



# SUDAN TRANSITIONAL ENVIRONMENT PROGRAM

REPORT ON THE PROCEEDINGS OF THE  
1ST TRAINING WORKSHOP



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## **COVER PHOTO**

Group Photograph of Participants to the 1st STEP Training Course in EIA/ESD held in Boma, Jonglei State, Southern Sudan.

# SUDAN TRANSITIONAL ENVIRONMENT PROGRAM

REPORT ON THE PROCEEDINGS OF THE  
1ST TRAINING WORKSHOP

**ENVIRONMENTAL ASSESSMENT AND ENVIRONMENTALLY SOUND  
DESIGN FOR SMALL-SCALE ACTIVITIES**

**BOMA WILDLIFE TRAINING INSTITUTE, SOUTHERN SUDAN  
23rd – 27th January, 2006**



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# ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
CAR	Central African Republic
CBOs	Community-based Organizations
CWEC	Christian Women Empowerment Center
DRC	Democratic Republic of Congo
EA	Environmental Assessment
EIA	Environmental Impact Assessment
ENCAP	Environmental Assessment and Management Capacity Building Project
ERF	Environmental Review Form
GNU	Government of National Unity
GoS	Government of Sudan
GoSS	Government of Southern Sudan
HIV	Human Immuno-deficiency Virus
IDP	Internally Displaced Person
IEE	Initial Environmental Examination
IRG	International Resources Group
NGO	Non Governmental Organization
PEA	Programmatic Environmental Assessment
PERSUAP	Pesticide Evaluation and Safer Use Action Plan
REDSO/ESA	Regional Economic Development Services Office for East and Southern Africa (USAID)
SEA	Strategic Environmental Assessment
SFO	Sudan Field Office
SRRC	Sudan Relief and Rehabilitation Commission
STEP	Sudan Transitional Environment Program
USAID	United States Agency for International Development



# PREFACE

USAID's Sudan Field Office (SFO) has been sponsoring "pilot" environmental assessment training courses among its implementing partners, Southern Sudanese public sector and NGO managers, and USAID's own staff in order to encourage an improvement in environmental management and monitoring capacity. To date, four rounds of training courses have been delivered in Southern Sudan, three in Yei, Equatoria, at the Christian Women's Empowerment Center: 29 March - 3 April, 2004; 18th -22nd October, 2004, 9th-13th May, 2005; and the present one held in Boma Wildlife Training Centre, Jonglei State from the 23rd -27th January 2006. For three of the workshops, the curriculum developed by ENCAP was adapted using core resources of the Africa Bureau ENCAP Program funded by USAID/REDSO and USAID's Africa Bureau Office of Sustainable Development (AFR/SD) (see <http://www.encapafrika.org.htm>), while the fourth round of training was funded under the Sudan Transitional Environment Program (STEP) funded by the USAID/SFO. Participants spoke of the analytical skills they gained, of the need to establish environmental policies and regulations in post-war Southern Sudan, and to ensure that the roles of different institutions are clarified, such as the role of the Southern regional government as differing from local or county government. Two similar courses will be offered this year to Southern Sudanese professionals under the STEP in a bid to continue building a base for strong engagement of environmental management in the development of Southern Sudan. By the time the three training courses funded under the STEP project are implemented, about 120 Southern Sudanese professionals will have been given skills in EIA/ESD. These people, together with those trained under previous initiatives, are expected to play a critical role in not only raising awareness on environmental issues, but also in the implementation and institutionalization of EIA/ESD in Southern Sudan.

# INTRODUCTION

This was the first training under the Sudan Transitional Environment Program (STEP) and funded by the USAID Sudan Field Office. The training was targeted at the personnel involved in the implementation of development activities in Southern Sudan during any of the stages of the project cycle (Planning and Design, Implementation, Monitoring and Evaluation). Participants were drawn from both Government and Non Governmental Organizations (NGOs). Arrival date was Sunday, January 22, 2006, the course commenced on the 23rd at 8.00 A.M. and ran for a period of five days up to Friday, January 27th.

Participants were drawn from 19 different organizations that were distributed as follows:

- Nine from four Ministries, namely: (i) Commerce, Trade and Supply (2); (ii) Environment, Wildlife Conservation and Tourism (2); (iii) Mining and Industry (3); and (iv) Cooperatives and Rural Development (2).
- Training Institutions: Boma Wildlife Training Institute (2) and the Fisheries Training Institute in Padak (3).
- Twenty-five from different NGOs, UNICEF, WFP and community-based organizations (CBOs).

## OPENING SESSIONS

The participants were welcomed to the training course by **Mr. Ephantus Wahome of USAID/REDSO/ESA** who also gave a brief of past ENCAP courses that have been held in Southern Sudan since 2004, after which he invited the Guest of Honor, The Executive Director of Pibhor County, Mr. John Boya to address the participants and officially open the course

Mr. Boya started his address by appreciating the good work that USAID is doing in Southern Sudan by training Sudanese personnel, which would in turn equip them with skills to tackle the many developmental challenges that are currently affecting the country. He urged them to take a keen interest for the entire period that the course will be ongoing so that they can derive maximum benefits. Mr. Boya added that the participants had a responsibility to disseminate what they learn to the rest of Sudan, so that all can benefit and be able to participate in the development of their country.

Part of the session was also devoted to introductions among the participants and facilitators.

## PARTICIPANTS EXPECTATIONS

Facilitated by F. Warinwa

Participants were asked to write on cards three of their expectations from the course. Their expectations are summarized as: To gain skills and techniques that can be used in environmental management; Understand environmental issues in southern Sudan and factors that are contributing to these problems; Develop career further and acquire the ability to implement what has been taught; Learn and understand what is EIA, the process of EIA and tools that can be used during the EIA process; Learn how to identify positive and negative impacts of project activities on the environment; Know how skills and information gained from the training course can be disseminated to other training centers in Southern Sudan, and among the local communities so as to protect Sudan's environmental resources; and Learn how to enforce compliance to sound environmental management practices.

## **PRESENTATION OF COURSE OBJECTIVES**

By Ms. Jane Kahata

Ms. Jane Kahata, STEP's EIA Specialist from IRG presented the course objectives to the participants.

She noted that the goal of the course is to assist USAID Missions and partners to use simple environmental assessment tools to better design and implement environmentally sound activities. USAID partners include contractors, PVOs, NGOs, host Governments and others.

To achieve this goal, the course is designed to help the participants:

- Develop a deeper understanding of how environmental issues can affect the sustainability of development programs and activities;
- Understand the basic Environmental Impact Assessment (EIA) process,
- Build skills to identify and assess reasonably foreseeable environmental impacts;
- Design mitigation and monitoring measures to avoid adverse environmental impacts.

The course was therefore focused on developing the participants' capability to (a) prepare an environmental assessment or environmental review reports and also provide relevant supporting materials, and (b) design a mitigation, monitoring and evaluation process for activity components with potential negative impacts.

## **COURSE TRAINERS/FACILITATORS**

Jane Kahata, EIA Specialist, International Resources Group (IRG)

Ephantus Wahome, Regional Environmental Specialist, USAID/REDSO/ESA

Fiesta Warinwa, NRM Specialist, African Wildlife Fund (AWF)

Weston Fisher CADMUS Group

[Contact details in Annex 4]

# MODULE PRESENTATIONS

This section only reports on:

- Issues/discussions arising from the modules that had opportunities for practical group exercises;
- Key issues raised and discussed after presentation of the two national papers;
- Presentations on the environmental review reports and monitoring and mitigation plans developed after the field case study visits and issues raised and or discussed.

The standard power point presentations of the ENCAP course are not included.

## CONSTRUCTION OF A HISTORICAL TIMELINE FOR SOUTHERN SUDAN

Facilitated By: Fiesta Warinwa

Participants were divided into four groups as follows: Group 1: 1955-1971; Group 2: from 1972-1983; Group 3: from 1984-1996, Group 4 from 1996-2006. They were then taken through the briefing notes on how to construct a historical timeline after which they split to their respective working groups. The consolidated Historical Timeline developed by the participants is shown here below.

### Historical Timeline for Southern Sudan from 1956 - 2006

2005	ENCAP training in Boma, Paulino Matip joins GoSS forces Signing of CPA, formation of GoSS and GNU, South to South dialogue facilitated by Moi Foundation Rehabilitation and reconstruction program of S Sudan begins Tribal clashes in Western Equatoria, Temporary opening of Juba-Yei road
2004	Tribal clashes in Yirol and declaration of cease fire by SPLA/M and GoS. Tribal clashes in Lakes Region between Dinka Agar and Gok. LRA attack on civilians around Torit and Juba.
2002	Invasion of Western Equatoria by Mbororo. Recapture of Raja by GoS. Recapture of Torit by SPLA/M . Recapture of Raja town in Bahr El Ghazel by the SPLA/M. Unity between SPLA/M main faction and SPLA/M United.
2000	Uncontrolled harvesting of Teak by SPLA soldiers & traders from East Africa in Yei. Intensification of aerial bombardment in most areas of Southern Sudan. Death of Commander Kerbino.
1998	Signing of agreement between SPLM/A United and Government of Sudan.
1996	Attack of people from Wau by murhalin Influx of returnees due to relative stability in most parts of Southern Sudan Tribal clashes in Upper Nile between militias
1994	Chukudum convention Use of chemical weapons by Government of Sudan in most part of Southern Sudan

1992	Establishment of camps for displaced persons from Southern Sudan Fall of Mengistu of Ethiopia
1990	Implementation of Sharia Law
1988	Flooding in Sudan, severe hunger in Juba (Black October)
1986	April uprising
1984	Formation of SPLA/M Integration of the forestry sector to Agriculture
1982	Construction of Juba Airport & its declaration as an international airport
1980	Ugandan refugees influx into Southern Sudan following the overthrow of Idi Amin
1978	Establishment of Juba University
1976	Construction of Jongeli canal began Outbreak of Ebola disease in Western Equatoria
1974	Discovery of oil, Establishment of agricultural project in Yei P.D.U
1972	Sudanese Refugees repatriation from Uganda, Ethiopia and DRC, large scale farming introduced
1970	Military coup and Nimeri becomes President of Sudan
1968	Massacre of chiefs, murder of William Deng
1966	Political riots
1964	Expulsion of catholic missionaries
1962	Establishment of railway network
1960	Formation of Anyanya I Movement
1958	Farms and farmland invasion by Locust
1956	Independence of Sudan
1955	Torit Mutiny

### KEY HIGHLIGHTS OF THE HISTORICAL TIMELINE

- 1955:** Torit mutiny led to the displacement of people and their subsequent resettlement in other areas, which led to deforestation arising from the cutting down of trees and clearing of land for cultivation in the newly settled areas.
- 1962-1969:** Flooding for a period of seven years as a result of the construction of the Aswan Dam occurs, leading to the displacement of people in **Bor**. Subsequent resettlement programs and rural-urban migration led to the development of slums, population pressure in urban centers and pollution. Those affected by the flooding were not equitably compensated as only the Arabs were
- 1967:** Industries such as the Wau Fruits and Vegetable factory were opened leading to water pollution by effluents from the industries
- 1972:** Refugees repatriated from Uganda and Ethiopia after the signing of the Addis Ababa agreement led to deforestation due to clearing of land for cultivation, construction and development of infrastructure
- 1974:** Discovery of Oil in Sudan leads to the re-demarcation of the boundary between North and Southern Sudan

- 1976:** Construction of Jonglei canal leads to destruction of fish breeding sites and the fisheries industry, blocking of wildlife migration corridors especially for the tiang and the white-eared kob, wetlands loss, human displacement and ecological changes
- 1978-1979:** Refugees influx from Uganda leading to deforestation, land conflicts and importation of better agricultural practices from neighboring countries into Sudan. Importation of better farming methods led to increased crop productivity
- 1991:** Massive displacement of the pastoralist communities living in Bor led to their migration into the Equatoria region leading to famine as crops were destroyed by livestock
- 1994:** Use of Chemical weapons by the GoS leads to widespread air pollution and other health problems that mostly affected women who had miscarriages and still births
- 1997:** Extensive exploitation of the teak forest by Government soldiers
- 2000:** Oil exploration in the Unity State led to the displacement of people and a lot of suffering

### **COMMENTS ON THE HISTORICAL TIMELINE**

Once again, construction of the historical timeline exercise was an excellent tool of understanding the social, political and environmental changes and issues that have taken place in Southern Sudan. The participants remained enthusiastic throughout and were able to identify numerous political events that have occurred in Southern Sudan and their linkages to environmental problems. Issues of conflicts in resource allocation, use and their linkages to political conflicts came out very clearly, such as in the re-demarcation of the boundary between north and south after the discovery of oil, riots leading to increased levels of air pollution due to the burning of vehicles, tyres, houses etc.

# TRANSECT WALK THROUGH THE BOMA WILDLIFE TRAINING CENTRE

Facilitated by: Wes Fisher, E. Wahome, J. Kahata, F. Warinwa

This was undertaken at the close of Day 1 activities. Participants were divided into two groups that were each assigned a transect to walk along, observing various environmental variables pertaining to the social and biophysical environments. They were also to observe the facilities as they walked, noting whether the facilities had been designed and constructed according to environmentally sound design principles.

The following are the observations made by the Groups:

## **GROUP I REPORT ON THE OBSERVATIONS MADE AS THEY WALKED ALONG THE TRANSECT**

### **CENTRE COMPOUND**

- Terrain of the area is generally sloppy.
- Trees were small and scattered.
- Evidence of soil erosion was observed around the buildings, which may have been due to rain and run off water.

### **Recommended Mitigation Measures**

- Gutters to collect roof water should be incorporated at the design stage to harvest rain water which should then be stored in an underground tank.
- Trenches to channel surface water run off may reduce erosion arising from surface run off.
- Trees and grasses should be planted around the compound to reduce the speed of run off water, thus reducing soil erosion.

### **FIRE PLACE**

- Wood from dry trees collected from around the training center is the main source of energy for cooking.

### **Recommended Mitigation Measures**

- Seek an alternative source of fuel to reduce tree cutting.
- Use efficient stoves to ensure less wood fuel is used, which in turn will reduce the rate and number of trees cut and the subsequent deforestation.
- Undertake a reforestation program using indigenous trees species or allow for regeneration.

### **ROAD**

- There is a road that passes through the national park (Boma) and a village that is also within the park. The road goes up to Ethiopia and is trunk road.

### **Effects**

- Connects the Boma community to markets.
- The road can be a conduit for social effects such as spreading of HIV/AIDS.
- Over speeding by vehicles can endanger wildlife.

### **Recommended Mitigation Measures**

- Road should be redesigned to serve as an access road rather than as a trunk road. This shall reduce instances of poaching and smuggling of goods across the border.
- Bumps should be introduced along the road to control vehicle speed, thus reducing accidents.
- Community should be sensitized about the dangers of HIV/AIDS and its related effects.

### **PRESENCE OF A LOCAL COMMUNITY IN THE PARK:**

- Poaching by local community members.
- Endangering people's lives by wild animals
- Poor sanitation in the village as evidenced by lack of latrines in the area.
- The participants also projected that with time, both the human and wildlife population will increase and this shall result in competition between the two for land space.

### **Recommended Mitigation Measures**

- Members of the local community should be involved in the management of the national park. To be able to do this effectively, they should be trained in the various aspects of park management.
- The community could also be relocated to some other place subject to acceptance from the community based on adequate negotiations and compensation.
- Fencing off humans from wildlife in the community area could also be a solution.
- A hygiene and sanitation promotion program should be instituted within the community to reduce incidence of diseases and pollution arising from poor sanitation.

### **TRENCH**

- This was observed around the village. Participants were informed that SPLA soldiers dug it in 1992 for defense purposes.

### **Effect**

- The trench could act as a breeding area for disease vectors, which in turn could cause diseases to the local people.

### **Recommended Mitigation Measures**

- The trench should be backfilled.

### **ROAD**

- Surface erosion, multiple tracks on some sections of the road; and longitudinal depressions were observed.
- Soil type along the road was noted to be variable from place to place.

### **Recommended Mitigation Measures**

- Side drains should be constructed during rehabilitation of the road.

- Proper cambering is required to keep the water off the center of the road.
- Off shots should be placed along the side drains to keep water off them.
- The terrain of the land should be properly surveyed and the soil type investigated.

#### **HAND PUMP**

- A pool of stagnant water was observed around the water point area. There was a possibility of ground water contamination, which may in turn cause diseases.
- Low yield of water was also observed, which could be due to mechanical problems with the pump.
- Animal deposits around the water point were also seen.

#### **Recommended Mitigation Measures**

- A proper drainage system should be constructed to take the water away from the hand pump.
- Wetland plants should be introduced at the end of the drainage system.
- A water use committee should be established to help in the management of the hand pump and ensure sustainability of the water project.
- Hydrogeological investigations should be carried out to ensure that water points have good yields.

#### **SEPTIC TANK**

- The flush toilet connected to a septic tank was non-functional due to lack of water in the area.

#### **Recommended Mitigation Measures**

- Proper hydrogeological investigation should be done in the surrounding areas to identify more high yielding boreholes for the training center.

### **GROUP 2 REPORT ON THE OBSERVATIONS MADE AS THEY WALKED ALONG THE TRANSECT**

#### **NYAT PRIMARY SCHOOL**

- Sheet erosion was evident all around.
- The structures that make the school cannot withstand strong winds.
- There are no sanitary facilities in the area.

#### **STRUCTURES OF THE CENTER**

- The facilities have been constructed using locally collected building materials. This eliminates quarrying as an activity and is therefore environmentally sound.
- The dormitories have no gutters/aprons for collecting rainwater and this accelerates the problem of soil erosion. If gutters had been installed, the rain water collected could help alleviate the problem of water shortages currently being experienced at the institute.
- Presence of gutters can help protect the foundations of building structures as they prevent the problem of backwashing as the water falls to the ground.
- Planting locally available indigenous trees and grasses should increase the vegetative cover within the center compound.

### **SOLID WASTE MANAGEMENT**

- Drums are used as dust bins and as incinerators, but they are not effective as incinerators due to lack of an adequate supply of oxygen.
- The solid waste receptacles also hold rainwater and this can make them breeding grounds for mosquitoes and other disease vectors.

### **LIGHTNING ARRESTORS**

- The centre has installed them near the dormitories and office block. They are however unnecessary due to the presence of hills that are higher than the buildings around the centre that would serve the same purpose.

### **ROADS WITHIN THE CENTRE**

- The steep inclination, coupled with regular vehicle movements and rain will cause gully erosion.

### **PIT LATRINES SERVING THE STUDENT DORMITORIES**

- There is a hard rock within the centre that makes digging pit latrines problematic. As a result, the centre improvised on how to construct pit latrines by digging the pit latrines up to 2 metres deep and then raised them for another 2 metres above ground, thus giving the latrines a depth of 4 metres in total. This design is environmentally sound.
- Upper part of the latrine has cracks that can lead to leakage unless plastered from within. The cracks most probably are as a result of improper curing of the cement during construction due to lack of water
- The latrines were producing some smell.
- An alternative to this design is the composite toilets.
- There are some good flush toilets that are connected to septic tanks but were not operational due to lack of water.

### **WATER POND WITHIN THE CENTRE**

- This is a pool of stagnant water used for various activities such as bathing, watering point for animals and washing cars. It is a perfect breeding ground for mosquitoes and other vectors that cause water borne diseases such as the bilharzia worm.
- The overflow from the pond flows by the Centre borehole during the rainy season.
- Improvements on the pond can be made such as introducing fish.

### **CENTRE BOREHOLE**

- Foot made out of steel casting which was already showing signs of rusting.
- No slab erosion.

### **GENERATOR SHED**

- This is too close to residential houses and offices and the noise can be disturbing.
- Some unnecessary tree cutting was observed.

### **BEEHIVES**

- They are too close to offices/residential area, and if bees are attracted by a nice smell or when in search of water, they can attack the residents.

**YARD BEHIND THE CONTAINERS THAT SERVE AS STORES**

- This is a junk yard where all the unwanted things are hidden. Fuel is also stored in the same area and a pot was found cooking near the storage area for fuel and this can cause a fire hazard.
- Some oil spill was observed in the area.

**KITCHEN AREA**

- Cooking is done in the open using firewood and this consumes a lot of wood. Alternative energy saving cook stoves should be used.
- There is poor sanitation at the back of the kitchen where dish-washing activities are undertaken. Wastewater from this activity is poured out and there is no drainage system. This creates an environment that is conducive for the breeding of mosquitoes and flies.
- More cupboards and shelves are needed in the kitchen to avoid keeping utensils and foodstuffs on the floor.

**FLUSH TOILETS**

- The toilets are well constructed and connected to septic tanks. This project must have cost a lot of money and yet the toilets will not be used so long as there is not an adequate water supply.

**VEGETABLE GARDEN**

- Terracing is done along contours instead of against them and this enhances soil erosion.
- There is also a high level of pest infestation and wildlife damage both of which reduce yields.
- The entire center should be fenced off for enhanced security.

# DISCUSSIONS ARISING FROM PRESENTATIONS ON THE BIOPHYSICAL AND SOCIAL ECONOMIC PAPERS

The two national papers elicited a lot of enthusiasm among the participants who had numerous questions to ask. Some of the themes that dominated the discussions were:

## **HIV AND AIDS**

This was identified as a major threat to the reconstruction efforts of Southern Sudan. It is anticipated that the influx of returnees (refugees and those internally displaced), will lead to a high prevalence of HIV/AIDS. This is because many of them have been living in the neighboring countries of Kenya, Uganda, DRC which all have a high prevalence of AIDS.

## **UNPLANNED HUMAN SETTLEMENTS AND INSUFFICIENT BASIC INFRASTRUCTURE**

This was identified as being a major problem in many towns in southern Sudan. Participants noted that the government should take the issue seriously by zoning and planning the urban areas if the resultant environmental problems were to be avoided. Failure to do this would lead to contamination of water resources (surface and ground) and the resultant higher incidences of water-borne diseases, participants observed.

## **EXTENSIVE BURNING OF VEGETATION FOR HUNTING PURPOSES**

This was prevalent all the way from Boma Town up to the training centre. While controlled burning may be a sound environmental management tool in range management, repeated uncontrolled burning can lead to range degradation, and this is likely to happen in the Boma area. Trees in the affected area have stunted growth due to repeated stresses of fire and some kind of control should be exercised in this activity. Poaching for the pot is also widespread and this is facilitated by the ready availability of small firearms in the area.

# CASE STUDY I: ENVIRONMENTAL REVIEW OF RURAL ROADS CONSTRUCTION AND REHABILITATION PROJECTS

## INTRODUCTION

This case study site is located along the road from Boma town to Lokichoggio town in Kenya, which is the main trunk and access road in an area that is quite remote. The road was constructed in the mid 1990s in order to allow for the transportation of goods and relief food between the two towns and beyond. Since its construction, there have been little maintenance and rehabilitation activities, and this has led to its current poor condition. The minimal rehabilitation and/or maintenance work done has been through food for work arrangements. Over the years, certain sections of this road have deteriorated badly, thus rendering them impassable. One such section is a 3 km stretch as you approach Boma town from Lokichoggio. This necessitated the opening of another road as a bypass through food for work activities. The bypass is also rapidly deteriorating and will also be in very bad shape soon. It is worth noting that food for work road construction activities rarely apply sound engineering design principles and as such, they rapidly deteriorate.

### Presentation of the Environmental Review Report on Rural Roads Construction and Rehabilitation activities Using the Leopold Matrix

Project components	Environment Components																				
	Physical Environment							Biological Environment					Social Environment								
	Soil Erosion	Soil Quality	Surface H2O Quantity	Surface H2O Quality	Ground H2O Quantity	Air Quality	Noise	Natural Forest	Biodiversity	Migratory Species	Disease Vectors	Wetland	HIV/AIDS	Physical Hazard	Cultural Values	Employment	Gender Relationship	Equity	Indigenous People	Cultural Resources	Community stability
1. Planning & Design -Survey																+	+	+	+		
2. Implement	-	-		-				-	-	-						+	+	+	+	-	
• Bush Clearance																					
• RD leveling	-					-	-		-	-				-		+	+		+		
• Gullies filling	+	+	+	+				+	+	+	+	+				+	+	+	+		
3. Operation	-	-						-	-	-			-	-	-	-	-		+		+
• Movement of vehicles																			-		-
• Transportation of charcoals	-							-	-	-			-			+			+		+
• Movement of people	-								-	-			-				+	+	+		
4. Decommissioning	+	+				-	-		-	-						+			+		
• Break- surface																					
• Filling gullies	+	+						+	+	+						+	+		+		
• Trees planting	+	+		+	+	+		+	+	+						+	+	+	+		

## CASE STUDY 2: ENVIRONMENTAL REVIEW OF RURAL WATER SUPPLY AND SANITATION PROJECTS IN BOMA TOWN

### INTRODUCTION

This case study reviewed water supply projects in Boma town, as well as the sanitation situation. Water in the town is supplied from boreholes drilled mainly by UNICEF and the Catholic Diocese of Torit (DOT). The existing boreholes were constructed about 10 years ago. Much more recently, an NGO known as Joint Aid Management has entered the scene and plans to drill 25 additional boreholes throughout the Boma Payam. While the boreholes mainly provide water for domestic purposes, a river that passes through the town provides water for livestock. A water spring exists high up in the Boma plateau and this may be tapped in the future to provide water to the town. Most of the existing boreholes are not functional due to lack of spare parts, lack of/or poor maintenance and community participation in the water supply projects.

### Presentation of the Environmental Review of the Water Supply and Sanitation Activities in Boma Town Using the Leopold Matrix

Project components		Environment Components													
		Physical Environment						Biological Environment			Social Environment				
		Soil erosion/Stability	Surface water quality	Surface water quantity	Ground water quality	Ground water quantity	Migratory Species	Disease Vectors	Public Health	Community stability	Cultural Values	Employment	Gender Relationship	Equity	Indigenous People
Planning and Design	Geological Survey	1-	0	0	0	0	0	0	0	0	0	1+	0	0	0
	Mobilization	2-	0	1-	0	0	0	0	0	1-	0	2+	1+	0	1+
Construction Phase	Borehole drilling	1-	1-	0	0	1-	1-	0	0	0	0	2+	0	0	1+
	Spring pipe construction	1-	0	2-	0	1-	2-	0	3+	1+	0	2+	0	0	1+
	Sand dam construction	1+	0	2+	0	1+	2+	0	1+	1+	0	2+	0	0	1+
	Rain water harvesting (roof)	0	0	0	0	0	0	0	2+	1+	0	1+	1+	0	1+
	Latrine construction	2-	2-	0	1-	0	0	2+	2+	2+	2-	1+	0	0	1+
	Testing water quality	0	0	0	0	0	2-	2-	2+	1+	0	1+	0	0	1+
Operation Phase	Training														
	Pump mechanics/ VLTC	0	0	0	0	0	0	0	3+	0	2+	2+	1+	1+	2+
	Management team	0	0	0	0	0	0	0	3+	1+	1+	2+	1+	1+	2+
	Hygiene promotion	0	0	0	0	0	0	0	3+	2+	2+	2+	1+	1+	2+
	Operation & maintenance (slab construction)	1-	1-	0	0	0	0	0	2+	2+	2+	3+	1+	1+	2+
	Minor repairs Cylinders By laws/regulations	0	0	0	0	2+	0	0	2+	2+	1+	2+	1+	0	1+
Decommissioning	Unused construction materials	3-	3-	0	3-	0	0	3-	2-	1-	0	1+	0	0	2-
	Excavated soil	3-	2-	0	0	0	0	0	1-	0	0	1+	0	0	1+
	Ceiling of the BH	1-	1-	0	0	0	0	0	0	0	0	1+	0	0	1+
	Covering used latrines	1-	0	0	1-	0	0	1+	1+	1+	0	1+	0	0	1+

#### Key

No Impact	1	Low impact
- Adverse impact	2	Medium impact
+ Positive impact	3	High impact

## CASE STUDY 4: ENVIRONMENTAL REVIEW OF SMALL SCALE HEALTH CARE FACILITIES IN BOMA TOWN

### INTRODUCTION

This case study is based on two healthcare facilities in Boma Town. The first was constructed in the year 2003 by an NGO known as Sudan Medical Care and it was the very first to provide medical care in the whole of Boma town and the surrounding villages. It is a very modest facility, constructed as one block having several rooms for the various activities such as the consultation room, a laboratory, a room for the traditional birth attendants and other support offices. Wastes are disposed of in a pit that was previously a pit latrine that was never properly decommissioned. The facility does not have an adequate supply of water, which comes from a nearby borehole that occasionally breaks down. The second health facility was constructed in 2004 by Medical Relief International (MERLIN). The Merlin Centre is more organized and modern with appropriate waste disposal facilities.

### Presentation of Environmental Review Report on Small Scale Health Care Facilities using the Leopold Matrix

Environment components		Physical Environment							Biological Environment					Social Environment												
		Agricultural lands	Soil erosion/stability	Soil Quality	Surface H2O Quality	Surface H2O Quantity	Ground H2O Quantity	Air Quality	Noise	Natural forest	Protected Areas	Biodiversity	Aquatic Ecosystem	Wetlands	Migratory species	Disease Vectors	Public Health	Physical hazards	Cultural Values	Employment	Gender Relationship	Equity	Indigenous Peoples	Resettlements	Cultural resources	Community Stability
Planning & Design	Site selection																									
	H2O source location																									
	Construction materials site																									
	Roads																									
	Qualified human resources																								L	L
Construction & Maintenance	Site clearance		M	H	M	L	H	L	L			M				L										
	Site leveling			H		H					L															
	Pit latrine digging			H		H																				L
	Borehole drilling		L	H	M																					L
	Local construction materials sourcing		H	H	H					H		M	M			H	M	L								
Operations	Sourcing of medical supplies																									
	Medical Waste Mgt				M						M	L			H	M	M									M
	Abstraction of H2O (borehole)		L	M	L		M								M											
	Use of latrines						M	L							M	M										
	Management of solid wastes														M	M										
	Medical personnel recruitment																									

Environment components		Physical Environment							Biological Environment					Social Environment												
Project components		Agricultural lands	Soil erosion/stability	Soil Quality	Surface H2O Quality	Surface H2O Quantity	Ground H2O Quantity	Air Quality	Noise	Natural forest	Protected Areas	Biodiversity	Aquatic Ecosystem	Wetlands	Migratory species	Disease Vectors	Public Health	Physical hazards	Cultural Values	Employment	Gender Relationship	Equity	Indigenous Peoples	Resettlements	Cultural resources	Community Stability
Decommissioning	Toilets/Dust pit closure							L							M	M	M									
	Replanting & reseeded	L	L	L	L							L	L													
	Destruction of non permanent buildings																	L								L

KEY: L= Low; H= High; M= Moderate

## COMMENTS/OBSERVATIONS ON THE ENVIRONMENTAL REVIEW REPORTS

All the groups did a good job in preparing their environmental review reports, as usual; it took a while before they fully understood how to go about doing the task. Deciding and scoring identified impacts was a problem for most of the groups who allocated high scores for the adverse impacts identified. They were advised by the facilitator to consider the issue of scale in their scoring systems or else certain impacts will look significant when they are actually not. The same problem applied to the positive impacts identified which were assigned high scores, while the real positive impact was negligible.



# PRESENTATION OF MITIGATION AND MONITORING PLANS FOR THE ADVERSE IMPACT IDENTIFIED BY THE ENVIRONMENTAL REVIEWS

Participants were asked to identify two or three impacts from the environmental review reports that they considered most significant and prepare mitigation and monitoring plans for them. The following are presentations on this exercise.

## CASE STUDY I: MITIGATION AND MONITORING PLAN IMPACTS OF RURAL ROADS IMPROVEMENT PROJECTS

S/ No	P. Activity	Impact	Mitigation measure	Indicators	Monitoring	Frequency	Costs
1	Bush clearance	<ul style="list-style-type: none"> <li>• Soil erosion</li> <li>• Biodiversity loss</li> <li>• Lowering of surface water quality</li> <li>• Reduction in underground water quantity</li> </ul>	<ul style="list-style-type: none"> <li>• Tree and grass planting and grass</li> <li>• Side drainage</li> <li>• Cambering</li> <li>• Culverting</li> <li>• Gabions construction</li> </ul>	<ul style="list-style-type: none"> <li>• Sheet erosion</li> <li>• Gully erosion</li> <li>• Rill erosion</li> <li>• Increase in sediments loads</li> <li>• Decrease in water yield from boreholes &amp; springs</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring how trees and grass are establishing</li> <li>• How the gully is filling up</li> <li>• Reduction in gully size</li> </ul>	More frequent at early stages & after the rains	To be incorporated at the design stage
2	Movement of vehicles and people	<ul style="list-style-type: none"> <li>• Soil erosion</li> <li>• Traffic accidents</li> <li>• HIV/AIDS increase</li> <li>• Degradation of community stability</li> </ul>	<ul style="list-style-type: none"> <li>• Construction of bumps &amp; traffic signs</li> <li>• Creation of awareness on HIV/AIDS</li> <li>• Creation of communal institutions</li> </ul>	<ul style="list-style-type: none"> <li>• Potholes</li> <li>• Traffic accidents &amp; deaths</li> <li>• Crimes rates</li> <li>• Low productivity</li> </ul>	<ul style="list-style-type: none"> <li>• Low rates of accidents</li> <li>• Ensure bumps are in place</li> <li>• Traffic laws followed</li> <li>• Records from health facilities</li> </ul>	Quarterly	

## CASE STUDY 2: MITIGATION AND MONITORING PLAN ON IMPACTS OF RURAL WATER SUPPLY AND SANITATION PROJECTS

### IMPACT: HEALTH HAZARDS

	Mitigation	Responsibility	Indicator for monitoring	Monitoring methods used	Means of verification	Monitoring cost	Problems to be monitored	Monitoring dates
<b>Design</b>	Identify the components	SRRC & The community	Project proposal	Checklist	Visit the site	2.5%		Every two months at the suspected water point
<b>Construction stage</b>	Change the site Water treatment	RWD NGO Community	Colour Smell Taste	Physical Chemical Biological	Bad smell High turbidity Lab results	Moderate cost < 1%	Water borne diseases Poisoning	After drilling and every two months Testing every water source
<b>Operation stage</b>	Training community (awareness)	RWD NGO Local Community	Good practices Number of people training	Observations Reports from Health Centers (on water borne Diseases)	No. of cases reported in Health Center (Statistics)	< 0.8%		Every six months
<b>Decommissioning stage</b>	Ceiling of borehole and leveling	Community and stakeholder	Re-vegetation of the area	Take photographs and sites visits	Sound environment	<0.2%		At the end of the project

### CASE STUDY 3: MITIGATION AND MONITORING PLAN FOR SMALL SCALE CONSTRUCTION PROJECTS

Impact	Mitigation Measure	Monitoring indicators	Methods of monitoring	Means of verification	Responsible persons	Monitoring interval	Cost
Deforestation	Reforestation	Trees growth	Site visits	Reports	Community	Every two weeks (at early stages, 1 month at later stage)	Moderate
	Site Selection	Number far less forested	Approval site visits	Site layout drawing	Local authorities	Design stage planning, * stage	Moderate
	Establish Energy woodlots	Trees growth	Approval site visits	Reports, photos	Forest rangers	Design stage	Moderate
	Use alternative materials	Stones, stabilized bricks	Approval site visit	Building specifications	Town planners, inspectors	Design stage and constructing stage	High
Soil erosion	Planting trees and grass	Trees growing	Site visits	Reports (photos)	Local authority	Weekly	Low
	Proper drainage	Rate of drainage	Inspections	Reports	Local authority	Bi monthly	Moderate
	Rain water harvesting	Gutters Storage tanks Dams	Approval	Site visits	Engineer inspectors	Design and construction stage	High
Public health	Back filling of borrow pits	Filled up borrow pits	Site visits	Reports	Local authority Community	Monthly	Low
	Reseeding	Growing of plants	Observation	Reports (photos)	Forest rangers	Initially Bi-monthly then lesser	Low
	Site select	Far from settlement	Approval	Site plannings drawings	Town planners	Design stage	Low
	Waste disposal	Properly disposed	Site visit	Reports	Public health officers	Weekly	Moderate
	Waste site protection	Waste site tencode	Site visit	Reports	Public health officers	Monthly	Moderately low
	Landscaping	Planting grass	Observation	Photos, reports	Landscape designers (drain common)	Monthly	Low

## CASE STUDY 4: MITIGATION AND MONITORING PLAN ON THE IMPACTS OF HEALTH CARE FACILITIES

### Mitigation Plan on the Impact of Accumulation of Medical Waste

	Mitigation	Who	Where/When	How Much
Design	Arch drawing of incinerators and pits	Project designer	At operation site/ Initial stage	Inclusive in the budget
Construction	Implementation of Arch design	Contractor	At the selected site/ Operation Initial stage	Inclusive in the budget
Operation	Adequate disposal of the waste	Specified and assigned personnel	Installation site/As wastes accumulates	Inclusive in the budget
Decommissioning	Pits/incinerators	Admin. & P.H.O	At the site/ unfunctional stage	Inclusive in the budget

### Monitoring Program for the Impact on Accumulation of Medical Wastes

Monitoring Indicator	When	How Often	Who	How Much
<ul style="list-style-type: none"> <li>• Full combustion of waste</li> <li>• Complete disposal of unburnt metals</li> <li>• Constant covering of pit holes</li> </ul>	At operational stage	So often as necessary or daily	Specified and assigned medical personnel	Inclusive in the initial budget

### Impact: Mitigation Table for the Impact on Serious Diseases Outbreak

	Mitigation	Who	Where/When	How Much
Design	Designation of the health center Comp.	Surveyor /P. Designer	At operational site/ Initial stage	Inclusive in the budget
Construction	Setting of the fence/w. tank	Construction/Engines	At the Op. site/ Setting stage	Inclusive in the budget
Operation	Adequate water distribution	Administrator	At the site/ Operation time	Inclusive in the budget
Decommissioning	Boreholes/Spring materials	Admin. & Engineer	At the site/ Ceased to function	Provision from the initial budget

### Monitoring Table for the Impact on Serious Disease Outbreaks

Monitoring Indicator	When	How Often	Who	How Much
<ul style="list-style-type: none"> <li>• Rate of water flow</li> <li>• Congestion at water point</li> <li>• Water distribution</li> <li>• Borehole management</li> </ul>	At operational stage	So often or constantly	Admin. & Community leaders	No budget required

## **COMMENTS ON THE MITIGATION AND MONITORING PLANS**

The participants displayed a good understanding of how to prepare mitigation and monitoring plans for adverse impacts identified, but a few observations were made such as the need to be explicit about mitigation and monitoring indicators and having measurable parameters. An example of this was noted in several of the groups where reforestation and establishment of energy woodlots had been identified as mitigation measures, and the indicator for the two had been identified as tree growth. The facilitator clarified that a better indicator would be the number of trees planted and/or acreage that had been reforested or put under energy woodlots. A mismatch between impacts and indicators was also identified in some cases and this was pointed out to the participants.

# CONCLUSIONS, RECOMMENDATIONS AND WAY FORWARD

1. The training course in EIA/ESD was well received by the participants. Despite the hot weather and a few logistical problems such as the prevailing drought and the resultant water shortage problems in Boma, the participants remained lively and active throughout the training, making contributions all along.
2. The first STEP training course had participants of excellent backgrounds drawn from different disciplines. This enabled them to bring their different experiences and share with the rest of the participants, further enriching the training. Such a system and criteria for selection should be maintained, they noted.
3. The participants expressed a desire to have a forum in which they would continue sharing their newly acquired skills in EIA and ESD. The forum would comprise of the trainees from all the training courses conducted in EIA/ESD in Southern Sudan since 2004.

Benefits of such a forum were enumerated as:

- Help foster cooperation among EIA participants in Southern Sudan.
  - Facilitate sharing of experiences and challenges faced during the implementation of the EIA skills.
  - Enrich participants on how members were able to overcome challenges while implementing EIA and other environmental programs and problems.
  - Facilitate dissemination of skills learned to the wider community in Southern Sudan for the training courses to be effective.
  - Help in maintaining enthusiasm and interest in EIA.
  - In future, get formally incorporated as a sub-group within the National/Regional committee on Environment in Southern Sudan.
4. As a follow up, the USAID/Sudan Field Office should support pilot development projects that can be linked to EIA and implemented by some of those who have attended EIA/ESD courses as a way of further developing the skills of those trained. The projects will assist in awareness building within all participating agencies and among the communities for whom the projects are developed.
  5. Sharing of information with participants e.g. training manuals, hand-books and reports that can widely be disseminated to NGOs, government ministries/departments and the six training centers (Fisheries, Livestock, and Agriculture, etc.) to enable trainers in these institutions to incorporate EIA/ESD in their training programs. This would help forge collaborative working relationships between and among the different government departments, NGOs, and CBOs.
  6. Duration of training should be extended if possible from five days to ten days to allow more coverage of this most important topic.

7. More participants from the government sector (e.g. SRCC) to be invited for the training courses to enable them monitor projects at the local level e.g. Payam and County Levels. Not all areas in Southern Sudan are covered by NGOs and therefore the need to have participants from the government sector is crucial.
8. More detailed EIA training courses should be conducted to impart more skills among the Southern Sudanese professionals.
9. Participants of STEP training courses should ensure that EIA is integrated and institutionalized in all sectors of Government and among the NGOs and CBOs.
10. The media should be engaged to disseminate EIA and ESD principles and skills in the whole of Southern Sudan. Talks, seminars, interviews and meetings with the press about the training, its importance and why it is necessary should be held. This would arm more people with skills needed in decision-making during this critical period of rehabilitation of Southern Sudan.
11. A Website containing information about the EIA/ESD training courses done in Southern Sudan and names and contacts of those who attended should be established.
12. Study tours to neighboring countries should be organized for some of the participants so that they can learn from others how they were implementing EIA regulations

# CLOSING CEREMONY AND PRESENTATION OF CERTIFICATES

By Mr. John Boya – Executive Director, Pibor County

Once again, Mr. Boya acknowledged the good work that USAID was doing in supporting capacity building activities in Southern Sudan and in the establishment of Boma Wildlife Training Centre. He thanked the participants for taking their time to learn about environmental management issues and noted that their skills will be useful in the reconstruction and development of their country. He further challenged them to disseminate what they had learned to others in the areas that they came from. After giving a brief speech, he then awarded certificates to the participants and closed the workshop officially.

# ANNEX I: USAID/SUDAN TRANSITIONAL ENVIRONMENT PROGRAM (STEP) CASE STUDIES

## CASE STUDY I: IMPACTS OF RURAL ROADS CONSTRUCTION AND REHABILITATION PROJECT ACTIVITIES

### INTRODUCTION

This case study site is located along the road from Boma town to Lokichogio town in Kenya, which is the main access road in an area that is quite remote. The road was constructed in the mid 1990s in order to allow for the transportation of goods and relief food from Lokichogio town to several towns along this route. Since the time it was constructed, there have been little maintenance or rehabilitation activities and is currently in very poor condition. The minimal rehabilitation and/or maintenance work done has been through food for work arrangements. Over the years certain sections of this road have deteriorated extensively, thus rendering them impassable. One such section is a 3 km stretch as you approach Boma town from Lokichogio. This necessitated the opening of another road as a by pass through food for work activities.

Food for work road construction activities are at times quite basic and many of them do not incorporate sound road engineering design principles during construction activities. This leads to a rapid deterioration of the condition of the road. The situation is made worse by the fact that regular maintenance is not provided for, nor is the responsibility for doing so clear. Roads opened through food for work efforts may entail marking of the designated path of the road and clearing of vegetation, especially the small trees and shrubs identified on the path. Repeated use of the road affects the vegetative cover, and what was once a track becomes a road.

While road construction and rehabilitation projects confer lots of benefits to the local communities they serve, they have the potential to cause many adverse environmental impacts such as severe erosion and gulleys, opening up of remote areas leading to increased exploitation of forests resources, creation of borrow pits that form ideal breeding grounds for mosquitoes and other disease vectors, and increased movement and interaction of local communities with outsiders which could cause increases in HIV/AIDS infections.

The purpose of this case study is to illustrate to the course participant examples of environmental impacts caused by road construction and rehabilitation activities, and also how these adverse impacts could be minimized or prevented. The environmental review exercise will include both physical impacts (e.g. loss of biodiversity, soil erosion occurrence, land degradation, etc.) and socio-economic impacts (e.g. creation of employment opportunities, transportation of goods, access to health centers and schools, etc.)

### CASE STUDY SITE BACKGROUND NOTES

**Note:** These case studies have been generated based on information that is sometimes conflicting or incomplete. If any participant has information that adds, corrects or presents another picture of the situation, please inform the course facilitators and the case study working group as soon as possible.

**Caution:** During the discussions with stakeholders, please avoid to raise any expectations (or fears) that the activities described in the case study will be implemented or otherwise.

## GENERAL INFORMATION

**Project Location:** The project is located Boma town, Pibor County, Jonglei State of Southern Sudan.

**Climate:** The mean annual rainfall varies between 1,430mm to 603mm. Rainfall is highest in the north and lowest in the south. The rainy season falls between April and November with peaks during the months of August and September and lowest between December and March. The mean monthly temperatures are 29.2 degrees Centigrade during the dry season and 27.2 degrees Centigrade during the wet season. Relative humidity is highest during the rainy season.

**Vegetation and Biodiversity:** The Eastern part of Boma National Park and the surrounding areas are covered with woodlands dominated by *Combretum* and *Ficus Spp.* In the area around isolated hills in the flat plains are dense thickets dominated variously by *Ziziphus spp.*, *Acacia seyal*, *A. zanzibarica*, and *Acacia drepanolobium* among others. There are also grass patches of *Hyperhenia*, *Penisetum*, *Sporobolus* and *Echinochloa*

Past censuses in the park have recorded the white-eared Kob that is migratory, Lesser Eland, the Oribi, Reedbuck, Roan antelope, Mangalla gazelle, the Tiang, and Lelwe Hartbeeste, among other plains game. Poaching is common in this area and happens all year round facilitated by the ready availability of small arms used for poaching. The dry season count of the white-eared Kob was 524,440 in 2002, while it was 849,365 in 1980, indicating a significant decline.

**Topography, Soils and Drainage:** Boma National Park is predominantly flat with scattered isolated inselbergs to the east and southern parts of the Park. The Maruwa Hills and the Boma Escarpment are the exception. Most of the plains are dominated by cotton clay soils that expand when saturated with rainwater during the wet season and shrink and crack in the dry season. On the slopes and the foot of the hills, the soils are laterite and sandy.

Several small streams and rivers originate from the Boma Plateau and traverse the area and Boma National Park. Fraxell (1983) stated that the entire region is a watershed that ultimately empties into the Nile River via the Sobat River.

**Population and Demography:** The population in Pibor County is estimated to be 97,000 persons in four Payams (Boma, Meound, Maruwa and Kassingor). The case study area is in Boma Payam.

There are five main ethnic groups: the Murle (Boma agriculturalists), the Maruwa pastoralists, Jie Anyuak, Suri (Kichipo) and displaced populations who are predominantly Dinka. The Jie and Maruwa Murle who are agriculturalists occupy the Boma Mountain on the western side while the Murle Boma and Bale Suri (Kichipo) who are agriculturalist occupy the Boma Plateau. Traditionally, the Jie cultivate during the rainy season and herd their cattle across the savannah in search of good grazing lands and water points as the season changes. Beyond the plateau, towards the east and the Ethiopian borders live the cattle keeping clans of Suri (Kichipo). The Anyaul communities who are agro-pastoralists and agriculturalists occupy the northern and eastern parts of the park respectively. Despite the diversity of the ethnic community groups that live in and around Boma N. Park, they have strong links between the different ethnic groups and within clans of each ethnic group.

**Land Use:** All the ethnic groups in Boma keep sheep, goats and cattle. However the three communities of Murle Ngaram, the Suri and the displaced Dinka mainly depend on crop farming for their livelihood. Livestock is kept under both semi nomadic and sedentary form of management. While the Jie and the other sections of the Murle ethnic group keep large herds of cattle, only some of the members of the Kachipo and Dinka communities rear cattle in small numbers around their settlements. Small flocks of chicken are almost found in every home of all the communities in Boma, except the Murle cattle owners who normally do not eat chicken. The Murle Ngalam and the Kachipo of Mewun and Runit used to own a substantial population of sheep and goats before the war, but today, this has dwindled drastically due to cattle rustling and other conflict-related reasons. The Murle Ngaram now rear about 25% of the number of cattle they used to before the war.

## **PURPOSE OF RURAL ROADS CONSTRUCTION AND REHABILITATION PROJECTS**

The purpose of constructing and rehabilitating the Boma - Lokichogio road is to improve on transport and communications between the two towns, thereby helping increase access to markets, social services and also allow for supply and distribution of relief food to Boma and the surrounding areas.

Sustainability of road construction and rehabilitation projects mainly depends on the following considerations:

- Training of local road rehabilitation and maintenance technicians, and local communities on “good practices” for the maintenance of rural access roads.
- Providing the local communities with the necessary tools for proper road rehabilitation and maintenance.
- Establishment of a road monitoring and maintenance program for ensuring timely rehabilitation and maintenance of roads (especially after the rains), and training of local communities on how to run the monitoring program for community managed access roads.

## **CASE STUDY REPORT PREPARATION**

### **THE COURSE PARTICIPANTS WILL DO THE FOLLOWING:**

- Conduct a detailed survey of the existing environmental conditions (baseline) in the project area, noting those environmental parameters that are likely to be impacted by road construction and rehabilitation activities (e.g. creation of borrow pits, surface run off);
- Identify stakeholders to be consulted during the process of carrying out an environmental review of the project;
- Identify both positive and negative impacts of the road construction and rehabilitation activities during the following stages of the project cycle (i) planning and design (ii) construction (iii) operation (iv) decommissioning phase;
- Note which of the adverse impacts identified are significant, indicating reason for considering them significant;
- Prepare, an environmental review report for road construction and rehabilitation project activities using a Leopold Matrix format to be presented to the rest of the group;
- Pick on three potential adverse impacts that the group considers to be most significant and prepare an environmental monitoring and mitigation plan that is appropriate for the type and level of the potential adverse environmental impacts identified (Sample formats for the Leopold Matrix and the Environmental Mitigation and Monitoring plan will be provided to the participants).

### **FACILITATOR:**

Ephantus Wahome, Regional Environmental Advisor, USAID/REDSO/ESA, Nairobi.

## CASE STUDY 2: IMPACTS OF WATER SUPPLY AND SANITATION PROJECTS IN BOMA TOWN

### INTRODUCTION

Water supply projects in Boma town have been undertaken by two players, namely UNICEF and the Catholic Diocese of Torit (DOT) through the provision of boreholes. The existing boreholes were constructed about 10 years ago. Joint Aid Management (JAM), an NGO, started its operations in Boma Town in 2004 and plans to drill 25 additional boreholes throughout the Boma Payam. While the boreholes mainly provide water for domestic purposes, a river that passes through the town provides water for livestock. A water spring exists high up in the Boma plateau and this may be tapped in future to provide water to the town.

Most of the boreholes that exist in Boma town are not functional due to lack of spare parts, lack of/or poor maintenance and community participation in the water supply projects. Out of ten boreholes drilled by UNICEF since 1998, only three are functional, while only one out of four drilled by the DOT is functional. The few boreholes that are still operational are characterized by very low water yields, meaning that the community is grossly under provided with water. None of the boreholes has been rehabilitated since installation.

Most of the water supply projects in Boma town did not have a sanitation component, increasing the risk of contamination of the existing water sources. It is estimated that only about 25% of the population of Boma town are using pit latrines, and where the latrines exist, they are located very close to the boreholes. There is therefore a possibility of contamination of borehole water by liquid human waste through underground seepage.

This case study has five sites that are located within Boma Township. The sites include (i) Marlin Hospital (one drilled by UNICEF and other by JAM), (ii) Market Zone, (iii) CRS School area, (iv) Air strip area, and, (v) Jie Community borehole.

The purpose of this case study is to demonstrate to the course participants' examples of environmental impacts of water supply and sanitation activities. The environmental review will include both physical impacts (e.g. soil erosion) and socio-economic impacts (e.g. creation of employment opportunities, reduction of water-borne diseases, etc.).

### CASE STUDY SITE BACKGROUND NOTES

**Note:** These case studies have been generated based on information that is sometimes conflicting or incomplete. If any participant has information that adds, corrects or presents another picture of the case study situation, please inform the course facilitators and the case study working group as soon as possible.

**Caution:** During the discussions with stakeholders, avoid raising any expectations (or fears) that the activities described in the case study will be implemented or otherwise.

### PURPOSE OF WATER SUPPLY AND SANITATION PROJECTS

Water supply activities are meant to increase access to safe and clean water for domestic use to the people of Boma town. The population of the town has been growing. There is therefore a need to improve and increase the water supply so as to meet the ever-rising demand. The following are the main reasons for water supply and sanitation projects:

- To improve the health and well being of the population. Adequate and clean supplies of water play a critical role in ensuring people do not suffer from diarrheal and other water-borne diseases;
- To help improve the general hygiene and sanitation of the people;
- To reduce the incidence of diseases and mortality rates especially among children who are most affected;

- To reduce the time spent on doing daily chores of fetching water. This affects women and children more as the time spent on this activity can be used for other productive activities;
- To reduce the incidence of contamination of water resources (both ground and surface) with fecal matter containing disease causing pathogens.

The benefits that accrue from the implementation of water and sanitation projects can only be realized if sustainability of such projects is assured. Factors that ensure sustainability include: capacity to manage, maintain and repair the boreholes as well as community participation. An integration of water supply with sanitation activities further enhances the realization of such benefits.

## GENERAL INFORMATION

**Project Location:** The project area is located in Boma town, Pibor County, Jonglei State of Southern Sudan.

**Climate:** The mean annual rainfall varies between 603mm to 1,430mm. Rainfall is highest in the north and lowest in the south. The rainy season falls between April and November with peaks during the months of August and September and lowest between December and March. The mean monthly temperatures are 29.2<sup>o</sup> C during the dry season and 27.2<sup>o</sup> C during the wet season. Relative humidity is highest during the rainy season.

**Vegetation and Biodiversity:** The Eastern part of Boma National Park and the surrounding areas are covered with woodlands dominated by *Combretum* and *Ficus Spp.* In the area around isolated hills in the flat plains are dense thickets dominated variously by *Ziziphus spp.*, *Acacia seyal*, *A. zanzibarica*, and *Acacia drepanolobium* among others. There are also grass patches of *Hyperbenia*, *Penisetum*, *Sporobolus* and *Echinochloa*

Past censuses in the park have recorded the white-eared Kob that is migratory, Lesser Eland, the Oribi, Reedbuck, Roan antelope, Mangalla gazelle, the Tiang, and Lelwe Hartbeeste, among other plains game. Poaching is common in this area and happens all year round facilitated by the ready availability of small arms, which are used for poaching. The dry season count of the white-eared Kob was 524,440 in 2002, while it was 849,365 in 1980, indicating a significant decline.

**Topography, Soils and Drainage:** The topography of Boma National Park is mostly flat with scattered isolated inselbergs to the east and southern part of the Park. The Maruwa Hills and the Boma Escarpment are the exception. Most of the plains are dominated by cotton clay soils that expand when saturated by rainwater during the wet season and shrink and crack in the dry season. On the slopes and the foot of the hills, the soils are laterite and sandy.

Several small streams and rivers originate from the Boma Plateau and traverse Boma National Park and the surrounding areas. Fraxell (1983) stated that the entire region is a watershed that ultimately empties into the Nile River via the Sobat River.

**Population and Demography:** The population in Pibor County is estimated to be 97,000 persons in four Payams (Boma, Meound, Maruwa and Kassingor). The case study area is in Boma Payam

There are five main ethnic groups: the Murle (Boma agriculturalists), the Maruwa pastoralists, Jie Anyuak, Suri (Kichipo) and displaced populations who are predominantly Dinka. The Jie and Maruwa Murle who are agriculturalists occupy the western side of the Boma Mountain, while the Murle Boma and Bale Suri (Kichipo) who are agriculturalist occupy the Boma Plateau. Traditionally, the Jie cultivate during the rainy season and herd their cattle across the savannah in search of good grazing lands and water points as the season changes. Beyond the plateau, towards the east and the Ethiopian borders live the cattle keeping clans of Suri (Kichipo). The Anyaul communities who are agro-pastoralists and agriculturalists occupy the northern and eastern parts of the park respectively. Despite the diversity of the ethnic community groups that live in and around Boma N. Park, they have strong links between the different ethnic groups and within clans of each ethnic group.

**Land Use:** All the ethnic groups in Boma keep sheep, goats and cattle. However the three communities of Murle Ngaram, the Suri and the displaced Dinka mainly depend on crop farming for their livelihood. Livestock is kept under both semi nomadic and sedentary form of management. While the Jie and the other sections of the Murle ethnic group keep large herds of cattle, members of the Kachipo and Dinka communities rear cattle in small numbers around their settlements. Small flocks of chicken are almost found in every home of all the communities in Boma, with the exception of the Murle cattle owners who normally do not eat chicken. The Murle Ngalam and the Kachipo of Mewun and Runit used to own a substantial population of sheep and goats before the war, but have dwindled drastically due to cattle rustling and other conflict related reasons lately. The Murle Ngaram now rear about 25% of the number they used to before the war.

### **CASE STUDY REPORT PREPARATION**

The course participants will do the following:

- Conduct a detailed survey of the existing environmental conditions (baseline) in the project area, noting those environmental parameters that are likely to be impacted by water supply and sanitation projects;
- Identify stakeholders to be consulted during the process of conducting an environmental review of the water supply and sanitation project activities;
- Identify both positive and negative impacts of the implementation and rehabilitation of water supply and sanitation projects activities during the following stages of the project cycle (i) planning and design, (ii) construction, (iii) operation, (iv) decommissioning phase;
- Note which of the adverse impacts identified are significant, indicating reasons for considering them significant;
- Prepare an environmental review report for water supply and sanitation project activities using a Leopold Matrix format to be presented to the rest of the group;
- Pick on three potential adverse impacts that the group considers to be most significant and prepare an environmental monitoring and mitigation plan that is appropriate for the type and level of the potential adverse environmental impacts identified (Sample formats for the Leopold Matrix and the Environmental Mitigation and Monitoring plan will be provided to the participants).

### **FACILITATOR:**

Jane Kahata, EIA consultant, USAID/Sudan Transitional Environment Program

## CASE STUDY 3: IMPACTS OF SMALL SCALE BUILDING CONSTRUCTION PROJECTS AND ASSOCIATED ACTIVITIES

### INTRODUCTION

There is a heightened level of activity in the building construction sector as the people of Southern Sudan embark on the rehabilitation of buildings damaged during the war. New buildings are also being constructed to provide office space, business premises, residential houses and social facilities such as schools and hospitals. These activities will continue to increase as more and more refugees and Internally Displaced Persons (IDPs) continue to return.

The building construction sector places certain constraints on the environment and natural resources that usually provide the raw materials needed such as bricks, sand and timber among others. One good example of this is the growing demand for construction bricks that are made from soil in many parts of Southern Sudan. Where brickmaking activities are high, as is currently the case in Yei town, many small borrow pits have been created leading to the establishment of suitable conditions for the breeding of mosquitoes and other disease vectors. Bricks are baked for a period of seven days, within which period a steady supply of firewood needs to be provided. This may lead to overexploitation of forest resources. Vegetation is also cleared to make way for new building construction, and this depending on the size of the land to be cleared, which could lead to more environmental impacts, such as soil erosion.

This case study is located in Boma Township, where buildings for schools, health clinics and residential houses are being constructed. The participants will visit a case study site where an office block and residential houses for the staff of Marlin Health Center are being constructed. The main office block is being constructed with bricks made from sand that is obtained locally, and cement imported from Kenya and then sun dried, while the kitchen block and some of the ancillary facilities will use bricks made from clay soils. The staff accommodation will be in the form of tents on a floor slab made of cement, sand and gravel. Construction started this year and should be completed by end of this year or by early next year.

The bricks made of clay soils will be obtained from a private entrepreneur who operates within the town. Participants will also visit the brickmaking site to look at the various activities involved in brickmaking. The brickmaking site is characterized by presence of bricks undergoing the various stages (freshly molded, those drying under the sun, those assembled in readiness for firing and some that have gone through the entire process and are ready for sale. Water for making the bricks is obtained from a nearby river, which had dried up during the site visit.

The purpose of this case study is to illustrate to the course participants examples of environmental impacts that are caused by small-scale buildings, construction projects and the associated activities. Of importance in this case study are the cumulative impacts of small-scale building construction activities. The environmental review should include both the biophysical impacts (e.g. soil erosion, loss of biodiversity, etc.), and socio-economic impacts (e.g. creation of employment opportunities, generation of revenue, breeding opportunities for disease vectors, and better housing facilities, etc.).

### CASE STUDY SITE BACKGROUND NOTES

**Note:** These case studies have been generated based on information that is sometimes conflicting or incomplete. If any participant has information that adds, corrects or presents another picture of the case study situation, please inform the course facilitators and the case study working group as soon as possible.

**Caution:** During the discussions with stakeholders, please avoid raising any expectations (or fears) that the activities described in the case study will be supported or otherwise.

## PURPOSE OF BUILDING CONSTRUCTION PROJECTS AND ASSOCIATED ACTIVITIES

Small-scale building construction activities are meant to meet the increasing demand for housing and other social amenities within Boma Town. Certain components of the construction industry such as brickmaking also provide opportunities for private sector participation, generating jobs and income to the local population.

The sustainability of the small-scale building construction activities will mainly depend on the following considerations:

- Continued demand for housing by NGOs and private individuals;
- Availability of a steady and sustainable supply of the raw materials used in the building construction activities;
- The socio-economic well being of the local people, including those who are returning from other parts of Southern Sudan and from the neighboring countries.

## GENERAL INFORMATION

**Project Location:** The project area is located Boma town, Pibor County, Jonglei State of Southern Sudan.

**Climate:** The mean annual rainfall varies between 1,430mm to 603mm. Rainfall is highest in the north and lowest in the south. The rainy season falls between April and November, with peaks during the months of August and September and lowest between December and March. The mean monthly temperatures are 29.2 degrees Centigrade during the dry season and 27.2 degrees Centigrade during the wet season. Relative humidity is highest during the rainy season.

**Vegetation and Biodiversity:** The Eastern part of Boma National Park and the surrounding areas are covered with woodlands dominated by *Combretum* and *Ficus Spp.* In the area around isolated hills in the flat plains are dense thickets dominated variously by *Ziziphus spp.*, *Acacia seyal*, *A. zanzibarica*, and *Acacia drepanolobium* among others. There are also grass patches of *Hyperbenia*, *Penisetum*, *Sporobolus* and *Echinochloa*.

Past censuses in the park have recorded the white-eared Kob that is migratory, Lesser Eland, the Oribi, Reedbuck, Roan antelope, Mangalla gazelle, the Tiang, and Lelwe Hartbeeste, among other plains game. Poaching is common in this area and happens all year round facilitated by the ready availability of small arms used for poaching. The dry season count of the white-eared Kob was 524,440 in 2002, while it was 849,365 in 1980, indicating a significant decline.

**Topography, Soils and Drainage:** The topography of Boma National Park is mostly flat with scattered isolated inselbergs to the east and southern part of the Park. The Maruwa Hills and the Boma Escarpment are the exception. Most of the plains are dominated by cotton clay soils that expand when saturated with rainwater during the wet season and shrink and crack in the dry season. On the slopes and the foot of the hills, the soils are laterite and sandy.

Several small streams and rivers originate from the Boma Plateau and traverse the area and Boma National Park. Fraxell (1983) stated that the entire region is a watershed that ultimately empties into the Nile River via the Sobat River.

**Population and Demography:** The population in Pibor County is estimated to be 97,000 persons in four Payams (Boma, Meound, Maruwa and Kassingor). The case study area is in Boma Payam. The Boma Payam population is estimated to be 24,000 persons.

There are five main ethnic groups: the Murle (Boma agriculturalists), the Maruwa pastoralists, Jie Anyuak, Suri (Kachipo) and displaced populations who are predominantly Dinka. The Jie and Maruwa Murle who are agriculturalists occupy the Boma Mountain on the western side while the Murle Boma and Bale Suri (Kachipo) who are agriculturalist occupy the Boma Plateau. Traditionally, the Jie cultivate during the rainy season and herd their cattle across the savannah in search of good grazing lands and water points as the season changes. Beyond the plateau, towards the east and the Ethiopian borders live the cattle keeping clans

of Suri (Kachipo). The Anyaul communities who are agro-pastoralists and agriculturalists occupy the northern and eastern parts of the park respectively. Despite the diversity of the ethnic community groups that live in and around Boma N. Park, they have strong links between the different ethnic groups and within clans of each ethnic group.

**Land Use:** All the ethnic groups in Boma Payam keep sheep, goats and cattle. However the three communities of Murle Ngaram, the Suri and the displaced Dinka mainly depend on crop farming for their livelihood. Livestock is kept under both semi nomadic and sedentary form of management. While the Jie and the other sections of the Murle ethnic group keep large herds of cattle, members of the Kachipo and Dinka communities rear cattle in small numbers around their settlements. Small flocks of chicken are almost found in every home of all the communities in Boma, with the exception of the Murle cattle owners who normally do not eat chicken. The Murle Ngalam and the Kachipo of Mewun and Runit used to own a substantial population of sheep and goats before the war, but today, this has dwindled drastically due to cattle rustling and other conflict relating reasons. The Murle Ngaram now rear about 25% of the number they used to before the war.

### **CASE STUDY REPORT PREPARATION**

The course participants will do the following:

- Conduct a detailed survey of the existing environmental conditions (baseline situation) in the project area, noting those environmental parameters that are likely to be impacted on by small scale building construction and ancillary activities;
- Identify stakeholders to be consulted during the process of carrying out an environmental review of the small scale building construction projects and associated activities;
- Identify both positive and negative impacts of small scale building construction and associated activities during the following stages of the project cycle (i) planning and design (ii) construction (iii) operation (iv) decommissioning phase;
- Note which of the adverse impacts identified are significant, indicating reasons for considering them significant;
- Prepare, an environmental review report for building construction projects and associated activities using a Leopold Matrix format to be presented to the rest of the group;
- Pick on three potential adverse impacts that the group considers to be most significant and prepare an environmental monitoring and mitigation plan that is appropriate for the type and level of the potential adverse environmental impacts identified (Sample formats for the Leopold Matrix and the Environmental Mitigation and Monitoring plan will be provided to the participants).

### **FACILITATOR:**

Fiesta Warinwa, African Wildlife Foundation

## CASE STUDY 4: HEALTH CARE WASTES: GENERATION, HANDLING, TREATMENT AND DISPOSAL

### INTRODUCTION

Small-scale healthcare activities, such as rural health posts, immunization posts, reproductive health posts, mobile and emergency healthcare programs, urban clinics and small hospitals provide often critical healthcare services to individuals and communities that would otherwise have little or no access to such services. Such facilities generate healthcare wastes, and currently, little or no management of such wastes occurs in Africa. Training and supplies are minimal. The general practice is to dispose off healthcare wastes along with other types of solid wastes, or in peri-urban and rural areas, to dispose them without treatment in unlined pits. In some places, small hospitals and healthcare clinics may incinerate wastes in designated onsite incinerators, but often they are not operated properly. Unwanted pharmaceuticals and chemicals may also be dumped into the local sanitation outlet, be it in a sewage system, septic tank or pit latrine (Source: Environmental Guidelines for Small Scale Activities).

This case study is based on a health care facility constructed and managed by Sudan Medical Care, an NGO. The facility was constructed in the year 2003 and was the very first center to provide medical care in the whole of Boma town and the surrounding villages. It is staffed with one doctor and two clinical officers, a medical assistant and laboratory technician, who are all full-time employees. The facility is very modest, constructed as one block having several rooms for the various activities such as the consultation room, a laboratory, a room for the traditional birth attendants and other support offices. Wastes are disposed of in a pit that was previously a pit latrine that was never properly decommissioned. The facility does not have an adequate supply of water, which comes from a nearby borehole that occasionally breaks down.

Common ailments reported are malaria, respiratory infections, diarrhea diseases (typhoid, dysentery, guinea worm), sexually transmitted diseases, especially syphilis and gonorrhea, among other minor ailments. Much more recently, two cases of HIV/AIDS have been reported in Marlin. Low levels of personal hygiene contribute to the high prevalence of diarrheal diseases, while the high levels of STDs are thought to be caused by the long absence of health facilities in Boma and surrounding Payams leading to cross infections, non compliance of medication and the polygamous nature of many of the local people. The facility attends to about 60 patients during the wet season and 120 during the dry season.

The purpose of this case study is to demonstrate to the course participants examples of environmental impacts (positive and negative) that can be caused by healthcare facilities and the associated infrastructure. Of concern are the impacts that relate to the handling and disposal of medical wastes. The environmental review will include both biophysical impacts (e.g. soil erosion) and socio-economic impacts (e.g. creation of employment opportunities, improvement in the health of the people of Boma town, etc). Participants should especially focus on the systems that are in place for the management and disposal of healthcare wastes and sanitation issues within the hospital.

### CASE STUDY SITE BACKGROUND NOTES

**Note:** These case studies have been generated based on information that is sometimes conflicting or incomplete. If any participant has information that adds, corrects or presents another picture of the case study situation, please inform the course facilitators and the case study working group as soon as possible.

**Caution:** During the discussions with stakeholders, please do not raise any expectations (or fears) that the activities described in the case study will be implemented or otherwise. The purpose of the case studies is NOT to critique how the facility is being run but to learn from the exercise.

### PURPOSE OF SMALL SCALE HEALTH CARE FACILITIES

They are the frontline of defense against epidemics such as AIDS, malaria and cholera among others and a key component of any comprehensive health development program. The medical and health services that

they provide improve family planning, nurture child and adult health, prevent diseases, cure debilitating illnesses and alleviate the suffering of the dying.

## GENERAL INFORMATION

**Project Location:** The project area is located in Boma town, Pibor County, Jonglei State of Southern Sudan.

**Climate:** The mean annual rainfall varies between 1,430mm to 603mm. Rainfall is highest in the north and lowest in the south. The rainy season falls between April and November with peaks during the months of August and September and lowest between December and March. The mean monthly temperatures are 29.2 degrees Centigrade during the dry season and 27.2 degrees Centigrade during the wet season. Relative humidity is highest during the rainy season.

**Vegetation and Bio-Diversity:** The Eastern part of Boma National Park and the surrounding areas are covered with woodlands dominated by *Combretum* and *Ficus Spp.* In the area around isolated hills in the flat plains are dense thickets dominated variously by *Ziziphus spp.*, *Acacia seyal*, *A. zanzibarica*, and *Acacia drepanolobium* among others. There are also grass patches of *Hyperbenia*, *Penisetum*, *Sporobolus* and *Echinochloa*.

Past censuses in the park have recorded the white-eared Kob that is migratory, Lesser Eland, the Oribi, Reedbuck, Roan antelope, Mangalla gazelle, the Tiang, and Lelwe Hartbeeste, among other plains game. Poaching is common in this area and happens all year round facilitated by the ready availability of small arms used for poaching. The dry season count of the white-eared Kob was 524,440 in 2002, while it was 849,365 in 1980, indicating a significant decline.

**Topography, Soils and Drainage:** The topography of Boma National Park is mostly flat with scattered isolated inselbergs to the east and southern part of the Park. The Maruwa Hills and the Boma Escarpment are the exception. Most of the plains are dominated by cotton clay soils that expand when saturated with rainwater during the wet season and shrink and crack in the dry season. On the slopes and the foot of the hills, the soils are laterite and sandy.

Several small streams and rivers originate from the Boma Plateau and traverse the area and Boma National Park. Fraxell (1983) stated that the entire region is a watershed that ultimately empties into the Nile River via the Sobat River.

**Population and Demography:** The population in Pibor County is estimated to be 97,000 persons in four Payams (Boma, Meound, Maruwa and Kassinger). The case study area is in Boma Payam.

There are five main ethnic groups: the Murle (Boma agriculturalists), the Maruwa pastoralists, Jie Anyuak, Suri (Kachipo) and displaced populations who are predominantly Dinka. The Jie and Maruwa Murle who are agriculturalists occupy the Boma Mountain on the western side while the Murle Boma and Bale Suri (Kachipo) who are agriculturalist occupy the Boma Plateau. Traditionally, the Jie cultivate during the rainy season and herd their cattle across the savannah in search of good grazing lands and water points as the season changes. Beyond the plateau, towards the east and the Ethiopian borders live the cattle keeping clans of Suri (Kachipo). The Anyaul communities who are agro-pastoralists and agriculturalists occupy the northern and eastern parts of the park respectively. Despite the diversity of the ethnic community groups that live in and around Boma N. Park, they have strong links between the different ethnic groups and within clans of each ethnic group.

**Land Use:** All the ethnic groups in Boma keep sheep, goats and cattle. However the three communities of Murle Ngaram, the Suri and the displaced Dinka mainly depend on crop farming for their livelihood. Livestock is kept under both semi nomadic and sedentary form of management. While the Jie and the other sections of the Murle ethnic group keep large herds of cattle, only some of the members of the Kachipo and Dinka communities rear cattle in small numbers around their settlements. Small flocks of chicken are almost found in every home of all the communities in Boma, with the exception of the Murle cattle owners who normally do not eat chicken. The Murle Ngalam and the Kachipo of Mewun and Runit used to own a substantial population of sheep and goats before the war, but have lately dwindled drastically due to cattle

rustling and other conflict related reasons. The Murle Ngaram now rear about 25% of the number they used to before the war.

### **CASE STUDY REPORT PREPARATION**

The course participants will do the following:

- Conduct a detailed survey of the existing environmental conditions (baseline or status quo) in the project area, noting those environmental parameters that are likely to be impacted on by wastes from small-scale healthcare facilities;
- Identify stakeholders to be consulted during the process of carrying out an environmental review of impacts relating to small scale health care facilities;
- Identify both positive and negative impacts of small scale health care projects activities during the following stages of the project cycle (i) Planning and Design, (ii) Construction, (iii) Operation, (iv) Decommissioning phase;
- Note which of the adverse impacts identified are significant, indicating reason for considering them significant;
- Prepare, an environmental review report for small-scale healthcare project activities using a Leopold Matrix format to be presented to the rest of the group;
- Pick on three potential adverse impacts that the group considers to be most significant and prepare an environmental monitoring and mitigation plan that is appropriate for the type and level of the potential adverse environmental impacts identified (Sample formats for the Leopold Matrix and the Environmental Mitigation and Monitoring plan will be provided to the participants).

### **FACILITATOR:**

Wes Fisher, CADMUS GROUP

# ANNEX 2: EVALUATION RESULTS OF THE 1<sup>ST</sup> STEP TRAINING COURSE IN EIA/ESD HELD IN BOMA, SOUTHERN SUDAN IN JANUARY 2006

Evaluation Summary	Average Score (lowest is 1 and highest is 5)
1. How would you assess the overall quality of the course content?	4.4
2. The extent to which the course Improved your understanding of EIA & Environmental Management	4.3
3. The extent to which you now feel prepared to undertake or assist in the preparation of a preliminary assessment	4.1
4. Course scheduling and organization	3.6
5. Course logistics and venue	3.3
6. Content of Participants' source book	4.7
7. Content of Environmental Guidelines for Small scale activities	4.7
8. Facilitation	4.5
<b>Average Score</b>	<b>4.2</b>

## SUMMARY OF COMMENTS FROM THE EVALUATION EXERCISE

### I. OVERALL QUALITY OF COURSE

- There is need to extend the duration of the course.
- If the number of days of the course were increased, participants would be able to grasp the concepts deeply.
- Time not enough but content of the material is so rich.
- Required more time to understand subject for better use in the future.
- Very educative.
- Course content very resourceful for field work.
- Very good and well detailed but it is a lot for a period of 5 days.
- The speed of explanation was very fast, have examples.

## **2. THE EXTENT TO WHICH THE COURSE HAS IMPROVED YOUR UNDERSTANDING OF ENVIRONMENTAL ASSESSMENT AND MANAGEMENT**

- Increase time to enable participants do more in the practical group work.
- Field visits made the course on EIA very understandable.
- The course really improved my understanding but more practice required through internship in EIA.
- Needs more practical exercises.
- Exercises help a lot.

## **4. COURSE SCHEDULING AND ORGANIZATION**

- It is advisable to stick to allocated times.
- Short duration does not compare well with the amount of course materials.
- Tedious with no resting time.

## **5. COURSE VENUE AND LOGISTICS**

- Need to improve on logistics.
- Pick up points and dates were not communicated in a timely manner.
- Venue was too far away from the airstrip.
- Very far from medical services in case one gets sick.
- Poor sanitation and no laundry services provided.

## **8. FACILITATION**

- All were knowledgeable in the subject.
- Excellent and straightforward.
- Need more adult learning techniques.

# ANNEX 3:AGENDA

**USAID/Sudan Environmental Assessment & Management Training Course**  
**Venue: Boma Wildlife Training Institute, Jonglei State, Southern Sudan**  
**23<sup>rd</sup> – 27<sup>th</sup> January 2006**

Time	Event or Module	Materials
3:00-6:00	Arrival. Registration and Logistical Arrangements	All Participants
<b>DAY 1: Introduction to Environmentally Sound Design</b>		
08:30 - 09:30	Opening Statements	Mr. John Boya
09:30-10: 30	1. Presentation of Course Agenda, Participant's Introductions, and Solicitation of Group Goals	E. Wahome & F. Warinwa
10:30-10:45	<i>Coffee Break</i>	
10:45-12:45	2a) What is environment? 2b) An Introduction to Environmentally Sound Design	Jane Kahata <a href="#">ESD overheads</a> (PPT 2596KB " <a href="#">Env. Sound Design</a> " (From new Draft Small Scale Guidelines) (PDF, 349K) E. Wahome & J. Kahata
12:45-1:00	2d. Principles and practice of Environmentally Sound Design in key sectors (with opportunity for discussion of participants experiences	New draft Environmental Guidelines for small scale activities (see resources pages) By: W. Fisher
13:00- 14:00	<i>Lunch break</i>	
14:00 -16:00	2c. Constructing a Historical Timeline for Southern Sudan & Discussions	Briefing notes Fiesta Warinwa
16:00-16:15	<i>Coffee Break</i>	
16:15 – 17:15	3a. Basic Concepts for Assessing Environmental Impacts	<a href="#">EIA basic concepts overheads</a> (828 KB) By J. Kahata <a href="#">EIA Topic Briefing (Section 1)</a> (PDF, 513K)
17:15- 18:00	3b. Transect Walk through the CWEC	Transect Walk briefing By E. Wahome Briefing Notes
18:00-18:30	Facilitators Meeting	All Facilitators
<b>DAY 2: An introduction to Screening Procedures (USAID &amp; Nuba Mts, World Bank</b>		
07:00-08:00	<i>Breakfast</i>	
08:00-08:30	Review of Day 1	By. F. Warinwa
08:30-10:00	5. An introduction to USAID, Nuba Mts & World Bank Screening Procedures Workgroup exercise: Classifying activities using USAID environmental procedures: Classifying projects using Reg 216	<a href="#">Overheads PPT 318 KB</a> By E Wahome EGSSAA: Chapter 6 Screening activities By. W. Fisher
10:00-10:15	<i>Coffee Break</i>	
10:15 – 10:45	Work group exercises Cont.	W. Fisher
10:45-11:30	Biophysical environment, environmental policy, information sources in S. Sudan Sources of Information and methods for conducting EIA in the local context	<a href="#">Overheads PPT</a> By F. Warinwa Paper on the same

Time	Event or Module	Materials
11:30-12:30	Information Requirements & Tools for Preliminary Assessment	<a href="#">Overheads PPT (328 KB)</a> By: Wes Fisher EIA Topic Briefing Section 3 PDF 513K
12:30-13:00	Writing the Preliminary Assessment (ERR)	<a href="#">Overheads PPT (388 KB)</a> By E. Wahome
13:00-14:00	<i>Lunch</i>	
14:00-15:00	The national context: social and cultural conditions, context and policy in S. Sudan Sources of information and methods for conducting social assessment in the local context.	PPT & Full paper on same By: F. Warinwa
15:00-16:00	Plenary Discussions on the two papers	Moderated By: Fiesta Warinwa
16:00-16:15	<i>Coffee Break</i>	
16:15-17:00	Introduction to Environmental Mitigation and Monitoring	<a href="#">Mit &amp; Mon overheads (PPT 1922K)</a> <a href="#">EIA Topic Briefing (Section 4)</a> By J. Kahata (PDF, 513K)
17:00-17:30	Field trip briefings (case study project sectors in the local context: (Working groups)	Country specific case site briefs prepared by course organizer (samples available in the participants manual). By: E. Wahome
18:00- 18:30	Facilitators meeting	All Facilitators
18:45-	<i>Dinner</i>	
<b>Day 3: Case study field trips</b>		
07:00-08:00	<i>Breakfast</i>	
Departure 07:30-08:30	Field trips to case study sites. (Working groups of 5-8 participants travel to separate sites; conduct initial assessments in the field.	All Facilitators
18:00-18:30	Facilitators' Meeting	All Facilitators
<b>DAY 4: Producing Environmental Reviews and Monitoring and Evaluation Plans based on the field trips</b>		
07:00-08:00	<i>Breakfast</i>	
08:00-08:30	Brief reactions to Field Trips	E. Wahome
08:30-11:30	Working Groups: Drafting Environmental Reviews for Case Studies (includes break)	All facilitators
11:30-12:30	Presentation and discussion of Draft Environmental Assessment or Environmental Review Outlines	Moderated By J. Kahata
12:45-14:00	<i>Lunch</i>	
14:00 - 15:00	Cont'd (presentation and discussion of draft environmental review	Moderated By J. Kahata
15:00 - 16:00	Wrap up sessions on best practices for each of the case studies	W. Fisher
16:00-16:15	<i>Coffee Break</i>	
16:15-16:45	Environmental Mitigation and Monitoring: More on Issues and Methods	<a href="#">Mit &amp; Mon overheads (PPT 1922K)</a> . By E. Wahome <a href="#">EIA Topic Briefing (Section 4)</a> (PDF, 513K)
16:45 - 18:00	Working Groups: Developing Plans for Monitoring and Mitigation for Case Studies	All Facilitators
18:00-18:30	Facilitators' Meeting	All facilitators
18:00-	<i>Dinner</i>	

Time	Event or Module	Materials
<b>DAY 5: Mitigation and Monitoring Plans, EIA Tools, and Synthesis</b>		
07:00-08:00	<i>Breakfast</i>	
08:30- 10:00	Preparation of Draft Mitigation and Monitoring Plans	All Facilitators
10:00-10:15	<i>Coffee Break</i>	
10:15-12:00	Presentation of Mitigation and Monitoring Plans	Moderated By: Fiesta Warinwa
12:00-12:30	What if I have to go Beyond the IEE	PPT By: E. Wahome
12:30-13:00	Special topics: Environmental Impacts of Pesticides	<a href="#">Overheads (PPT 211KB)</a> By Jane Kahata
13:00 -14:00	<i>Lunch</i>	
14:00-14:30	Presentation on Nile Treaty & Water Resources Management in S. Sudan	By: Lulu Hayanga
15:00 -16:00	Course Evaluation, Synthesis, and Recommendations for Follow-up Activities	By: F. Warinwa
16:00- 17:00	Closing Ceremony	By: John Boya –Executive Director, Pibor County
<b>DAY 6: Departure</b>		
07:00-08: 30	<i>Breakfast</i>	
	Departure	

# ANNEX 4: PARTICIPANTS LIST

## 1<sup>ST</sup> STEP TRAINING COURSE HELD IN BOMA, SOUTHERN SUDAN FROM THE 23<sup>RD</sup> – 27<sup>TH</sup> JANUARY 2006

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