern Sudan's wetlands, watercourses, and wildlife, as the original ETOA notes. There are measures that can be taken to reduce impacts, among them, crossing waterways and wetlands at the narrowest location and using adequate drainage structures

As mentioned, the Sudd is a Ramsar-designated wetland, and contains critically important biodiversity. The Sudd also contains Sudan's largest oil block (http://www.ramsar.org/wn/w.n.sudan_sudd.htm). Oil exploration and extraction activities can reach deep into the Sudd and could result in significant species and habitat loss.

Concerns from oil exploration and extraction include disruption of water flow patterns as a result of seismic testing and diking; wetland and floodplain fragmentation due to access roads and oil exploration sites; and contamination due to oil spills and contamination with human wastes (Catterson, 2007).

Some long-term effects of oil exploration and production on communities are difficult to predict. Income generation opportunities can result in increased population in this fragile area. Roads and other infrastructure can irreversibly change the character of the Sudd. Socio-cultural effects from oil wealth are likely, as well.

The Livelihoods Profile (2006) looks at oil exploration and production through a lens related to local community development and benefit. The report states that at household level it remains unclear how communities will benefit from oil revenues. Oil extraction may actually result in very few direct benefits, such as employment and increased household income.

Given the relatively low capacity at the MEWCT, assessment and oversight of environmental impacts from development activities is limited. This is especially the case for oil exploration and extraction activities. The political will to hold oil companies accountable for environmental impacts is low. An appropriate focus on environmental protection has as yet to be incorporated into the high priorities for developing Southern Sudan.

Environmental threats from development activities can usually be resolved with functioning and transparent institutions that provide adequate oversight, promote public input, and hold development organizations and the private sector accountable for environmental harm. With the return of peace, the pace of development in Southern Sudan will increase, including development projects with potentially significant environmental effects. A strengthened MEWCT-Directorate of Environmental Affairs will be needed to provide the necessary oversight and monitoring to ensure environmental impacts are mitigated and significant environmental effects do not occur.

(5) Movement of people into Southern Sudan. IDPs and refugees living in other parts of Sudan, and in Kenya, Uganda, the DRC, and Ethiopia are returning to their original homes or settling in new locations. Some IDPs have already returned, and many more displaced are expected to return or be relocated. Most returnees are settling first in urban areas. They may decide to remain in these urban areas, or only settle there temporarily prior to moving back to their more rural locations. Regardless, with the restoration of peace and decreasing reliance on food aid, agricultural production is expected to increase substantially in the coming years. Revitalization of agriculture in the post-conflict period will inevitably lead to a reduction in native vegetation to make way for agricultural crops.

White et. al. (2006) found, in a post-conflict case study in and around Aweil Town that people were returning to areas they cultivated before the war. The Aweil assessment team determined that agricultural expansion was currently not a serious threat since traditional shifting cultivation systems are sustainable when population density is low. However, the assessment team noted that in Aweil, as in many towns in Southern Sudan, population growth is high and traditional systems of cultivation may not be sustainable when population density is high. Forest resources and other native vegetation, as well as biodiversity in general, could be at risk as agricultural areas expand. .

In Yambio, White et. al. (2006) conducted another post-conflict case study assessment. Yambio is very productive with high rainfall, fertile soils and relatively low population density, however here, as in Aweil, population growth is high. The assessment team found that the agricultural expansion in this area is resulting in deforestation. Shifting cultivation is common, and after two to three years, soil fertility declines, and within six or even fewer years, the farmer moves to another plot, sometimes burning existing forest to create agricultural land.

Widely practiced slash and burn agriculture, especially when it does not include soil fertility management, results in excessive clearance of forest and other native vegetation and can pose a threat to biodiversity. When slash and burn is used, normally land is cleared and used for two to three years, and then the farmer moves on to clear more. The original ETOA noted this threat, as well.

Other threats that are expected to increase with the return of IDPs and refugees are:

- **Hunting and bushmeat consumption:** It will take time for newly arrived people to begin to generate income, and early on, household agricultural production may be insufficient to provide dietary needs. Returnees may still be armed, so they will likely turn to hunting and bushmeat to supply protein in their diets.
- **Solid and liquid waste that is disposed of indiscriminately on the land and in waterways:** This can affect aquatic and terrestrial biodiversity resources, and also threaten human health. Aquatic resources are contaminated with waste, and wildlife and humans that rely on these resources are suffering as well.
- **Increased demand for construction materials, fuelwood, and charcoal** is discussed below in “Key Threats to the Forestry Resource.”

(6) Climate change. There is clear evidence of desertification advancing southward. As discussed, Ahmed and Warrag (2005) reported significant changes in the vegetation in the north compared to Harrison and Jackson’s vegetation map in 1958. Other authors have reported declining rainfall over the entire country. For example, White et. al. (2006) found that in the location of the Aweil rice scheme (Northern Bar el Ghazal), one of the two environmental problems described by the rice scheme manager was the lower levels of rainfall and flooding compared to the past. The manager was finding it increasingly difficult to maintain the rice fields under water for the three to four months required to produce a good rice crop. After interviewing many local people and professionals in and around Aweil, the Aweil study team (White, 2006) found that shorter rainy seasons, reduced levels of rainfall and lower flood levels was one of the main environmental issues facing the case study area. White et. al. (2006) state that although this will reduce agricultural output and livestock carrying capacity, “it is part of a wider, perhaps global, phenomenon and caused by factors outside the control of the local population. Mitigating measures taken locally are unlikely to change that trend, and therefore the population must adapt to those changes through environment management strategies such as modified agricultural and range management practices.”

White et. al. (2006) also looked at environmental issues in Yambio and found that climate change in the form of reduced rainfall and higher dry season temperatures was one of two main environmental concerns in the area (the other being shifting agriculture and soil fertility loss).

7.2 KEY THREATS TO FORESTRY RESOURCES

(7) Commercial forest exploitation. Commercial exploitation of forest resources collapsed during the war with the exception of teak harvesting in plantations in Central Equatoria, carried out by logging companies mainly from Uganda. The post-war construction boom has led to increased demand for sawn wood, poles, and other forest resources. Reconstruction of roads is providing access to plantations and natural forests to supply this demand. The forest departments at GOSS and State levels do not have the capacity yet to regulate forest exploitation, although some progress has been made since the original ETOA. The GOSS FD has assigned forester staff and provided transport and equipment to protect and manage the Central Equatoria teak plantations and has trained a number of forest guards.

STEP's work on improved forest governance has assisted in these efforts through generating information on timber supply and demand, assisting with forest inventory and mapping work, assisting in reviewing and reforming forest revenue collection systems and providing training.

(8) Demand for construction materials, fuel wood, and charcoal. As mentioned in the original ETOA, it can take up to 50 small acacia or similar trees to build a simple tukul. Constructing schools, clinics, churches, and other facilities that accompany settlements require even more sawn timber. With IDPs and refugees returning to the south, the demand for construction material can threaten forest resources.

With growing populations in Southern Sudan cities, towns, and villages, there is also a growing demand for charcoal and fuelwood for cooking. Estimates suggest that fully 95 percent or more of Southern Sudan's population relies on charcoal and fuelwood for their energy needs.

There is also a substantial and growing trade in charcoal and fuelwood from the south to Khartoum and from around Yei into Uganda. The forest resources in upper Nile (Renk area) are already degraded by excessive exploitation for this trade. The southern Kordofan area (Nuba Mountains) is now supplying increasing quantities of fuelwood and charcoal to the Khartoum market. The trade is not quantified at present and not regulated and poses a threat to the forest resources in those areas.

The original ETOA noted the threat to forests from charcoal production, and to date, there has been no strategy or initiatives put in place to promote sustainable wood product enterprises.

7.3 ACTIONS NEEDED TO CONSERVE BIODIVERSITY AND TROPICAL FORESTS AND EXTENT TO WHICH USAID MEETS THE NEEDS

This section addresses the two requirements of the FAA, Sections 118 and 119: (1) the actions necessary to conserve tropical forests and biodiversity (to reduce the identified threats); and (2) the extent to which USAID actions meet the identified needs.

Table 6. Actions Needed to Reduce Threats and USAID's Role

Threat	Actions Needed to Reduce Threat	How USAID is addressing this need
1) Limited Policy Framework	a) Formulate policies and accompanying legislation based on best practices in other East African countries. Sector policies and legislation that need to be updated and revised cover wildlife, forestry, fisheries, and environment.	a) STEP: providing TA to strengthen MEWCT and MAF policies (Wildlife, Forestry, and Environment Policies) b) WCS (USAID central funding) to assist in the preparation of a Protected Area Management Plan for Boma National Park.
2) Limited Institutional Capacity (limited capacity to control poaching, illegal timber extraction, and unsustainable fisheries practices)	a) Strengthen capacity in GOSS Ministries (at the two main natural resource ministries, MAF and MEWCT), covering technical skills such as CBNRM, EIA, GIS, wildlife management, wildlife ranger training, park management and planning, sustainable forest management, etc., and also in basic public administration, such as budgeting and planning, financial management; and community outreach and communication skills. b) Implement MEWCT and MAF key responsibilities, especially those affecting significant biodiversity resources and forests.	a) STEP: institutional capacity strengthening at MEWCT and MAF (including Study Tours, EIA courses, Wildlife Sector assessment, training in forest surveying and chain of custody tracking; and TA in budgeting and financial management) b) STEP: assisting MAF to oversee teak plantation management and to combat illegal harvesting; assisting MEWCT to assess environmental impacts of development projects and supporting the Boma Wildlife Training Center.

Threat	Actions Needed to Reduce Threat	How USAID is addressing this need
3) Decentralization progressing slowly	<ul style="list-style-type: none"> a) Formulate a decentralization policy so that GOSS and local government responsibilities in the environment sector are clear. b) Strengthen capacity at local government levels so staff can take on natural resource management responsibilities. 	<ul style="list-style-type: none"> a) not addressing b) STEP: EIA training for environmental professionals, including at local government levels
4) Effects of development on habitat	<ul style="list-style-type: none"> a) Strengthen capacity at MEWCT and at local government levels to improve environmental review and follow-up of oil exploration and other development activities, especially those with potential significant impacts on wetlands, waterways, and wildlife. b) Increase awareness of relevant ministers, parliamentarians, and other high level decision makers so they understand the full realm of effects of oil exploration on the environment. c) Increase awareness of relevant ministers, parliamentarians, and other high level decision makers, about the importance of wetlands, waterways, and wildlife to the Southern Sudanese economy and different cultures and benefits of sustainable use. 	<ul style="list-style-type: none"> a) STEP: EIA courses, "EPA" Study Tours, Scoping Statement on oil exploration and production, and Road Rehabilitation PEA; and STEP and Sudan Infrastructure Project sector level guideline development for Ministry of Transport & Roads b) and c) STEP: Study Tours for high level decision makers, EIA courses, TA to produce Scoping Statements and EIAs/PEAs for development activities
5) Movement of people into Southern Sudan (expansion of area in agricultural production; increased demand for bushmeat; and contamination of water and land from indiscriminate dumping of waste)	<ul style="list-style-type: none"> a) Promote sustainable agriculture including soil fertility management, use of improved seed, weeding and spacing techniques, and improved on-farm water management as a means to discourage slash and burn agriculture; and encourage market agriculture. b) Create opportunities for legal and sustainably managed bushmeat enterprises as a way to discourage illegal, uncontrolled poaching. c) Improve local planning efforts to help prepare and provide for the existing population and returnees. d) Provide adequate infrastructure, facilities, and services for the returning and existing populations. 	<ul style="list-style-type: none"> a) SSARP: promoting sustainable agriculture in its efforts to increase agricultural production and marketing. b) not addressing c) Strategic Town Planning project: strengthening participatory planning expertise and developing urban/town plans d) SIP: rehabilitating infrastructure
6) Climate Change	<ul style="list-style-type: none"> a) Discourage slash and burn agriculture, which intensifies the effects of climate change. b) Encourage retention of natural forest to help attenuate the effects of climate change. 	a, b) Not addressing
Threats specific to the Forestry Resource		
7) Commercial Forest Exploitation	<ul style="list-style-type: none"> a) Strengthen capacity of MAF-FD and State FDs to oversee management and trade of forest products. b) Identify legal and illegal channels of forest product trade and focus on patrolling the main problem areas. c) Provide adequate number of trained Forest Guards 	<ul style="list-style-type: none"> a) STEP: strengthening capacity of MAF and State level in forest management planning, GIS, mapping, surveying b) STEP: conducting surveys of illegal and legal forest products, custody chain tracking. c) not addressing
8) Demand for Construction Material, Fuelwood, and Charcoal	<ul style="list-style-type: none"> a) Promote the use of community woodlots in participatory planning activities b) Provide extension expertise to help manage community woodlots c) Encourage legal, sustainably managed charcoal and other forest product enterprises and thereby discourage unsustainable harvesting to supply the charcoal and construction industries. d) Promote plantation forestry to provide timber for in-country use (most teak is now exported rather than used to satisfy construction material demand in-country). 	<ul style="list-style-type: none"> a) and b) STEP to address through support to community forestry c) not addressing d) STEP: working in plantation forestry sub-sector

Ample Opportunities for Other Donor Involvement: The ETOA Team believes it is essential to note that there is ample opportunity for other donors to become involved in the environment/natural resources

sector. At present, we are only aware of anticipated NORAD support to the forestry sector and a follow-up by UNEP to its Post Conflict Environmental Assessment. Support for dealing with solid waste and water and sanitation issues in and around Juba is also foreseen from other donors and resident aid missions as part of the efforts currently being organized by STEP. Although the nascent capabilities of both the GOSS Ministries concerned (MEWCT and MAF) suggest modest additional absorptive capacity, support that builds capacity could be most useful in a series of action areas such as: formulation of decentralization policy and capabilities related to the sector; modernization of agriculture and livestock husbandry and the elimination of slash and burn practices and limits to open burning; training and deployment of additional forest guards and extension foresters; and continued oversight as relates to large-scale infrastructure programs funded by these same donors. The key to effectiveness within the sector will be a good degree of cooperation and coordination made possible by improved communications among sector supporters.

8. RECOMMENDATIONS

8.1 MEASURES TO REDUCE ENVIRONMENTAL THREATS FROM USAID ACTIVITIES

The following recommendations are based on the discussion in Section 6.1.

SO 10 supports (SOs have changed since the 2006-2008 strategy was prepared, but is used here so as to be consistent with the strategy document):

- 1. Construction and Rehabilitation of Infrastructure especially in Areas Most Affected by the War.** Infrastructure rehabilitation and construction can harm the environment, and as such, environmental impacts should be assessed and mitigation formulated prior to implementing these activities.

The SIP is required to incorporate mitigation measures from STEP's Road Rehabilitation PEA into road rehabilitation project designs. The SIP is also developing environmental guidelines for other transport infrastructure projects. The Ministry of Transport and Roads is expected to incorporate these guidelines into their sector level EIA review process.

USAID-supported infrastructure rehabilitation and construction projects other than those under the jurisdiction of the MTR may also require guidelines, EAs or PEAs. If these activities are not already evaluated in an IEE, an amended IEE will have to be prepared that includes a recommendation for additional environmental review, if necessary.

- 2. Activities that Promote the use of ITNs.** These activities may need to comply with the Africa Bureau ITN PERSUAP. If ITNs are received in-country already impregnated with insecticides, there are few, if any environmental concerns. If the nets are "do-it-yourself", i.e., insecticides are impregnated once received in-country, adverse environmental effects may occur. In this case, the existing Africa-wide ITN PERSUAP should be revised, as needed for the country-specific situation, and submitted to the Africa Bureau Environmental Officer prior to implementing activities.
- 3. HIV/AIDS Interventions.** If these involve construction or rehabilitation of clinics or other facilities that handle medical waste, environmental effects may result from construction activities, but probably more critical from an environment and human health perspective, from disposal of medical waste. USAID should ensure that an environmental review is conducted, and adequate measures are included to ensure environmentally sound disposal of waste. .
- 4. Agricultural Production Activities.** If these include assistance for the use or procurement of pesticides, a PERSUAP will be needed before implementation of these activities. If encroachment of agricultural land into protected areas, wetlands, or other important natural areas is possible, a thorough environmental review should be conducted to determine whether mitigation is possible, and to provide recommendations for mitigation and monitoring.

Since the 2006-2008 USAID strategy came into effect, USAID has designed and/or are considering additional activities, some of which may have environmental impacts:

- a. USAID, through STEP, is considering support for a waste management facility in Juba. If not already included in the SO level IEE, an IEE should be prepared for this activity. Depending on the support envisioned, this activity may need further environmental review to determine adverse environmental effects and mitigation measures to minimize them. This could be used as an EIA exercise in STEP's continuing efforts to strengthen MEWCT's Directorate of Environmental Affairs EIA capacity.

- b. If USAID supports the production of Forest Management Plans or provides assistance for timber harvesting, including the purchase of equipment that could be used to harvest timber, USAID's environmental regulations require that an EA must be conducted to determine environmental impacts and mitigation.
- c. If USAID will support the preparation of Protected Area Management Plans, an EA may need to be conducted to determine environmental impacts and mitigation.

8.2 RECOMMENDATIONS TO USAID TO SUPPORT BIODIVERSITY CONSERVATION

(1) POLICY AND LEGISLATIVE FRAMEWORK

Through STEP or a similar vehicle, USAID should continue to strengthen the legal framework that governs natural resource management and biodiversity conservation, and continue to build capacity of natural resources professionals so they can effectively manage resources. These recommendations are based on the following findings:

- Most environmental policies and regulations are still in draft or have not yet been updated;
- Existing legislative framework is based on a government-intensive approach rather than considering civil society as a partner in conservation;
- Capacity in government institutions is still weak;
- The drive to develop is overshadowing the need for conservation of resources;
- Illegal and inappropriate activities are common, such as small-scale and commercial poaching, unsustainable fishing practices; unsustainable timber harvesting; and indiscriminate dumping of solid and liquid waste.

USAID's support for policy and capacity strengthening should continue as it has under STEP, with an emphasis on identifying GOSS priorities and providing technical assistance to bring them to fruition rather than imposing USAID or other donor priorities on GOSS.

(2) INSTITUTIONAL CAPACITY

USAID's interventions to strengthen institutional capacity through in-class training, study tours, and using practical exercises (scoping exercises, preparation of EAs, etc) is important and well-targeted. However, training should focus more on building skills that will help the MEWCT and MAF to implement projects (i.e., actual skills needed on the job) rather than in-class training. The following activities can be implemented as part of on-the-job capacity strengthening initiatives:

a) Preparation and implementation of Protected Area Management Plans covering one or more priority protected areas. This would include training in the preparation of plans; increasing capacity of protected area staff to implement plans; and training in surveying methodology to increase the biological information base of protected areas (wildlife, vegetation surveys). This would also involve the provision of necessary supplies and equipment to ensure adequate management of the protected areas.

Preparation and implementation of plans could be undertaken as part of the transboundary peace park initiative being implemented under an existing MOU with Uganda. A draft cable on the topic (March 5, 2007) states that support of transboundary peace parks would bring existing protected area management expertise from Uganda to Southern Sudan, to help strengthen capacity. In addition, working with Uganda, a country with several years of experience attracting ecotourists, this initiative could help generate revenue for Southern Sudan's nascent tourism industry. The international boundary area between Sudan and Uganda harbors exceptional biodiversity on national, regional, and global levels. On the Southern Sudan side of the border,

Nimule National Park is the location of one of the proposed peace parks. Salter (2006) recommended assistance in the preparation of Protected Area Management Plans for Nimule National Park because it has conservation value and relatively easy access and logistics, and Boma National Park because it is one of the largest parks in Africa and likely a site of global conservation significance (to be confirmed by surveys— Salter, 2006).

b) Development of community initiatives for the sustainable use of wetland resources. This would involve training of staff in CBNRM, conflict resolution, natural resources enterprise development, and would involve training at local levels as well as at GOSS. Given that the Sudd and other wetlands are such critical biodiversity resources and are so important to the livelihoods of Southern Sudanese, Southern Sudan needs to develop a cadre of professionals with expertise in sustainable management of wetland resources.

This would help to show communities and decision makers that wetlands can be sustainably used and can generate income, and will help to build an advocacy community for sustainable use of wetland resources.

c) Development and implementation of CBNRM/co-management guidelines covering wildlife, forestry, and/or fisheries sectors. As discussed, the GOSS has a tendency to use “command and control” approaches to manage natural resources and to combat illegal activities, and this is no longer considered best practice. In the wildlife sector, CBNRM/co-management could include working with communities around protected areas to develop benefit sharing activities, such as the establishment of sustainable harvesting of bushmeat. In the forestry sector, this could involve support for community forests, which communities would manage and from which they would earn revenue. In the fisheries sector, it could involve community monitoring and enforcement of fisheries bylaws.

(3) ENVIRONMENT SECTOR DECENTRALIZATION POLICY AND LOCAL CAPACITY

USAID should promote decentralization of natural resources authority to local levels in line with GOSS intentions.

As discussed in this ETOA, given the diversity and size of Southern Sudan, and the limited capacity of natural resources institutions, decentralization can help to ensure that natural resources are used in a more sustainable manner and that biodiversity is conserved. In a country as large and diverse as Southern Sudan, devolution of natural resources management authority is especially critical, and production and implementation of a decentralization policy should be a top priority for GOSS and donors. Capacity development at local levels is equally as important. In addition to devolving authority to local levels, community-based initiatives (as above, Recommendation 2) should be pursued to help develop a support base for sustainable natural resource management, and to possibly generate income from sustainable use of natural resources.

USAID should consider the following actions to promote decentralization and devolution of authority to local levels:

- a) Enter into dialog with the GOSS to encourage formulation of a decentralization policy as it pertains to the environment sector.
- b) Strengthen capacities at State ministries and in other local government offices. Through STEP, USAID has strengthened capacities mainly at GOSS level. However, capacities of staff hired and being deployed to State and County offices in wildlife, forestry, fisheries, and environmental sectors will need training.

(4) EFFECTS OF DEVELOPMENT ON HABITAT

Given the significant pressure to develop, and the weak state of the MEWCT Directorate of Environmental Affairs, USAID should continue and expand STEP’s capacity strengthening efforts that target MEWCT’s Directorate of Environmental Affairs staff.

(5) MOVEMENT OF PEOPLE INTO SOUTHERN SUDAN

- a) USAID should expand efforts in sustainable agricultural production, aiming to discourage slash and burn agriculture. These efforts should be targeted at areas that are expected to receive high numbers of returnees, who will be practicing agriculture, and where significant biodiversity still exists. The focus of these activities should be on encouraging improved practices, such as soil fertility management, encouraging the use of improved seed, implementing IPM, and improved weeding and spacing. These practices should target subsistence and commercial agriculture producers.
- b) USAID should assist GOSS and local authorities to create a legalized and controlled bushmeat trade by promoting domestication of certain species; by providing licenses to a limited number of hunters; by certifying enterprises that use domesticated sources of bushmeat or that are hunting in a sustainable manner. While the bushmeat trade is impossible to stop, it can be controlled and made sustainable. Lessons from West and East Africa should be incorporated into this program.

(6) CLIMATE CHANGE

- a) As in 5a above, discourage slash and burn agriculture by providing farmers with technical assistance that can assist them to implement alternative measures.
- b) Encourage retention of natural forest, as in 7b, below, to help attenuate the effects of climate change.

8.3 RECOMMENDATIONS TO USAID TO SUPPORT CONSERVATION OF FORESTS

(7) COMMERCIAL FOREST EXPLOITATION

- a) Under STEP, USAID has strengthened capacities at GOSS MAF-FD. This should continue and be expanded to State Forest Departments and Forest Guards, who are on the “front lines” of the illegal trade in forest products.
- b) STEP’s involvement in the community forestry sub-sector should be supported. Community forest management could help alleviate government’s responsibility for forest management and enforcement, and build community advocates for sustainable management of forests. This would help address the limited number of forest guards available for enforcement.

(8) CONSTRUCTION MATERIAL, FUELWOOD, AND CHARCOAL DEMAND

With the growing demand for construction material and charcoal, innovative measures are needed to reduce threats to forests. USAID should consider supporting, through STEP or a similar vehicle:

- a) measures to develop certified-sustainable construction material enterprises (wood, brick, and lime enterprises, all use forest resources) and charcoal enterprises, for which sources of wood can be traced and verified. This initiative can be used to help discourage unsustainable and illegal cutting of trees for construction material and for charcoal production.
- b) establishment of community and privately owned woodlots that can meet part of the growing demand for wood and wood products. Adequate extension services are needed to advise in management of the woodlots.
- c) sustainable management of natural forests (to include community participation and benefit) to meet the growing demand for wood and wood products. This could involve preparation and implementation of Forest Management Plans; training in sustainable forest management and appropriate silvicultural measures, CBNRM, and forest enterprise development; and/or promoting and assisting with decentralization of forest management responsibilities.

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ANNEX A: USAID GUIDANCE COVERING FAA 117/8/9 ASSESSMENTS

ADS 201.5.10g contains USAID’s guidance on incorporating environmental requirements into mission ISPs. This guidance is derived from provisions of the Foreign Assistance Act (FAA), as follows:

Environmental Sustainability: USAID recognizes that concern for the environment and wise management of the natural resources base are absolute requirements of any successful development program. Section 117 of the FAA “Environment and Natural Resources,” dictates that efforts be made to maintain (and restore) natural resources upon which economic growth depends, and to consider the impact of USAID’s activities on the environment. The legal requirements of the FAA are reflected in USAID’s ADS Chapter 204 “Environmental Procedures,” which guides users on the application of 22 CFR Part 216. Regulation 216 codifies the Agency’s procedures “to ensure that environmental factors and values are integrated into the A.I.D. decision making process.”

Tropical Forestry and Biological Diversity: Sections 118 “Tropical Forests” and 119 “Endangered Species” of the FAA codify the more specific U.S interests in forests and biological diversity. These two provisions require that all country plans include: 1) an analysis of the actions necessary in that country to conserve biological diversity and tropical forests; and 2) the extent to which current or proposed USAID actions meet those needs. Section 118/119 analyses are specific legal requirements of all USAID operating unit strategic plans.

22 CFR 216.5 requires USAID to conduct their assistance programs in a manner that is sensitive to the protection of endangered or threatened species and their critical habitats.

The following is excerpted from USAID guidance, “References for USAID FY 2007 Operational Plans,” dated January 10, 2007.

ENVIRONMENTAL ANALYSIS (118/119)

Sections 118(e) and 119(d) of the Foreign Assistance Act of 1961, as amended, require each country development strategy statement or other country plan prepared by USAID to contain analyses of the actions necessary in that country to achieve conservation and sustainable management of tropical forests and biodiversity in that country, and the extent to which the actions proposed meet the needs thus identified. Country strategic plans prepared by USAID contain these analyses, and meet this requirement. The FY 2007 Operational Plan provides the platform for identifying actions that support needs identified in previous analysis.

Note: These 118/119 analyses are separate from and do not replace the legal requirement to undertake environmental impact assessment on every program, project, activity, or amendment under 22 CFR 216 (See ADS 204) and to manage all activities to ensure their environmental soundness and compliance with their approved environmental impact determinations.

Supplemental Guidance for Relevant Sections of the *FY2007 Operational Plan Guidance*

Program Area and Program Element

1. Program Area Narratives

The Operational Plan requires narratives for all funded Program Areas. Depending upon the operating unit context, forestry and biodiversity activities can be programmed in one or more of the five Objectives of the new Foreign Assistance Framework rather than solely in the Natural Resources and Biodiversity Element under Economic Growth (EG 8.1).

As always, the latest 118/119 assessment should be used to inform and make decisions on activities included in the OP.

The endorsement memorandum from the Ambassador must include a statement regarding whether the Operational Plan includes activities that will address actions necessary in that country to achieve conservation and sustainable management of tropical forests and bio-diversity and if so, which program elements contain such activities. The program elements narratives should discuss in greater length (see below). Please upload the most recent 118/119 assessment as a supporting document to the Operational Plan.

Also, please consult with your Bureau Environmental Officer to determine whether your country's 118/119 assessment is sufficiently up to date for use in any future FY 2008 strategic planning process, or whether you will need to arrange for either an update or a new assessment before you begin any strategic planning in FY 2008.

Note: For those countries that are entirely outside of the tropics (Capricorn and Cancer), the assessments were required to cover just biodiversity (119), though for practical reasons including analysis of non-tropical forests is recommended as part of the 119 biodiversity work in such countries.

2. Program Element Narratives

The Program Element section of the Operational Plan requires several narrative sections for each Element funded.

Program Element – Overview Narrative

Describe what actions the Agency will support to conserve biological diversity and/or tropical forests.

Implementing Mechanism Narrative

In implementing mechanism narratives that include biodiversity programs, Operating Units should make clear that their programs will meet all four key criteria of the biodiversity code, although there may not be space to fully describe how criteria are met in this document. These minimum requirements are spelled out in the “Biodiversity Code” (see <http://inside.usaid.gov/EGAT/off-nrm/biodiv-team/code.htm>). The biodiversity code covers activities with either a primary or secondary objective of conserving biodiversity; again, such activities can be programmed under any of the five Objectives of the framework. **Whether implementing existing programs or designing new ones, operating units must ensure that their programs meet all four code criteria.**

Indicators, Targets and Narrative

Include F-provided common indicators for biodiversity and tropical forestry conservation.

Key Issues

All biodiversity activities meeting the criteria referenced above should be reported under the Key Issue “Biodiversity.”

ANNEX B: ETOA SOW

ENVIRONMENTAL THREATS AND OPPORTUNITY ANALYSIS (ETOA) REVISIONS CONSULTANT

SCOPE OF WORK

In 2003, at the behest of the USAID/Sudan Mission and in responsive to the Congressional Mandate to carry out a Section 118/119 (Tropical Forestry and Biodiversity) Analysis, an Environmental Threats and Opportunities Analysis (ETOA) was prepared as an input for programming efforts at the time. The ETOA methodology is the preferred approach to the Section 118/119 requirement in the East Africa Region for USAID. Changes in the Mission Strategy for Southern Sudan dictate that the ETOA should be updated in the light of recent developments and challenges in the country. This task has been included in the activities expected of the USAID/Sudan Transitional Environment Program (STEP) which were modified in mid-August, 2006.

Owing to the capacity building nature of STEP, it has been agreed that this USAID programming requirement would be carried out in conjunction with Government of Southern Sudan (GOSS) counterparts so as to avail them of the hands-on training opportunity in sector analysis and programming. In order to carry out this task (performance measure no. 2), STEP would like to contract the services of a specialist consultant to assist the Team Leader and his counterparts in the GOSS Ministry of Environment, Wildlife Conservation and Tourism.

The Consultant will work under the direction of the Team Leader, who was, coincidentally, the primary author of the earlier version of the ETOA, to analyze the present situation of the environment in Southern Sudan and revise the report as necessary. More specifically, this effort will involve the following activities:

- The consultant will thoroughly familiarize herself with the present version of the ETOA and develop an analytical framework regarding how to approach the updates required.
- Meet with USAID/Sudan and Regional USAID staff both in Nairobi and in Southern Sudan to poll their ideas on the overall direction and key themes they hope will be addressed in the revised ETOA. Similarly, meet with the authorities and staff of the GOSS Ministry of Environment, Wildlife Conservation and Tourism to get their views on the same subject.
- With the assistance of the Team Leader, compile and review the most pertinent new literature available about the environment and development for Southern Sudan, assembling as possible an annotated bibliography.
- Chose specific areas on the basis of these preliminary analysis and interviews that should be further subjected to data and information collection as major inputs to the revised ETOA. These choices could be expressed in the form of an annotated outline of the eventual ETOA Report and a short work plan for the remainder of the consultancy, including suggestions for field visits and team work with MEWCT staff.
- Given the experience of the past few years, since the original ETOA was published and sector development programs got underway, it is likely that special attention should be devoted to two key themes: 1)- institutions and processes and, 2)- the most likely areas for adverse impacts. These two themes areas will be of considerable use in guiding future programming activities for the sector by USAID and others.

- The consultant will also give special attention to collecting appropriate graphics for use in the ETOA Report, such as photos, maps, figures and charts as may be available or can be produced so as to enhance the overall presentation of the report.

Before departing from the country, the Consultant along with some of the MEWTC staff who have participated in the analysis and field work will make a presentation to USAID and GOSS officials regarding the general findings of the revised ETOA. This will be done on the basis of a power-point presentation. The Consultant will present the Team Leader with a full draft of the ETOA Report for review and comment by STEP, the MEWCT and USAID/Sudan. She will make changes as required in response to a written review of the draft and finalize it for publication by the IRG Home Office in Washington within two weeks of receiving the comments from Southern Sudan.

Duration/LOE: Seven person weeks, with three weeks in country

Location: Southern Sudan, and at home in the US

ANNEX C:AUTHORS' BIOGRAPHICAL SKETCHES

Thomas M. Catterson, STEP Team Leader/Environmental Policy Advisor served as a member of the team carrying out this revision of the ETOA. He was the principal author of the original ETOA and drew up the plans and provided much of the design of the present effort, and advice and editorial oversight for this new version. Mr. Catterson has over 35 years of experience with environment and natural resources management-related work in 75 countries of the developing world. He has worked on a number of programmatic environmental assessments in different countries (Ethiopia, Guatemala and Guinea) and in different fields (small-scale irrigation and natural forest management). In addition, he is one of the co-authors of the USAID-Africa Bureau Environmental Guidelines for Small-Scale Activities in Sub-Saharan Africa. Mr. Catterson has a Masters degree in International Forestry (1973) and speaks several languages.

Sean White has worked in the forestry sector in Southern Sudan since 2003. Currently he is the Senior Forestry Advisor with the STEP program focusing on forest governance issues and he also provides technical assistance to Kagelu Forestry Training Centre. Prior to working in Sudan he held long-term technical advisory positions in the forestry and natural resources management sectors in Tanzania, Kenya and Uganda. He was Chief Technical Advisor with IUCN at Mt Elgon Conservation and Development Project in Uganda from 2001-3 and Forest Plantation Management Specialist on the World Bank funded Kenya Forestry Development Project from 1993-97. In Tanzania he worked on agroforestry and land use planning from 1989-93. Prior to working in Africa he worked in forest management and research with the State Forest Services in Ireland and the UK.

Karen Menczer is currently based in New Mexico, USA, and is a Senior Associate with The Cadmus Group. From 2000-2006, she worked as an independent natural resources consultant, while living in Uganda, Jamaica, Botswana, and Ghana. From 1997-2000, Ms. Menczer was a Natural Resources Advisor in USAID/Uganda, and from 1991-1997, she was a Natural Resources Advisor in USAID/Washington's Latin America and Caribbean Bureau. Her Bachelor's and Master's degrees are in Ecology, and she has done course work and research in Galapagos towards a PhD.

Cecilia Mogga completed her Uganda Advance Certificate of Education in Kitgum High Uganda. She worked for the international NGO, Agency for Cooperation Research in Development (ACORD) from 1995 to 2003. In 2004 she went for training in High Wycombe UK. Currently Ms. Mogga is with the Ministry of Environment, Wildlife Conservation and Tourism.

Nickson Faustino Lawrence graduated from Juba University, College of Natural Resources and Environmental Studies, Department of Environmental Studies. He earned a Bachelor's Degree with honors in the Environment Field in 2003, and since June 2006, has worked for the Ministry of Environment, Wildlife Conservation, and Tourism as an Assistant Inspector for Flora and Fauna in the Department of Biodiversity.

ANNEX D: LIST OF CONTACTS

Name	Title, Affiliation	Contact Information
Brian Hirsch	USAID/Africa Bureau Environmental Officer, USAID/Washington, DC	bhirsch@usaid.gov
Walter Knausenberger	USAID/East Africa Regional Environmental Advisor	waknausenberger@usaid.gov
West Yugulle	CTO/STEP, USAID/Southern Sudan program	wyyugulle@usaid.gov
David Kinyua	USAID/East Africa, Assistant Regional Environmental Advisor	dkinyua@usaid.gov
Azene Bekele-Tesemma	World Agroforestry Centre (ICRAF), Capacity Building Advisor, East Africa Region	Azene.Bekele@cgiar.org
Meshack Nybanege	World Agroforestry Centre (ICRAF), East Africa Region	Meshack.Nybanege@cgiar.org
Russ Misheloff	STEP Project Manager	misheloff@irglttd.org
Victor LoTombe Wurda	Director of Environmental Affairs, MEWCT	vlotombe@yahoo.com
David Bol Madok	Director for Agriculture, Lake State, Rumbek	
Matthew (?)	Ministry of Gender, Deputy Director for Rehabilitation and Community Development, Rumbek	
Joseph Maker Madit	Director General, Physical Infrastructure, Rumbek	
John Maker Nyai	Southern National Park Game Warden	
Sgt. Abrham Budiang Akech	Yirol Wildlife Forces	
Major Mariel Akech	Yirol Wildlife Forces	
Captain Moses	Deputy to Major Akech (Yirol Wildlife Forces) and Financial Officer for Lake State	
Alfred Madol	Yirol Wildlife Forces	
James Mathiang Achinkoch	Yirol Wildlife Forces	
Colonel Gabriel Gurguri	Warden, Shambe National Park	
Amach Kuocnim Nyuon	Paramount Chief	
William Wol Chol	Tonj South County, County HQ, Senior Inspector of Local Government	
Michael Lou Babur	E.O. Tonj South County	
Costantino Madhien	E.O. Tonj South County	
Mariel Koic Nyendeng	Executive Director, Tonj South County	
Captain Akol Macek	Tonj Wildlife Forces	
Jima Mongay	Tonj Wildlife Forces, Logistics	
Brigadier Sebti Joseph Payiti	Director of Wildlife Service, Western Bhar el Ghazal, Wau	8821643099459
Ibrahim Issa,	Director General, Ministry of Local Government and Law Enforcement, Wau	
Ishag Elias Ibrahim	Ministry of Local Government and Law Enforcement, Wau	
Joseph Amadeo Adu	Acting DG, Ministry of Physical Infrastructure and Urban Development	
Noel Lako Francis	Forest Utilization Unit, MAF-FD GOSS	
Kagelu Forestry Training Center (Yei)		
Martin L. Tobiolo	Principal	8821655531559, FTCKagelu@yahoo.com
Hakim Ezezenios	Tutor	hakerez@yahoo.co.uk

Name	Title, Affiliation	Contact Information
Otto Kenneth	Tutor	ottoknnt@yahoo.com
John Taban Jacob	Tutor	johntabanjacob@yahoo.co.uk
Daga?	Tutor	
Yei River County Offices		
Issa Ali Abdurahaman	Public Health Officer	
Francis Onel Simion	Senior Environmental Health Inspector	
Cosmos Lanya Manase	Forest Officer	
Martin Wan	Bookkeeper	
Yei River County Wildlife Forces		
S/M Henry Laila William		
Sgt. David Wut		
Officer Glauak Marial		
Daniel Lokorto	Tutor, Outreach Department, Crop Training Center (Yei)	
Ministry of Agriculture and Forestry (Yambio)		
Isaac A. Justin	Minister for Agriculture (Acting), WES	
Johnson Ezibon	Ag. Director General, Ministry of Agric, WES	
James Odrande Jolama	Director of Forestry	
Joseph Ermínio Abiambu	County Director for Forestry, Yambio	
Oliver Yasona Yu,	Asst Conservator of Forests, Yambio	
Abisai Yepeta Tabia	Director of Plant Protection, WES	
Yambio Wildlife Forces		
Col. Jonathan Nyari Mande		
Major Johnson Paul Lemi		
1 st Lt. Andrea Masiagba Peter		
S/M James Enosa Anania		
Ministry of Physical Infrastructure (Yambio)		
Stephanie F. Clement	Acting Director General	
Timothy Kenyi Sebit	Director of Survey	
Dr. Taye Teferi	Conservation Programme Director, World Wildlife Fund Eastern Africa Regional Programme	TTeferi@wwfearpo.org +254(0)20 387 7355
Jamus Joseph, PhD.	Assistant Director and Survey Coordinator, Wildlife Conservation Society	jjoseph@wcs.org (718)220-1387
James Isiche	Regional Director-East Africa, International Fund for Animal Welfare	jisiche@ifaw.org +254(0)203870540
Natalie Topa	Country Director, International Relief & Development (ex-Creative Associates)	ntopa@ird-dc.org +256 477 113 820
Dr. Sandra Cooper	Consultant, Ministry of Roads and Transport	shawkinbemy@yahoo.com