Industry and the Environment

An oil well being drilled at Heglig field, Southern Kordofan. The rapid growth of the oil industry is set to change Sudan’s economy, society, and environment.
Industry and the environment

7.1 Introduction and assessment activities

Introduction

Sudan’s industrial sector is currently undergoing rapid change and expansion. Historically limited to utilities and small-scale food processing, the sector is now booming thanks to oil production, which began in 1999.

Environmental governance of industry was virtually non-existent until 2000, and the effects of this are clearly visible today. While the situation has improved significantly over the last few years, major challenges remain in the areas of project development and impact assessment, improving the operation of older and government-managed facilities, and most importantly changing attitudes at the higher levels of government.

Industries covered in this chapter include oil production, power generation, food-processing, transportation, chemicals and construction.

Assessment activities

UNEP teams visited a range of industrial facilities across the country. In some cases, a full tour of the facility was possible; in others only brief inspections were carried out due to limited time or access. The sites visited include:

Port Sudan region, Red Sea state:
- harbour operations and warehousing (site meetings and full tour);
- several very light industry sites (site inspections);
- saltworks (full site tour);
- desalination plant (full site tour);
- power station (external viewing only); and
- refinery (site meeting only).

Khartoum state:
- Comfort soap and toothpaste factory (brief site visit); and
- GIAD car assembling complex (brief site visit).

Gezira state:
- Baggier industrial complex (brief site visit);
- Aqsa cooking oil factory (brief site visit); and
- Hibatan tannery and leather factory (closed).

Chlorine storage cylinders outside a chemical plant in Barri, Metropolitan Khartoum. UNEP’s assessment of the industrial sector included visits to many factories. Access was normally granted without restriction.
Sennar state:
- Kenana sugar factory (full site tour); and
- Asalaya sugar factory (full site tour).

Southern Kordofan:
- Heglig crude oil production complex (site meetings and full tour).

Jonglei state:
- oil exploration seismic survey base and line sites (site meeting and tour).

Northern state:
- Merowe dam site (Khartoum meetings, no access to the site, visited the downstream region, see Chapter 10 for details); and
- Atbara cement factory (brief site visit).

The number of sites visited was considered sufficient to evaluate the environmental governance of industry in Sudan; the assessment was supported by an analysis of both general and site-specific legislation and enforcement practices.

Oil-related sites were visited, but not in sufficient depth and number to gain a comprehensive picture of the industry. The implications of this data gap are addressed further in this chapter.

7.2 Overview of the industrial sector in Sudan

General industrial structure

Sudan is experiencing rapid industrialization due to the growth of the oil industry and associated service industries and imports. For the purposes of this environmental assessment, industry is divided into five sectors, as follows:

1. the upstream oil industry;
2. the downstream oil products industry;
3. utilities (power generation and water supply);
4. food processing (sugar, sesame oil, cereals); and
5. miscellaneous (including mining, textile manufacturers, tanneries and workshops).

Oil, utilities and food processing dominate the industrial sector. Until recently, virtually all of the major industries in Sudan were state-owned or controlled. This has now changed, as many of the main manufacturers have been privatized. Apart from the newer oil facilities, the industrial sector has suffered from a lack of investment which is reflected in the condition of the plants and their environmental performance.
Oil industry structure

The oil industry is conventionally divided into three sectors:

- The **upstream** sector, which covers exploration for crude oil and gas, extraction, and transport via pipelines and tankers to markets;
- The **downstream oil products** sector, in which the supplied oil and gas are refined and converted into usable products (petrol, diesel, lubricants) and sold to customers; and
- The **petrochemicals** sector, in which oil and gas are converted into chemicals and materials such as solvents and plastics.

Sudan’s upstream oil industry is set to dominate industrial activity in the country for the next generation. UNEP interviews indicated a nationwide concern about the environmental impacts of exploration and extraction of oil, and this topic is addressed in some detail below. In contrast, the downstream sector in Sudan is relatively small and set for moderate growth only. There is no petrochemical industry in Sudan yet.

Oil industry exploration and production history

Oil exploration in Sudan started in 1959, but the first major find was only made in 1980 by the US company Chevron (now Chevron-Texaco), north of Bentiu in Western Upper Nile state (now renamed and boundaries changed to Unity state). Further finds were made in 1982, 70 km north of Bentiu in the Heglig district, in Southern Kordofan [7.1, 7.2].

Oil production in Heglig and Bentiu was delayed until 1996 by the north-south civil war, which was itself partly caused and sustained by the competition for control of the oilfields. The conflict and political changes during this period were accompanied by a shift in international oil development partners. Most western companies gradually withdrew, due in part to pressure in their home countries. They were replaced by Chinese, Malaysian and Indian national oil companies, which now manage the oilfields in Sudan together with representatives from the Government of National Unity.
Current oil industry activities

Sudan started exporting oil in 1999. According to official figures, oil production in Sudan was approximately 400,000 barrels per day as of mid-2006, and was expected to rise to 500,000 barrels per day within a short period of time [7.3, 7.4]. Based on an oil price of USD 67 per barrel [7.5], the latter production level equates to a theoretical revenue stream of USD 33.5 million per day or USD 12.2 billion per year, which represents 14 percent of the 2005 estimated gross domestic product for Sudan (USD 85.5 billion) [7.6].

Sudan also has significant gas reserves (some 3 trillion standard cubic feet) [7.7, 7.8] and currently produces gas as a by-product of oil production in central Sudan. Unfortunately, no large market has yet been developed for this gas in Sudan. As a result, most of it is burned off by flaring. Efforts are ongoing to tap this supply by increasing the existing liquefied petroleum gas (LPG) market.

As of mid-2006, the principal oil and gas production facilities in Sudan are:

- production wells and initial treatment complexes in the fields of Heglig (Southern Kordofan), Bentiu (Unity state), Thar Jath, Muglad and Adar (Upper Nile state); some of these facilities are still under development but expected to start or increase production within the next two years;
- four crude oil export pipelines connecting the fields to Port Sudan, with a combined length of 3,900 km; and
- a marine oil export terminal at Port Sudan.

Oil exploration and production plans

Sudan’s commercially recoverable oil reserves are currently in the approximate range of 500 to 800 million barrels, and total oil reserves are estimated
to be up to eight billion barrels [7.8, 7.9, 7.10]. At present and projected extraction rates, these reserves will last for approximately a decade, though it is expected that further reserves will be discovered and exploited over time. Current plans are to expand production to 1.5 million barrels per day by 2008 [7.3, 7.11].

Only a small portion of central Sudan has been explored thoroughly, and only a fraction of that small area is in production. Before the Comprehensive Peace Agreement (CPA) was signed in 2005, exploration was limited to military-controlled areas in the north-south border regions. The establishment of peace and security is now allowing exploration to expand into the rest of Southern Sudan, as well as Southern Darfur.

There are nine exploration concessions in Sudan (see Figure 7.1), totalling approximately 250,000 km² or ten percent of the country’s land area. Most of the important unexplored areas are in Southern Sudan. Accordingly, large-scale oil exploration and perhaps development are expected to come to Southern Sudan within the next ten years. Some activity has already started: the White Nile Petroleum Company has been conducting seismic surveys in Padak County, Jonglei state since 2006 (see Case Study 7.2) and plans to commence drilling in the second quarter of 2007.

### 7.4 General industry-related environmental issues

#### An absence of environmental considerations in the development of new projects

Environmental issues have rarely been considered in the development of major industrial projects in Sudan over the last forty years. This has been the case throughout Sudan for all aspects of project implementation: design, feasibility, site selection, and facility construction and operation.

As a result, a number of large projects have had very negative impacts on the environment. Unfortunately, new projects are still being implemented without environmental consideration today (see Chapter 10 for section on dams). What’s more, development in Sudan has historically been driven by a series of national-level plans and mega-projects, such as the Gezira agricultural scheme and the Jonglei canal. These schemes tend to have high-level political backing and progress rapidly from conception to construction, without opportunity for assessment or public consultation.

7.3 Overview of industry-related environmental issues

Industry-related environmental issues can be divided into those applicable to all industries and those applicable to the upstream oil industry only.

General issues are:
- absence of environmental considerations in the development of new projects; and
- poor environmental performance at operating sites.

Upstream oil industry issues are:
- isolation from governance and scrutiny;
- existing impacts and future risks of oil exploration;
- produced water;
- produced gas flaring and utilization; and
- oil spill risks from sea transportation.

The construction of this major new harbour facility in Port Sudan proceeded without an environmental impact assessment or mitigation of its impacts.
Figure 7.1  Sudan oil industry

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

Sources:
ECOS; SIM (Sudan Interagency Mapping); USGS; vmaplv0, NIMA; various reports, maps and atlases; UN Cartographic Section.
CS 7.1  Port Sudan power station waste oil dumping

The lack of environmental governance in the industrial sector is readily apparent throughout Sudan. In Port Sudan, for example, electricity is supplied by several government-operated oil-fired power generation stations. Power Station C is located 5 km south of the city on the Port Sudan-Suakin road. It is built on what were previously salt marshes and located approximately 200 m from a shallow lagoon, 500 m from one of the only remaining mangrove forests and at an equal distance from the principal coastal recreation site outside the city.

The diesel generators require regular oil changes, generating large quantities of waste oil. The UNEP inspection team witnessed this oil being simply poured onto the ground in vacant land next to the station, whence it gradually flowed into the lagoon; open channels had been cut in the sediment to aid its flow.

Poor environmental performance at operating sites

UNEP site inspections revealed chronic serious environmental problems at the majority of industrial facilities visited. The issues noted ranged from air emissions and water pollution to hazardous and solid waste disposal. There was no correlation with scale: large facilities had the same performance as smaller ones, if not worse. Air and liquid discharges were found to be mostly uncontrolled, and untreated effluent was seen to be discharged directly into watercourses at several sites.
The environmental performance of the two utilities visited by UNEP in Port Sudan – the water desalination plant and Power Station C – was very poor (see Case Study 7.1). Utilities are still generally owned by the state and suffer from a lack of investment. They are also effectively immune from legal sanctions because they provide vital services that cannot be interrupted.

At the country’s five main sugar estates, the key problem was the release of effluent. All sugar factories were found to be releasing factory wastewater directly into the Blue and White Nile without pre-treatment. This wastewater contains an elevated biological oxygen demand (BOD), which can reach 800-3,000 ppm. The resulting pollution of river water is suspected to be the leading cause of frequent fish kills, particularly in the Blue Nile. It should be noted that the Kenana factory is in the process of constructing a wastewater treatment plant to address this problem. Others have yet to follow suit.
7.5 Environmental issues specific to the upstream oil industry

Generic issues

The generic environmental impacts and risks associated with the oil industry are well known and include:

- oil spills during any part of the process with a particular risk related to sea transport;
- very large-scale intrusion into previously undeveloped or inaccessible areas via access roads for exploration, production plants and pipelines;
- generation of water pollutants (produced water from well fields is a particular problem);
- generation of general and chemical solid wastes;
- air emissions, particularly from gas flaring; and
- secondary development impacts as the oil facilities attract populations seeking employment and other benefits.

The significance of these impacts can vary dramatically from one oilfield or plant to another, depending on the scale of the facility, the sensitivity of the location and the standards of operation.

As noted in the introduction, UNEP's assessment did not cover the full extent of the industry. Detailed comments are hence restricted to what was physically viewed and verified by the UNEP team, and to what was reported by oil industry personnel. Unverified statements with significant implications are recorded as such.

UNEP also received numerous and generally extremely negative anecdotal reports from southern Sudanese, which focused on the following:

- discharge of untreated produced water;
- damage to pastoral land and dwellings from road building; and
- oilfield chemical dumping.

Figure 7.2 Um Sagura seismic survey grid

The seismic lines and access roads in the Abyei region were cleared by bulldozer. They are visible as a grid at least ten years after completion of the survey, indicating significant damage to the vegetation and drainage patterns.
Additional accounts of environmental problems have been documented in some detail by a number of NGOs and international observers over the last ten years [7.12, 7.13, 7.14, 7.15]. These accounts are not reproduced here due to lack of verification by UNEP on these critical and sensitive issues.

**Upstream oil industry isolation from governance and scrutiny**

The upstream oil industry in Sudan is essentially self-regulated and has never been subject to independent technical scrutiny. Due to the limited scope of the assessment, UNEP cannot comment in detail on the actual performance of the upstream oil industry in Sudan. Elsewhere in the world however, the general experience is that the industry’s level of environmental performance is closely linked to the level of external scrutiny – secrecy is bad for performance.

**Existing impacts and future risks of oil exploration**

If it is not well managed, the exploration process can have the greatest impact on the environment of all the phases of oil production, due to the large areas affected and the temporary nature of the work. Exploration is unsuccessful in over 90 percent of cases, and when the results are negative, oil companies abandon the areas surveyed. Unless it is remediated, the environmental legacy of exploration can last for generations.
The most significant of these impacts are access roads for very heavy equipment, seismic survey lines and drilling sites. The damage is mainly physical, comprising deforestation and devegetation, erosion and watercourse siltation, and disrupted drainage patterns. Extensive damage of this type was observed by the UNEP team north of the Heglig facility in Southern Kordofan. Inspections of seismic lines in Jonglei state, however, revealed a much lower level of impact (see Case Study 7.2).

The areas targeted for oil exploration in Southern Sudan are particularly vulnerable to exploration-related damage, as they do not have many existing roads, are relatively well forested, have very soft soils, and flood for several months a year. Control of such impacts should therefore be a top priority for the industry. While appropriate control measures would increase the cost of exploration, exploration itself would not be undermined, as it would be prohibited only in the most sensitive areas, and then only at certain times of the year.

**Produced water**

The single most significant environmental issue for crude oil production facilities in Sudan is the disposal of produced water. Produced water is the water extracted from the reservoir along with crude oil, and separated from it before the oil is transported via pipeline. The volume of water can be very large, particularly in the later years of production, when the wells tend to produce more water and less oil as reservoirs become depleted. The Heglig facility alone currently generates over ten million cubic metres of produced water annually. Full production of the central Sudan fields in ten years time may yield five to twenty times that amount.

Appropriate treatment and disposal options exist for produced water, but they can be costly. In the absence of regulations, it is unfortunately common practice around the world to simply discharge it to the nearest watercourse. Legislation and investment in treatment facilities are required to protect the environment from this type of pollution.

UNEP’s inspection of the Heglig facility in March 2006 noted an operational produced water treatment facility based on reed bed technology. However, the GONU State Minister for Energy and Mining, as well as oil industry personnel, reported to UNEP in November 2006 that produced water was now being discharged untreated from the complex; volumes were not specified. The reasons given for the lack of treatment were a recent major increase in produced water flow rates and under-sizing of the treatment plant.

*Produced water flowing into a holding pond at Heglig. Produced water can be difficult and expensive to treat, but has serious impacts on the environment if released untreated*
Produced gas flaring and utilization

The gas produced as a by-product of crude oil in Sudan is presently not all used. Some of it is flared (burned off) at the production site. Precise figures for gas flaring were not available to UNEP at the time of the assessment, but irrespective of scale, this practice has three negative impacts:

- needless emission of large volumes of greenhouse gases;
- waste of an energy resource that could feasibly replace much of the charcoal that is the cause for extensive deforestation in central Sudan; and
- local air quality issues (generally a minor problem).

The petroleum gas that is being flared could potentially be converted to bottled LPG. Though there is still ample room for growth (present market penetration is approximately 18 percent [7.7]), the market for LPG is currently developing in Sudan. In 2005, the domestic consumption – mainly in cities in the northern states – was 102,000 tonnes, but the potential domestic demand for LPG has been estimated by government sources at 554,000 tonnes per year. Sudan also exports LPG through a terminal at Port Sudan, and this market could be expanded as well.

The development of the domestic LPG market and other uses for co-produced gas, such as electricity generation, would reduce the demand for fuelwood dramatically. In the long term, this could be the single most important factor in reversing the deforestation observed in the central and northern states.

Sea transport oil spill risks

There are two main sources of risk for oil spills arising from export operations in the Red Sea. The first is the process of loading the ships from the shore; the second is the navigation of the loaded tankers through the Red Sea.

Spills associated with loading have occurred, but have apparently been very minor. One such incident reported by the Government in 2004 was a spill of approximately 10 m³ at the loading point of the marine oil terminal (details not verified). Given that the marine oil terminal facilities are very modern, the risk of a major spill occurring during the loading process is considered moderate to low, provided operations are well managed.

Oil tanker transport presents a larger risk. The Red Sea is a busy shipping corridor connecting Europe to the Arab Gulf states and Asia. The traffic at the Port Sudan oil terminal is a new and growing load, with over 200 tankers anticipated per year as the industry develops.

The Red Sea generally has relatively calm weather but it is littered with navigational hazards in the form of over 1,000 very small islands, sandbars and shallow submerged coral reefs. Much of the coastline is fringed by reefs and there are few safe havens able to take large vessels. In addition, the presence of coral reefs and seagrass beds makes the Red Sea highly sensitive to pollution.

Oil-spill response resources in Sudan and elsewhere are structured according to a recognized international scale:
Tier 1 Small spills that can be managed using the resources available to the facility (or to a local government unit in the case of small ship or coastal spills);

Tier 2 Small- to intermediate-scale spills that require a coordinated response using local and national resources; and

Tier 3 Large spills requiring both national-level mobilization and the importation of international specialized spill response resources. There are many centres worldwide capable of providing such equipment, but only three major centres (Southampton, Singapore and Dubai) are designed for rapid and large-scale international responses.

The marine oil terminal and Port Sudan both have Tier 1 facilities (not verified). The oil terminal management has conducted several training exercises to build capacity, including spill containment boom deployment. However, there is reportedly no oil dispersant (surfactant) capacity in country, and UNEP interviews indicated that Tier 2 planning was not well advanced due to difficulties in communication between different ministries and government bodies. The Ministry of Energy and Mining reported that the marine oil terminal had a Tier 3 agreement with Oil Spill Response Limited in Southampton (not verified).

Interviews also revealed that small oil slicks (1-10 m³) caused by passing ships clearing bilges in international shipping lanes were very common in Sudanese territorial waters. This is an endemic international problem, and is not linked to Sudan's oil industry.

To summarize, while it is impossible to eliminate the threat of a major oil spill, the risks observed and the safeguards reported to be in place for Sudan's oil export industry appear to be generally in line or only slightly below those for oil export facilities worldwide. The most important areas for improvement would be the ability to mobilize surfactant-based responses, and better coordination at the Tier 2 level. Notwithstanding the response capacity, the risk of an oil tanker incident is still considered relatively high due to the abundance of navigational hazards.
Industrial waste burning on vacant land in Khartoum state. Waste management and water pollution are two areas in need of improved governance.

7.6 Industrial sector environmental governance

General industrial facilities

Industry is subject to national- and state-level environmental legislation, but the enforcement of existing laws is limited and difficult.

At the national level, Sudanese industry is governed by the Environmental Framework Act of 2001. In some cases, it is also regulated by the need to obtain and renew operating licences issued by state governments. While there is no specific national-level statute addressing the environmental impacts of industry, individual operating permits may have provisions regarding air emissions or effluents.

The most direct form of environmental governance observed by UNEP during the assessment was at the state level, where local complaints of large-scale air and water pollution had led to action by the State Governor and a form of state-level environmental council. In two cases reviewed (a cement factory and a tannery), the action was successful: the cement factory was upgraded and the tannery was shut down (see Case Study 7.3). In one other case, the facility (a lubricant plant) was resisting control.

Settlement pond under construction at the Kenana Sugar Company, located near Kosti, which has recently invested heavily in the construction of water treatment facilities.
Oil industry

The oil industry in Sudan is managed by the Ministry of Energy and Mining, and governed by directives from the highest levels of the Government of National Unity (GONU). Oil industry staff report that, in terms of environmental performance, companies are regulated by clauses of the 1998 Petroleum Wealth Act.

The White Nile Petroleum Company is an exception, as it is not controlled by GONU. Rather, the Government of Southern Sudan (GOSS) is a minor shareholder in the venture, and the company’s government counterpart is the GOSS Ministry of Industry and Mining. However, UNEP’s assessment of the company’s operations and the Ministry’s capacity has made clear that the company is effectively self-regulated.

In theory, the Environmental Framework Act of 2001 applies to the oil industry, but discussions with the GONU Ministry of Environment and Physical Development revealed that MEPD personnel could generally not gain access to oil industry sites and had never applied any form of sanction for violation of any legislation.

In addition, UNEP enquiries did not uncover any form of publicly available environmental or social

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**CS 7.3 Upgrade of the Atbara cement factory**

The Atbara cement factory in Northern state is a positive example of the potential benefits of local governance and foreign investment in improving environmental performance.

The factory is one of only two major cement production facilities in Sudan. It was established in 1947 as a private sector shareholder company and began production in 1949, with second-hand equipment. It was nationalized in 1970, before being privatized and purchased by a foreign company in 1994. One of the conditions for privatization was that the existing plant emissions be significantly reduced. An eighteen-month window was given for the installation of the necessary equipment.

When this had not occurred by the deadline, the Governor of Nile state closed the plant by decree. Within three months, the company had completed installation of a filtration system and the plant was permitted to re-open. Emissions are now reported to be significantly lower and the plant is undergoing a number of other improvements.

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The Atbara cement factory is now privately owned

The newly installed bag house filter treats emissions from the main furnace
impact assessment for the oil industry, although interviews with industry personnel indicated that some environment-related studies had been conducted. One management document, the (now obsolete) Marine Oil Spill Response Plan, was publicly available [7.16].

Project development and environmental impact assessments

As detailed above, environmental impact assessment (EIA) processes exist on paper in Sudan but are not followed in practice. The Environmental Framework Act of 2001 includes a basic EIA and approval process, which is not applied effectively to the majority of projects, and not applied at all to upstream oil projects.

7.7 Conclusions and recommendations

Conclusion

Environmental governance in the industrial sector of Sudan is problematic and in need of major improvement and reform. Due to the relatively limited level of industrial development to date, environmental damage has so far been moderate, but the situation is expected to worsen rapidly as Sudan embarks on an oil-financed development boom.

The main problems include:

- absence of sector-specific legislation and statutory guidance;

Oil well drilling pits such as these at Heglig are normally remediated after use. At present, however, there is no oversight of the oil industry’s performance or detailed environmental standards for such work.
• lack of performance standards and enforcement capacity; and
• immunity of the oil industry, state-owned firms and major new projects to public scrutiny.

The upstream oil industry and water pollution from industrial sites are sources of particular concern. There are, however, some positive examples of governance at the state level for individual facilities.

Background to the recommendations

Two key issues strongly influence the recommendations for Sudan’s industrial sector. First, unlike many other sectors of the economy, industry generally has the capacity to invest its own funds in improving environmental performance, and site-specific solutions are usually straightforward. If required, capacity-building can also be purchased in the commercial market. For GONU and GOSS, industrial environmental performance is considered first and foremost to be a governance issue.

Second, the environmental impact of the oil industry in central and Southern Sudan clearly has the potential to catalyse conflict between the industry and local interests. Accordingly, resolving this issue is considered to be of the highest priority.

Recommendations for the Government of National Unity

R7.1 UNEP or another fully independent body should undertake an environmental assessment of the upstream oil industry. The scope of this assessment should encompass the impacts of past exploration, current operational practices and proposed exploration. The agreed final results should be made public, so as to eliminate the atmosphere of suspicion caused by the current information vacuum.

CA: AS; PB: MOEM; UNP: UNEP; CE: 0.4M; DU: 6 months

R7.2 Develop a national oil industry environment act with accompanying statutory guidelines and standards. This would be a major venture requiring a cooperative approach with the oil industry and GOSS. Due to the complexity, and political and financial implications of this recommendation, the highest levels of political will and cooperation as well as international assistance are required. The cost estimate is for legislation development. The cost of legislation implementation is expected to be tens of millions of US dollars over five years to be adopted by industry into existing projects and then implemented as standard.

CA: GROL; PB: MOEM; UNP: UNEP; CE: 0.5M; DU: 2 years

R7.3 Develop a national-level, independent environmental enforcement unit for the industrial sector, including the oil industry. This would entail greatly strengthening the capacity of the Ministry of Environment and Physical Development (or a similar body) to review EIAs, issue environmental permits, conduct inspections, support prosecutions and carry out similar governance tasks.

CA: GROL; PB: MEPD; UNP: UNEP; CE: 2M; DU: per annum

Recommendations for the Government of Southern Sudan

R7.4 Establish an interim environmental screening and industrial permitting process for all new projects on GOSS territory. This would be designed to cover the urgent requirements for project assessment before adequate longer-term controls can be established. A multi-ministry committee could be appointed to review all significant project proposals and issue construction and interim operating permits (up to five years).

CA: GROL; PB: MEWCT; UNP: UNEP; CE: 0.3M; DU: 2 years

R7.5 Monitor GONU progress on R7.2 and R7.3; if not implemented within one year, commence a regional governance programme similar to that described above. Development of the oil and general industry sector will go ahead in Southern Sudan, and governance is definitely and urgently needed. A uniform approach at the national level is the preferred approach, and GOSS should lobby for this.

CA: GROL; PB: MIM; UNP: UNEP; CE: 0.7M; DU: 2 years
It is completely feasible to reduce the environmental impact of oil exploration and production to acceptable levels in all but the most ecologically sensitive areas. That, however, requires both commitment and substantial investment.