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Traditional Institutions in Sudan

Environmental Education in Sudan

Aliwayya Ahmed

African-Caribbean Institute

Mutasim E. Atta El Moula holds a master of science in environmental studies from the University of Khartoum, where he now serves as a research associate in the University's Institute of Environmental Studies. As an ACI fellow, Mr. Moula is currently examining the possibilities for reviving traditional Sudanese institutions that once played a vital role in maintaining a viable balance between forest resource use and environmental protection.

Alawiyya Jamal M. Ahmed holds a master's degree in education from the University of Khartoum and currently serves as an environmental curriculum specialist in the University's Institute of Environmental Studies. As an ACI program fellow, Ms. Jamal is concerned with the present status of environmental education in Sudan, its major omissions, and the types of educational policy reform, curricula, and teaching materials required to overcome these constraints.

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**CONSERVATION FOR DEVELOPMENT IN
BOTSWANA, KENYA, SOMALIA, AND SUDAN**

**Edited by
Rodger Yeager**

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FOREWARD

This publication is a part of a larger body of materials from eight authors in eastern and southern Africa that have been sponsored by the African-Caribbean Institute's Natural Resource Project. The combined works are in three main sectors. Papers by Betty Wamalwa and Mutasim El Moula focus on traditional institutions in environmental management in Kenya and Sudan. Papers by Mohamud Jama, Ahmed Yasin, Ahmed Hassan, and Amina Warsame are concerned with specific sector issues in energy, dry land fishing, camel husbandry, and women in forestry in Kenya and Somalia. The final section by Eagilwe Segosebe and Alawiyya Ahmed concerns modern industrial waste management problems in Botswana and finally the important issues of environmental education in Sudan.

Further studies will focus on issues of forestry and women and the preservation of biological diversity in eastern and southern Africa. As with the projects that are nearing completion or currently underway, the African-Caribbean Institute will edit, publish, and disseminate the works. This commitment and all other aspects of the African Fellowship Program are intended to serve ACI's ultimate goal of assisting in the quest for genuinely African solutions to African problems of resource conservation and development.

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For further information, contact:
African-Caribbean Institute
4 West Wheelock Street
Hanover, New Hampshire 03755 U.S.A.

**THE ROLE OF TRADITIONAL INSTITUTIONS IN MANAGING
THE FOREST RESOURCE: A SUDAN CASE**
Mutasim E. Atta El Mouia

INTRODUCTION

The rural poor of the world are primary users of its natural resources, and at the same time primary misusers when forced by a lack of alternatives. Still, they can be key in efforts to ensure a sustainable use of the environment. The rural poor in marginal areas have developed systems of managing scarce resources that are well adapted to the capabilities and constraints of a particular ecosystem.

Such management systems, although founded on a wealth of indigenous knowledge capable of providing long-term productivity of the resources, are often little known outside the immediate environment.

Recognizing the importance of such valuable indigenous knowledge, resource managers have begun investigating ways and means of integrating such knowledge with the findings of modern science in a coherent, viable program. Such an approach implies the involvement of local people in the development process.

Experience has shown that the failure of many development projects in the third world was mainly because target groups were not effectively involved. Consequently, the involvement of local inhabitants in the development process and in resource management became central to planners and managers. In the search for effective local participation in the implementation and management of development projects, traditional and grass-root institutions become the medium through which local inhabitants were involved.

Such institutions should be capable of establishing good horizontal linkages with local inhabitants as well as vertical linkages with government authorities who implement and manage the projects. A successful project for managing scarce resources in a marginal area should rely on locally available tools and expertise and make utmost use of local skills. By this means, the projects can become self-sustaining.

Traditional ways of managing natural resources have survived in many rural societies despite the changes brought about by modernization. And modern development approaches often ignore traditional systems, diverting resources to large development projects. In these cases the traditional systems have been weakened. However, traditional knowledge should not be treated as a rigid system. It should be strengthened, modified and adapted, when necessary, to cope with more contemporary resource management systems.

Sudan is similar to many other developing countries in that a large number of traditional resource management systems do exist. This paper attempts to study and evaluate the effectiveness of such local management systems in the country as a whole

BACKGROUND

Natural resources in the Sudan are managed either by government agencies or traditional local groups. The government administers natural resources through the Departments of Forestry, Range and Pasture, Soil Conservation, etc. Unfortunately, the policies that result are often piecemeal, resulting in uncoordinated and fragmented activities.

Traditional resource management institutions are linked to tribal structures and groups such as Nazirs, Omads, Sheikhs, etc. Below the tribal hierarchy are smaller institutions responsible for managing and organizing resource utilization at the village level. Over the years these institutions have succeeded in maintaining a balance between resource use and sustainability.

Unfortunately, little is known about the organizational structure and capability of traditional institutions, especially how they managed resource access and use of grazing land, arable land, water and trees.

RESEARCH PROBLEM

Traditional resource management institutions are found in nearly all local societies. Their functions range from organizing land use and land allotment to efforts of environmental protection such as fighting fires, locusts and other undesirable pests. They are linked to tribal structures and get prestige and power from the support given by tribal leaders. Following is a description of the development of local government institutions in the history of the Sudan and the role of traditional leaders throughout this development

Turko-Egyptian Rule: 1820-1885. Local institutions flourished and leadership had respect and power, including the authority to collect taxes and maintain law and order.

Mhadist Rule: 1885-1898. Islamic laws were passed and tribal authority as a political or administrative institution was abolished. However, the army of the Mhadi was organized on a tribal basis, thereby preserving identity by ethnic community and maintaining the potential for restoring tribally-based leadership.

Anglo-Egyptian Condominium: 1898-1955. The British colonial government created a strong base and reinforcement for local government authority, passing a series of laws and regulations to organize and regulate local administration. The Native Administration included the Powers of Sheikhs Ordinance (1927), and the Powers of Nomadic Sheikhs Ordinance (1932). These regulations provided increased decentralization and participation in public administration as well as authority for traditional leaders. Also, the Native Administration took responsibility for maintaining order, organizing the use of the natural resource base, preventing crimes and collecting taxes.

Under this system tribal leaders were very influential to the extent of dominating the political, economic and social life of the country. In the field of environment, they were authorized to regulate the use of common property resources and prevent their destruction. Their authority for natural

resource management was based on customary law as well as specialized written codes, such as the 1932 Forest Ordinance, which gave them the right to arrest any person reasonably suspected of committing a forest offence.

Post-Independence Rule: 1956-1985. The 1971 People's Local Government Act replaced the 1951 Local Government Act. The objectives of the new Act were to create a modern system of administration empowered with legal, political and economic functions to operate at the local and regional levels of the decision-making structure. Thus, in place of tribal leadership, the 1971 Act created new organizations such as Village Councils, Youth Associations, Village Development Committees, etc. Membership in these organizations was elected from the party ranks and tended to be younger and non-traditional in their orientation. Hence the tribal leaders were systematically isolated; new office holders tended to have no links to tribal leaders, and consequently little to do with the concerns of the tribe, its customary laws or traditional institutions. Under such circumstances traditional ethnic institutions lost their tribal support, and the authority and prestige of tribal leaders dwindled.

At the same time, the newly created organizations failed to fill the gap created by abolition of the Native Administration and its associated traditional institutions. The so-called "modern" institutions were ineffective, especially in managing common property and the natural resources of the rangelands, because of the following factors:

1. Government policy abandoned duties related to tribalism for the sake of creating modern institutions in the rural societies.
2. The new emphasis caused the new generation of leaders to ignore traditional lore and knowledge in local societies.
3. The new institutions cut across traditional groups, functioning without consideration for differences in traditions, norms and customs.
4. Traditional leaders were removed from participation in any development planning or implementation.

As a result of these changes in administration of rural areas, natural resources

were misallocated and the environment was degraded, especially the fragile rangelands. This degradation took many forms, but especially in greatly increased desertification and deforestation which led to flooding, reduced food production, declines in gum arabic production, loss of livestock and eventually to increased poverty and hunger among rural Sudanese.

THE CASE OF EL SHEIKH EL SIDDIG VILLAGE

The first part of this study showed the development of local traditional institutions in the history of the Sudan and their role in managing the natural resources, especially in marginal rural areas.

Location. We study a specific village, Sheikh El Siddig, which lies between 14 55' and 32 20' East Latitude on the west bank of the White Nile, about 100 km south of Khartoum.

Objectives. Detailed studies on ethnic institutions are not available, a serious gap in our knowledge. This study examines a community in White Nile Province in which many traditional leaders and institutions have survived despite the legislation and activities of the 1970s. Objectives are:

1. to test the performance of existing village traditional institutions as they operate for protection, conservation and management of natural resources;
2. to conduct a critical analysis of the strengths and weaknesses of such institutions;
3. to find out what factors affect the involvement of local people in resource management activities and to determine the effectiveness of this involvement;
4. to survey and study El Sheikh El Siddig village as a case study to assess the efficiency of different traditional institutions involved in natural resources management.

Hypothesis. To achieve the objectives of this study, the following hypotheses are tested:

1. traditional ethnic institutions are still capable of guiding local development and resource management practices;

2. authority of local officials (such as sheikhs) is a key element in ensuring protection of forests and other local common property resources;

3. the primary reason for the effectiveness of traditional institutions is that everyone shares equally in the responsibility for protection of forest reserves and other natural resources;

4. everyone in the community shares the products of the forest reserve equally;

5. different socio-economic groups have different tree use patterns that vary by use, access and attitudes;

6. existing tree species are not meeting local people's needs;

7. trees are managed (or planted) on private land (in compounds, on goz cultivation of sandy soils, or on gerif cultivation along river banks) for short economic gain rather than for conservation or aesthetic purposes;

8. due to tight protection of the forest area at Sheikh El Siddig, the forest resources in the areas surrounding the village are more heavily exploited than would otherwise have been the case.

Methodology. Data are drawn from different sources including documentary sources such as reports, files, etc., formal and informal interviews with the officials, group leaders and local people, and observation and rapid rural appraisal.

History. The village was established during the Fung period, but acquired its name after a religious leader, El Sheikh El Siddig, settled there in the late 19th century. He dug a well and established a Koranic school and mosque. The main points in the village's history are listed below:

1885	The Sheikh died
1925	Land registration
1937	Jebel Aulia Dam built
	Start of goz cultivation of dukhn (millet) west of the village
	Loss of crop residues
	Abu Gota irrigation scheme established
	Some villagers given farms at Abu Gota

- 1951 Local Government Act and establishment of Native Administration. Native leaders given power to administer affairs of rural people and implement forest regulation.
- 1956 Primary school for boys established
- 1960/61 Drought (senat El Mohal); loss of cattle; some villagers moved to Gezira scheme
- 1970 First forest guard appointed
- 1971 Abolition of Native Administration; establishment of People's Courts and other new institutions (village councils, youth associations, etc.)
- 1973 Drought
- 1979 Start of growing mesquite trees (proposis chilensis)
- 1981 Construction of Khartoum-Kosti road
- 1983-84 Drought; some cattle owners settle in Omdurman
- 1988 Good rainy season; locust invasion
- 1989 Return of Native Administration (appointment of a new Omda)

Survey. During this stage of the project, some of the following preliminary questions and investigations were carried out, including:

a. What?

- What tree species are grown?
- What are the multiple functions of particular trees?
- What are the preferences and criteria for selection?
- What are the key problems and criteria and what are the key problems and opportunities relating to their management?

b. When?

- Seasonality of production - management.
- Historical trends, particularly focusing on channels following droughts.
- International activities.

c. Where?

- Location of compounds, rainfed land, irrigated land, communal land.
- Competition for land.

- Influence of nearby villages and cities.
- Migration of people in and out.

d. Who?

- Who manages and harvests trees (men, women, rich, poor)?
- Who pays for inputs?
- Who browses animals on tree fodder?
- What are institutional controls, tenure procedures and ownership regulations?

e. Why?

- Comparative advantages, short-run costs and benefits versus other activities (crop, livestock, charcoal, fruit, firewood); long-run costs and benefits; criteria for choice.

f. How?

- Management practices
- Marketing flows
- Interrelationships of the various livelihood systems

In addition to these preliminary questions devoted to forest management, the researcher must also prepare maps and diagrams depicting aspects of land use, location of important sites in the village, and areas occupied by different social groups.

During the survey interviews were carried out with each of the following groups:

- farmers owning goats, with gerif and goz cultivation
- farmers owning goats with goz cultivation only
- traders
- artisans
- laborers
- government employees
- migrants to Omdurman
- migrants to Gezira scheme
- migrants outside of Sudan
- displaced settlers
- female-headed households
- sheikhs' families

Additional information was collected from key informants such as:

- court officials
- forest guards

- village council members
- charcoal merchants
- bakery owners
- carpenters
- owners of the mesquite trees (*proposis chilensis*) on Ingeed Island
- individuals from neighboring villages.

Some of the questions were:

Which tree products do you use? What for? Where do these come from? Are they bought or collected? What are the important species?

Also, some problem questions were asked, such as:

Do you get any of the products from the forest around Sheikh El Siddig? Do you cut trees? If yes, where? What species? What for? What tree products are difficult to get? Why? What other products are needed? Why? What species might fill these gaps? What tree species do you have in the compound? Under goz land? On the gelif land? If there are trees, why are these left there? If not, why not? Who owns the trees in the compound? Under goz? Under gelif? Have you or members of your family planted any trees? If yes, what trees? Why? If no, why not? What are the benefits of the protected forest around the village? What may happen in the future?

PHYSICAL CHARACTERISTICS OF THE AREA

Geomorphology. Going south from Jebel Aulin, the village has a geological formation of nubian sandstone. This is the oldest formation in the area. More recent superficial deposits are the goz sands and clay deposits. Just south of the Juba Aulia Dam some residual hills of the nubian sandstone have come to the surface. In other areas the sandstone is covered by a mixture of superficial deposits. The nubian sandstone commonly consists of poorly sorted, coarse to medium-grained sandstone mixed with quartz pebbles and mud flakes. It is believed the sandstone and mudstone represent continental deposits laid down as flow or flood plain material by braiding rivers (Davies, 1985).

The goz (sand dunes or sandy deposits) cover a wide area, 25 to 30 km in breadth. It is

believed the sand is composed of frusted quartz grains, likely derived from local sand alluvial deposits. These deposits consist of fine sand mixed with coarse sand, silt, clay and gravel in different proportions depending on depth.

The alluvial clay plains form a belt of land surrounding the White Nile. It consists of three sub-units: the flood plain, the lower terraces, and the upper terraces. The clay deposits consist of clay mixed with sand and silt and small amounts of coarse material. The clay materials vary in thickness from about 3 to 20 m. Studies show these plains are of alluvial origin that underwent inundation and seasonal flooding at various times.

Soils. According to the studies carried out in the area it is possible to identify the following soil units:

1. Heavy clay soils: these have been developed on flood plains and recent terraces of former courses of the White Nile and on the wadi beds. Generally these are deep, cracking clays with slow permeability and different proportions of silt and clay. They are generally fertile, being extensively untilled for cultivation of vegetables and dura.

2. Sandy clay soils: derived from the nubian sandstone parent material which covered an extensive area. These soils are not fertile, but easy to work and when the nubian sandstone comes to the surface the soil is quite shallow or non-existent. To the west, on the border of Kordofan Province, the oz soil exists. This is the main area for millet cultivation, frequently subjected to wind erosion, especially after the removal of vegetation by cultivation.

Climate. The area is semi-desert with an average annual rainfall less than 250 mm. Generally it is characterized by a hot, dry climate for most of the year with the rate of evaporation exceeding precipitation for most months. The rainy season varies in length but usually occurs between June and September. It reaches its peak in August. Sometimes long dry spells occur which considerably affect both cultivation and natural vegetation. Drought in the area is a recurrent problem. It has been recorded since the beginning of this century and again in the 1940s, 1960s and 1980s. Rainfall will almost certainly fluctuate in the years to

come with annual accumulation less than 140 mm.

Hydrology. Apart from the waters of the White Nile, two other resources exist: surface waters confined mainly to wadi flood plains and ground water from the nubian sandstone aquifers. The latter provides an alternative source to surface water and is annually replenished by water from direct rainfall. A number of wells have been dug with depths varying from 20 to 30 m.

Several intermittent water courses such as wadis and ids are found in the area. Some of these run eastward and end in the White Nile while others incise the goz area. Generally the water runs in these watercourses for just a few hours immediately after sufficient rainfall. Since the ground water lies only a short depth beneath some of the khor beds, the water running in them enriches the water table. Therefore many wells are dug in the beds nearby.

The White Nile forms the most prominent hydrological feature in the area. This river is characterized by its low gradient and has few meanders. Most of its course is a braiding river with many alluvial islands (Shakesby, 1985). It is shallow and wide with no definite banks. During the flood (August to April) the river covers a large area of cultivated lands; when it subsides it leaves a wealth of moist soils stretching more than four km in width (Kogali, 1983).

Vegetation. The vegetation of El Sheikh El Siddig is climax vegetation consisting mainly of a tree cover, in between short seasonal grasses and herbs. The main types of trees in the area include *Acacia tortilis* ssp, *raddiana*, and *spirocarpa*, *A. melifera* (kitir), and *A. orfota* (Loa't). These species have the ability to withstand prolonged periods of drought. *A. tortilis* is the remaining surviving dominant species in an area becoming continually and gradually desertified. *A. raddiana* is never leafless, due to the ecology of the site where it occurs (El Huri, 1982). These are usually near the watercourse where moisture is available. On the other hand, *spirocarpa* occurs away from the water courses where moisture is presumably less than in the *raddiana* sites such as in drier

gravelly areas or on shallow soils where the sandstone outcrops occur.

Other species of trees found in the area but in low density include *Acacia nilotica* (sunut) found in maiyas which are periodically flood areas where water remains for extended periods; *balonites* (Heglig), *Zizyphus* (sidir), *A. albida* (Haraz), etc.

With the exception of the trees, the vegetation is a dry season annual one. After the onset of the rains, green carpets appear, though briefly, as the consumption by animals and man quickly reduces the grass cover to brown stubble.

FACTORS AFFECTING TREE MANAGEMENT

Local Economy. El Sheikh El Siddig village is bound by the White Nile in the east and the goz land on the borders of Kodofan Region to the west (25 km). Also, the village is transected by the Khartoum-Ed Dierm road.

Traditionally the people of Sheikh El Siddig have been semi-nomadic or semi-settled, herding cattle, sheep and goats or practicing subsistence cultivation, growing crops such as *dura* and millet (*dukhān*). However, secondary occupations are very important for the economic well-being of rainfed cultivation and livestock. These include working in the market as traders, butchers and tailors; generating income from laboring in irrigated schemes; joining building trades, or pursuing service occupations such as education and health.

Uncertain agriculture or pastoral returns due to the frequent years of drought has resulted in a great diversity of income-generating activities in the village. The proximity to Khartoum and the existence of a trucking route through the village meant trading and artesant business could be established. However, the building of the new Kosti-to-Khartoum road has diverted a lot of traffic, and many businesses are suffering.

Migration outside the country has been known as a source of income among people of the village since 1960. The high wages in the Arab countries attract many young people. Also, many inhabitants of El Sheikh El Siddig rely on income earned outside the village, especially during the dry season and drought years. Seasonal labor opportunities on the

mechanized farming schemes to the east have grown massively through the 1950s and 1960s to the present. The growth of greater Khartoum during this period also opened up chances for urban employment.

Other income opportunities are found largely during the dry season. Labor migration either to the urban centers or to the Gezira and Managil schemes occur between November and June (dry season). Handicrafts such as rug-making are practiced in the dry season also. Some local businesses, such as cheese making, are dependent on seasonal supplies of milk from Sheikh El Siddig and surrounding villages, and peak during the rains.

Interviews with villagers showed about 45% were semi-nomadic and subsistence farmers; 30% worked in the market and as government employees, 10% worked outside the village as laborers in irrigation schemes and elsewhere, 10% worked in the capital city and 5% worked in the Gulf or in Libya.

The economic activities of the villagers are diversified, with cultivation and animal rearing most important. In addition, many people combined these activities with other work, e.g., animals graze adjacent to fields whilst people are temporarily resident there. Also, jeriflands can be cultivated after the Nile recedes, and at the same time herds can be grazed on the bank of the river without damaging crops. Some people cultivate jeriflands and gozlands and rear animals. This can easily be done because cultivation of jerif and gozlands occurs in different seasons. The combining of more than one activity is due mainly to the physical and cultural characteristics of the region to avoid the natural hazards associated with them. Both cultivation and animal raising are practiced in a number of ecological zones separated from each other by some distances.

Cultivation is practiced in different locations. On the sandy goz soils of Kordofan (25 km west), rainfed cultivation of millet is practiced. In the past, rainfed cultivation was restricted to dura (feterita) on the silty, clayey beds of some wadis. Now many people prefer millet to sorghum. This may be because the water requirement of dura is higher than that of millet, which means that dura can only be cultivated during wet years. Second, weeding,

the most important aspect of cultivation and water conservation, is more difficult on clay and loamy soils than on sand. Thus it becomes even more difficult after heavy showers. Therefore more attention is directed to the goz lands. Also, millet is favored because of its taste. While birds find it sour, it is easy to prepare as food or drink. Farmers try to conserve the limited available moisture to cultivate both dura and millet. Water conservation is achieved through early cultivation and establishment of earth embankments or terraces.

Riverine cultivation (gerif) depends on the annual flood of the White Nile. The flood plain is inundated annually from the beginning of July until September, but cultivation usually begins in April after the recession of the previous year's flood. Recently gerif lands have been put under cultivation by using petrol-driven pumps on the banks of the river.

The gerif land is registered under the Land Registration Act of 1925. Accordingly, individuals hold title to land which stretches out from the Nile bank to the point where the floods retreat. This constitutes a strip of fertile alluvial soil annually replenished by the flood. Much of this land is cultivated using residual moisture, but diesel pumps are used to irrigate land beyond the high flood level.

Before establishment of the Jebel Aulia Dam, the area of gerifland was more extensive and available for cultivation for longer periods. Since the building of the dam, the duration of cultivating gerif land has been limited to 4-5 months (April-August). A wider range of crops is grown on gerif land than on rainfed lands because of the abundance of river water. Okra (bamia), tomato, eggplant, cucumber, watermelon and some other vegetables are cultivated. Cotton, wheat and groundnuts are grown on the irrigated pump-fed schemes such as Abugota and Gaboga.

Animal-raising is a main occupation for a small sector of the population. Many people integrate it with other occupations to avoid the hazards associated with drought and desertification, and the eventual loss of animals. As mentioned before, this is a drought-prone area. People try to maintain a dynamic equilibrium with a variable ecosystem. Livestock owners conveniently range

over large areas to take advantage of rainfall and vegetation that was highly variable over time and space.

With the onset of the rains (June/July), animals are sent westward away from the village to the goz of North Kordofan where the rain starts earlier. Thus they make use of the new grazing and water and reserve the pastures around their settlement for use during the dry season. They stay there until October or November, and by this time grazing resources are depleted and water pools dried up. Livestock then return to the village where water and pasture are still available. During the period from November to March, livestock stay in the vicinity of the village and depend mainly on crop residues and the pods and leaves of acacia tortilis from the reserved forest.

The reserved forest is roamed by goats which are dominant, and to a lesser extent by sheep, which browse. Also, during the long dry season, livestock graze the pasture along the banks of the White Nile after it recedes. Pods of *poposis chiensis* (mesquite) provide good fodder for livestock. This is either collected or purchased from the people having trees on Ingeed Island. Normally the grazing resources are not enough to support the animals in the area, so supplementary food such as oil cake (ombaz) and dura stalks are purchased. Although the area is semi-arid, pastoralists try to maximize the use of the meager grazing resources with minimum damage to the ecosystem. This is clearly noticed, as mentioned above, in their extensive variable movement over time and space.

Recently, due to the prolonged period of drought, some cattle owners have been forced to go out of their traditional grazing areas to Omdurman/Khartoum where they settled in the Kamad El Neck area. They buy fodder and cake from the market and sell milk to cover their expenses. During the rainy season they return with their cattle to the traditional grazing area where there is green growth. In this way they keep a delicate balance within the limits of the ecosystem.

Unlike cattle, small animals such as sheep and goats are less vulnerable to drought and also act as safeguards against drought. They provide a ready source of cash from milk sales to cheese farmers in the area. They are also a

security against crop failure. When nothing is left, people can sell their animals and purchase crops for food. People try to invest in livestock during the good years.

Local Perception of Tree Utilization. The case of El Sheikh El Siddig village provides an excellent example of how traditional institutions have affected forest preservation efforts. The village dramatizes the importance of participation and involvement of local people in such activity. El Sheikh El Siddig was a religious leader who was respected and trusted by the villagers. He was the first in the village to declare priority for forest preservation and to prevent cutting of its wood. El Sheikh had relied on a basic consensus to protect the forest and organize the other natural resources in his area. This consensus derived from his position as a religious leader and from the harsh environment which necessitates cooperative action to realize conservation of scarce resources. Also, it is derived from the culture of nomads since the forest resources play a supportive role for their animals during the critical dry season. The reserved forest which lies near the village is roamed by goats and sheep when the annual grasses and herbs are exhausted.

Since 1927 the forest has been recognized as a forest reserve and an ordinance was passed to that effect. It is believed the present coverage of trees is more than that of the original area, although similar areas in other parts of the Sudan have been completely destroyed in the intervening years. This is because people themselves and not government institutions took the responsibility of protecting the forest around Sheikh El Siddig from misuse. This was practiced before the Forest Ordinance was enacted. In addition, everyone in the community has the obligation to stop tree felling and offenders are taken to the Native Court. In the village a number of volunteers patrol the area to check on woodcutting activities. Prosecutions are brought by local reporting of the law to the guard, who checks on the offence and brings the accused to court. The courts are either the local village court or the district court. The village court with its membership drawn from El Sheikh's sons and other older people put strong penalties on forest

offences. The court was authorized to confiscate the products and give a fine which might amount to LS 200 for a forest offence.

Such restrictions succeeded in minimizing offences against the forest to the extent that not more than one offence happens in a month. However, strict enforcement of laws began during the Native Administration period (1951-1971). In 1971 the official responsibility for the forests was transferred to the government and the Forest Department. The Forest Guard began operations in the late 1970s, covering five villages in the Sheikh El Siddig area. Guard efficiency is ensured by widespread awareness of regulations and cooperation of local people and their leaders. Forest Guards and regulations are found in most areas in the Sudan, but few are as effective as that found in Sheikh El Siddig, due to the strong and long commitment of local leaders, widespread knowledge and apparent acceptance of the regulations. The effectiveness of the regulations is due more to the people themselves than to the forest authorities.

Like other rural areas in the Sudan, the village depends overwhelmingly on fuelwood and other forms of biomass for more than 90% of its energy and construction needs. While this results in stripping the landscape of vegetation, the people of El Sheikh El Siddig are allowed only to collect dead wood and lop dead branches. Sometimes dried animal dung is also used for fuel.

Villagers obtain most of their construction needs from urban areas such as Getena on the White Nile and Omdurman. Interviews with a builder, a wood seller and a carpenter showed that most villagers prefer eucalyptus and hardwood for building and softwood for furniture. Eucalyptus comes from the irrigated forests of the Gezira Scheme and softwood from the Gebel Merra in western Sudan. Khogali (1983) estimated that on the average a village family uses about 14 donkey loads of wood and charcoal. Little of this need is satisfied by local wood, even that obtained from dead branches of fallen trees. However, sometimes they practice selective felling of one or two stems of multi-stemmed trees such as *Spirocarpa* for energy use or for building fences.

Villagers import wood and charcoal from Dar Kababbish in north Kordofan Province and

from the eastern bank of the White Nile. In order to satisfy their needs for wood, people cover extensive areas and this assists in preserving vegetation.

Concerning tree management and the socio-economic benefits derived as a result, a list of hypotheses was set for testing, and interviews with key informants carried out. The final result was a ranked list of preferences with reasons for the position of each species on the list.

DECISION-MAKING IN THE VILLAGE

The village is dominated by the influence of the Sheikh's family. This leadership, both administrative and religious, has been continuous throughout successive administrations. The result has been a stable local political structure despite changes made during the abolition of the Native Administration and the creation of new leadership during the 1971 Local Government Act. It is also clear that the religious sheikh as well as the administrative sheikh are the focal points of all institutions in the village, whether governmental or non-governmental. The sheikhs play a unique role in the life of the people: they represent the regional government in the village, and the administrative sheikh is responsible for tax collection and other local services.

In social life the sheikh is responsible for monitoring order, preventing crimes and settling disputes. Hence he acts as a system of social control; there are no police in the village. The sheikh is also a member of the Court.

In the field of environment, the sheikh organizes grazing rights and solves disputes. The administrative sheikh and the Forest Guard are responsible for organizing efforts for forest conservation and protection.

The religious sheikh, being the spiritual leader of the community, plays a major role in guidance and support of the administrative sheikh. His authority stems from being the Imam and advisor of the villagers in religious as well as other matters related to their life.

FURTHER READING

Arifi, S. A., et al. "Some Aspects of Local Government and Environmental Management in the Sudan." Proceedings of the Khartoum Workshop on Airdlands Management, 22-26 Oct. 1983.

Desmann, R. F., Milton, J. P. and Freeman, P. H. (1974). "Ecological Principle for Economic Development." J. Willey, London, p. 252.

Ecohold, E. P. (1982). "Down to the Earth: Environment and Human Needs." Norton, IIED, p. 238.

Hussein, H. E. (1983). "Citizen Participation: The Experience of Sudanese Local Government." Ph.D. Thesis (unpublished). Institute of Public Administration, Khartoum.

Salih, G. M. (1974). "The Heritage of Local Governmen" In John Howell (ed.), Local Government and Politics in the Sudan, Khartoum: Khartoum University Press, p. 21-24.

**ENVIRONMENTAL EDUCATION IN SUDAN:
THE NEED FOR NEW CONTENT AND METHODS**
Aliwayya Jamal Mohammed Ahmed

The government of the Sudan has made a number of attempts at reversing environmental damage. One such project, by UNDP, is the replanting of the *Acacia Senegal* belt in the Kordofan region. In a related study, the Ministry of Planning, the Institute of Environmental Studies and IIED, are developing recommendations for an overall approach for the rehabilitation of the *Acacia Senegal* belt throughout the Sudan. Another successful project is the trial replanting, by the Department of Range and Pasture and the UNSO, of degraded areas around water sources in the El Cdiya area. There are many other small projects with the goals of arresting degradation and providing models of proper resource management throughout the country. But a closer examination of these activities shows that these responses to environmental challenges are fragmented, uncoordinated, and limited in scope and objectives.

Most environmental rehabilitation projects do not match the level of the environmental crisis in the Sudan, and such attempts may even be described as ill-conceived. The projects do not recognize that man is the major agent of change and contributor to the degradation taking place in the country. More appropriate responses to environmental degradation must be directed toward the root cause of the problems. Looking into the environmental problems of the Sudan, it is clear that they are the result of human behavior and human attitudes. Such an understanding puts the emphasis on the behavior of individuals, government agencies, and corporations. Thus, an effective solution of these problems must start with a change of human behavior through education, awareness, and law enforcement. Environmental education programs for all sectors of the society should be considered the right response to the Sudan's environmental problems.

A closer look at the Sudan's main environmental problems indicates that they are the result of human behavior. It is true that natural events and disasters have played a role in the intensification of these problems, but

even so, the major causes are related to human behavior. If such an understanding is accepted, any corrective measure must have education as its main focus. However, an educational component is often ignored when considering the different proposed or implemented environmental rehabilitation projects. Instead, development projects are simply designed to either rehabilitate degraded areas or provide the inhabitants with alternative means of livelihood without any measure to change behavior. Despite such good intentions, closer examination of these projects reveals that they are badly designed, uncoordinated, and planned and implemented at the top without proper consideration of the local resource base or lively local participation.

Evaluations and studies show that many of these projects failed to achieve their objectives mainly because of the defects mentioned above and a lack of an educational component. Environmental problems cannot be treated in a fragmented manner or directed towards symptoms. It requires an integrated approach in which activities in resource management are supported and reinforced by activities in social development and education.

An assessment of the present educational system in the Sudan shows the lack of such a holistic approach in dealing with environmental issues. Studies carried out by Massa (1983) and Dossougi (1983) show many deficiencies in the school curricula. The present curricula lack a clearly defined environmental orientation. There are several scattered environmental topics in various subjects which may provide students some knowledge, but these are not enough to change behavior.

What is needed in the Sudan is the introduction of a true Environmental Education programme in schools. This type of education increases knowledge, raises awareness, develops skills to deal with present day environmental problems, creates commitment and leads to change of behavior which promotes sustainable development.

Environmental Education Curriculum

- I. Environmental Problems
 1. Desertification
 2. Deforestation
 3. Inappropriate technology
 4. Air and water pollution
 5. Waste management
 6. Sanitation
 7. Indiscriminate use of pesticides
 8. Aquatic weeds
 9. Wildlife depletion
- II. Some Causes of These Problems
 1. Individual behavior
 2. Behavior of government agencies and departments
 3. Behavior of corporations and the private sector
- III. Some Measures to Respond to These Problems
 1. Pressure to change politics
 2. Taxation
 3. Boycotting
 4. Environmental education
- IV. Environmental Education
 1. To increase environmental knowledge
 2. To provide skills to deal with present day and the future environmental problems
 3. To create commitment
 4. Eventually to change behavior

RESOURCES FOR THE STUDY OF SUDANESE DESERTS

Abbadi, K.H., 1974, Progress report on DDT residue in human milk in Sudan. Gezirer Pesticide Laboratories, Plant Protection Department, Wad Midani, Sudan. pp. 6.

Abbadi, K.H., and Shaaban, I.S., 1986, Organochloride insecticides in the blood of occupationally exposed workers in Sudan. Gezirer Pesticide Laboratories, Plant Protection Department, Wad Midani, Sudan.

Ahmed, A.H.M., 1986, "Pesticides and their effect on the environment" in

Environmental Issues and Future Environmental Prospects in Sudan; a collection of papers of the Sudan Environment Conservation Society, April 1986. p 73-84. (In Arabic).

Barnard, G. and Zaror, C., 1986, "Industry: creator or destroyer of forests", The Courier, no. 95.

Basta, A.H., 1978, "Some aspects of pesticide residues in the Sudan", Plant Protection Conference, Munster, 6-9 August, 1978.

Bayoumi, M.S., 1975, "Nomadism in th Sudan", a paper presented to the Preparatory Conference of the ILO on Comprehensive Employment Mission, Khartoum, 1975.

Besher, K.T., 1975, "The problem of the water hyacinth, *Eichhornia crassipes*, with special reference to the Sudan, Plant Protection Report, 1975.

Beshir, M.E. and Adel-Gadir, L., 1975, "Aquatic environments in the Sudan with special reference to the Gezira canalization scheme", in Aquatic Weeds in the Sudan, with special reference to water hyacinth, ed. Mohd. Obeid.

Bishari, 1961, "The effects of the water hyacinth on the fisheries of the Sudan", H.R.U. Report 8, p 29-36.

Callaghan, T.V., Bacon, P., Lindly, D. and Moghraby, A.I., 1985, "The energy crisis in the Sudan: alternative supplies of biomass", in Biomass 8, p 217-232.

Dahab, S.M.M., 1988, "Some aspects of pesticide residues in soils and vegetable tissues", unpublished M.Sc. Thesis, I.E.S. University of Khartoum, pp 93.

Davies, H.R.J., 1959, "The effects of *Eichhornia crassipes* on the people of Sobat and the White Nile between Sobat and Kosti, H.R.U. University of Khartoum, 6th Annual Report, 1958/9. p 26-29.

- DECARP, 1978, Desert Control Bulletin, UNEP, vol 7, June 1978.
- Dissogi, L.A., 1974, Some aspects of the biology and control of the water hyacinth, *Eichhornia crassipes*, M.Sc. Thesis, University of Khartoum.
- El Mekki, A.B.A., 1978, "The utilization of National Parks as educational sites in the Sudan: the case of Khartoum Sunt forest, Um Barona, and Dinder National Parks", unpublished M.Sc. degree I.E.S., University of Khartoum, pp 143.
- El Sayem, F. El Kider, 1978, "The effects of deforestation in equatorial Africa or rainfall in central Sudan", *Mausan*, vol. 38, no. 2, p 233-238.
- FAO, 1979, "A report to the government of Sudan on forestry education and legislation for local communities", Rome.
- GEMs, 1988, "Assessment of urban air quality", UNEP and WHO.
- George, T.T., and Moghraby, A.I., 1978, "Status of aquatic pollution in the Sudan, its control and protection of living resources", sixth FAO/SIDA Workshop on Aquatic Pollution in Relation to Protection of Living Resources, Nairobi, Kenya, 12 June - 22 July, 1978.
- Hakem, O., 1976, "Revision of agricultural production relations in the Sudan", Department of Agricultural Economics, Ministry of Agriculture, Khartoum, Sudan.
- Hayes, Denis, 1979, "Pollution: the neglected dimensions", *World Watch Paper* no. 27.
- Hidyetalla, A., 1975, "The development of water resources in the Sudan"; Proceedings of the First National Agricultural Congress, Khartoum, Sudan, April, 1975.
- Ishag, H.M., 1970, "Growth and yield of irrigated ground-nuts", *Journal of Agricultural Science*, no. 74, p. 533-537.
- Khogali, Mustafa M., 1987, "An assessment of Gereih Ai Sarhe Pilot Scheme for the settlement of nomads and improvement of the livestock sector in the Sudan, *Geo-Journal*, vol. 14, no. 1, p. 53-62.
- Koch, W., 1974, Report on expertise journey of Prof. Koch within the framework project III/IFE 3920 Sudan 868/72, Water hyacinth control in the Sudan.
- Kühnhold, W.W., 1969, "The effect of water-soluble substances of crude oil on eggs and larvae of cod and herring", *I.C.E.S.C.M.* 1969/E:17.
- Lesinger, Thomas, 1987, "Micro-organisms and persistent compounds: an overview", *Microbial Technologies To Overcome Environmental Problems of Persistent Pollutants*, ed. Martin Alexander, UNEP, Nairobi, 1987.
- Mahdi, M.A., 1974, "Studies on the factors affecting survival of Nile fish: the effect of 2-4-D", *Sudan Notes and Records*, vol. 55, p. 134-137.
- Ministry of National Planning, "The six-year plan of economic and social development, 1977/8 to 1982/3", Vol I and II, Khartoum University Press.
- Moghraby, A.I. and Abdu, A.S., 1985, *The Dinder National Park Study Area; final report*, I.E.S., University of Khartoum.
- Muktar, 1988.
- Munir, M.B. and Hakim, S.A.R., 1985, "The Dinder National Park: a cry for conservation", *Sudan Environment*, newsletter of I.E.S., University of Khartoum, vol. 5, no. 3.
- Newbold, D., 1924, "A desert odyssey of a thousand miles", *Sudan Notes and Records* 17, p. 447-832.

- Niblock, T., 1987, "Class and power in Sudan: the dynamics of Sudanese politics, 1898-1985", Suny Press, 1987.
- Numir, M.B., 1983, "Wildlife values and management in northern Sudan", Ph.D. dissertation, Colorado State University, USA, pp.228.
- Orekoya, T., 1978, "Oil pollution abatement", presented at the sixth FAO/SIDA Workshop on Aquatic Pollution in Relation to Protection of Living Resources.
- Owen, J.S., 1952, "The unusual cruel traps of Darfur", Sudan Wild and Sport, 2(4):14-16.
- Saad, A., (1975), "Pesticide chemicals in the Sudan", Technical Bulletin, National Council for Research, Khartoum, Sudan.
- Saghayoon, El Zein, 1975, "The water resources of the Nile for agricultural development", Aquatic Weeds in the Sudan with Special Reference to the Water Hyacinth, ed. Mohd. Obeid, November, 1975.
- Shawki, M.K., 1968, "The role of rural water in economic and social development in the Sudan", Khartoum, 1968.
- Shroeder, J.H., 1982, "Man versus reef in the Sudan: threats, destruction, protection", Proceedings of the 4th International Coral Reef Symposium, Manila, 1:253-257.
- Sudan Gezira Board, 1985, "Subject tender for the supply of insecticides and herbicides", Season 1985/1986, Barakat, pp.18.
- Tag El Seed, M., 1972, "Some aspects of the biology and control of *Eichhornia crassipes* (Mart) Solms", Ph.D. dissertation, University of Khartoum.
- Taha, I.M., 1987, "The influence of some pesticides on legume *Rhizobium* symbiosis", unpublished M.S. Thesis, I.E.S., University of Khartoum, pp. 92.
- Vale, B., 1985, Sudan Gezira Board Tender, 1985, Shell Chemical, pp. 2.