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Ministry of Environment &  
Physical Development  
Higher Council for Environment &  
Natural Resources  
General Secretariat  
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وزارة البيئة والتنمية العمرانية  
**المجلس الأعلى للبيئة والموارد الطبيعية**  
الأمانة العامة  
شارع الجامعة

Date : 27/02/2002

No : .....

التاريخ : .....

الرقم : .....

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Subject: Report on Incentive Measures to Conserve  
Biodiversity in the Sudan

Reference to your letter dated 29<sup>th</sup> November 2001 in connection with the above-mentioned subject, I would like to apologize for the delay in the preparation of the report.

Attached herewith, is the above-mentioned report for your consideration.

Thanks and best regards.

26872

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## *Higher Council for Environment and Natural Resources*

### **Report on Incentive Measures to Conserve Biodiversity in Sudan**

#### **I. Introduction**

1. Ecological degradation and its corollary - biodiversity loss - pose a serious threat to development. Sudan, like other developing countries, seeks to utilise its biodiversity resources to generate real economic growth and provide income to address social goals. It is agreed that ecologically destructive economic activities are inefficient not merely because of the resulting resource misallocation but also because of the scale of activity levels.

2. In order to bring about sustainable resource conservation and management, it is essential to adopt several different approaches for managing Sudan biodiversity resource base (SBRB). For a long period of time, Sudan relied entirely upon command -and-control regulations, neither had been effective in protecting SBRB. The pace and extent of SBRB degradation made it clear that more flexible, far-reaching approaches are needed. Incentive-based approaches to the conservation of SBRB can help fill that need by complementing, and in some cases substituting for, traditional regulatory approaches. Although Sudan is yet to start implementing incentive-based approaches to SBRB protection, nevertheless, there were some efforts which can be such labelled.

3. This report is to give visibility to these efforts to experimenting with incentive-based approaches around the nation and to suggest further areas to identify, design, and implement incentives and to give views on what policy changes would help to make the use of incentives more effective and widespread.

#### **II. Sudan Biodiversity Resource Base**

4. With 2.5 million square km of land area, Sudan occupies 2% of the world area making it the tenth largest country in the world. Surrounded by nine neighbouring countries with 9000 Km of the Nile, the longest river in the world, and its tributaries bisecting the country from south to north and 650 Km of coast line on the Red Sea, Sudan is endowed with diverse ecological zones and natural

resources with rich biological diversity and habitats that host a wide range of fauna and flora.

**Box 1: Sudan Biodiversity Resource Base**

The large variation in climate and soil has been reflected in a high diversity of ecological habitats. The biodiversity of Sudan includes over 3100 species of flowering plants, of which 409 are endemic. Wildlife is an important component SBRB; out of the 13 mammalian orders in Africa, 12 occur in Sudan that include 266 species and subspecies, 19 of them are known as globally threatened. The mammalian wildlife of Sudan is characterized by the regularity of elephants, buffalo giraffe, rhino, gazelles, ibex, chimpanzee mammals, about 931 species of birds, over 120 species of fresh water fish, 250 species of marine fisheries, about 100 species of snakes, 1000 insects, and unknown figure of reptiles and amphibians.

Sudan has some 36 million ha of arable land, 100 million ha of grazing land, and around 18 million ha of natural forests. Sudan has four main water resources: rainfall, the Nile river, ground water, and the Red Sea.

5. The importance of Sudan biodiversity resource base (SBRB) arises from the fact that the livelihood of the population is fully depend on it. It provides many products and services that includes water, crops, livestock, wildlife, fish, wood for fuel and construction, forage, recreation, carbon sequestration, and medicinal material. Throughout history, human interference with SBRB have occurred, in an effort by the local population to obtain the basic needs of food, water, shelter, clothing, energy, and other small needs. The magnitude of these interference have remained small compared to the size of SBRB. Even the forced migration, at times of hardship, of some local communities to new locations, was practiced on a local level.

6. The expansion of the national economy; of mechanized and chemicalized agriculture; and of the fast urbanization of the country population; has put growing pressure on the country's natural resources, upsetting the natural cycles which over the years have permitted living creatures, including human beings, to adjust to and achieve a rough equilibrium with SBRB. This neccessitated the regulation of SBRB.

### **III. An overview of Regulatory approaches to SBRB protection**

7. Sudan national and state environmental regulatory systems relied over the years entirely upon command-and-control regulations. Despite significant progress in addressing the many environmental problems of Sudan, SBRB degradation continues to be widespread. Neither regulation nor litigation had been effective in protecting it. The pace, extent, and many dimensions of SBRB degradation- and the demonstrated cost and limited sphere of influence of existing regulatory programs- make it clear that more flexible, far-reaching approaches are needed.

8. The emergence of ecosystem management as a strategy in science and in public policy as a means by which to reconcile economic and environmental objectives has rationalized the development of tools which are better suited to this purpose than the existing regulatory framework. Incentive-based approaches to ecosystem protection can help fill that need by complementing, and in some cases substituting for, traditional regulatory approaches.

### **IV. Incentive-based Measures in Sudan**

9. Incentive-based measures is any mechanism that motivates a company, individual, community, state, or any other organization, to improve environmental performance or natural resource management. They may include anything- money, information, or social and cultural rewards- that motivates activities that help to maintain or restore ecosystem function or conditions. The flexibility inherent in these approaches builds support for environmental protection within the private sector, while the efficiency, effectiveness, and transparency of such programs builds support among the public and environmental community.

10. Information can be an effective part of incentive-based environmental strategies. Reliable, straightforward information about the ecosystem impacts of different production processes or daily behavior can motivate significant changes in behavior. Sudan Higher Council for Environment and Natural Resources (HCENR), established in 1991, is using the information approach through making long-term plans for rational and balanced use of environmental resources and implementing programs that provide basic information on ecological conditions and trends. This information-based measure seek to motivate change by providing information about the ecosystem impacts of different production processes of daily behavior. HCENR, through promoting networking, shares these information with different stakeholders which is essential for an informed and inexpensive approach to biodiversity conservation.

### **Box 2: Sudan National Biodiversity Strategy and Action Plan**

Recently HCENR, funded by UNDP & GEF, has developed Sudan National Biodiversity Strategy and Action Plan (NBSAP) within the framework of the Convention on Biological Diversity. NBSAP has aimed to strengthen the capacity of national institutional structures and human resource development in the country motivating the key stockholders to contribute to the conservation and sustainable utilisation of biological diversity. NBSAP has built upon and reinforced other existing national strategies, plans and programs. It has established a multi-sectoral steering committee, conducted biodiversity assessment, identified and analysed options, and prepared and disseminated a country report.

11. Similar measure which is also information-based is the **voluntary approach** to encourage better environmental performance. This voluntary approach complements the government efforts and also play the very important role of environmental watchdogs capable of influencing private and public and programs and projects. Information creates a "coercive incentives" which is an incentive predicated on avoidance of destructive actions to the environment. The public availability of performance information of the resource-users, a company for example, will positively influence its behavior because it perceives that publication of the information may affect its wellbeing. Voluntary organizations in Sudan, like the Sudanese Environment Conservation Society (SECS), follow a strategy that makes information about facilities and products available to the public, in the expectation that this will lead to greater accountability and voluntary improvement in performance of resource-users. SECS, the oldest and biggest environmental membership group in Sudan, has the flexibility to develop, test, and carry out innovative approaches to working with communities, especially women and the poor. With the ability to raise public awareness and provide technical assistance and other educational activities, SECS and other voluntary organizations, have a role in policy advocacy, information gathering, and applied research.

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**Box 3: Advocating Environmental Policy**

SECS launched in 2001 a lobbying and advocacy program (LAP), funded by Novib of the Netherlands, aiming to create a mechanism to link the public with policy-making process for a better environment quality.

LAP specific objectives are as follows:

- \* to raise public awareness about environmental issues and legislation,
- \* to promote popular participation in national efforts to tackle environmental problems,
- \* to support the dialogue for the citizens right to a healthy and better environment,
- \* to work towards the implementation of environmental policy,
- \* to promote cooperation between stakeholders in environmental issues.

12. Another set of tools are the **community-oriented approaches**. Policy makers are challenged to find solutions which engage stakeholders, reflect balance between economic and environmental objectives and which offer opportunities for cooperative planning in lieu of the regulatory straitjacket. It is agreed that there is a great need to involve local communities, and to design models which decentralise management and offer incentives to the local population to conserve biodiversity resources. Poverty, dependency on natural resources, and erosion of biodiversity are closely intertwined. In areas where people are to be involved, incentives for their participation must be identified.

**Box 4: Incentives addressing conflicts in protected areas  
(Dinder National Park Project)**

Dinder National Park Project goal is the preservation of the Park biodiversity. Dinder Park, established in 1935, is one of two parks in Sudan designated as a UNESCO Biosphere Reserves. The Park is threatened by the absence of land use plans in the areas surrounding the Park which lead to horizontally-expanded rainfed farming with its destructive consequences on biodiversity, besides the civil wars and recurrent droughts that caused a large influx of people who settled within the Park peripheries. The project intervention, funded by UNDP and GEF and executed by HCENR, is to encourage species conservation and the sustainable use of resources through the integration of the local communities in the utilization and management of the Park biodiversity. The project emphasizes the need to involve the local people within and outside the Park by allocating funds to improve their standards of living.

13. The **social and cultural incentives** are another set of incentives and maybe the most important of all. The desire to identify oneself or one's business as a member of a place-based community can be a powerful motivator for action. The promise of better standing and trust within the community can also motivate greater stewardship. Social norms that exclude ecologically destructive behavior may achieve longer lasting and more widespread change than any other type of incentive.

14. **Indigenous knowledge** is part of the social and cultural package. It is about what local people know and do in their physical environment and what has been passed to the generations. It is incorporated in the way of life and is part experience, customs, religion, customary laws and attitude of people towards their lives and those of other living and non-living things. It has a great value in maintaining and conserving the biodiversity.

#### **Box 5: The Value of Indigenous Knowledge**

The traditional farming system of mixed cropping, soil and water conservation and biological pests management is still alive and well in many parts of Sudan. Food security, which came into sharp focus in the last two decades, had revealed the role traditional knowledge about local and wild foods and how vital it had been in the years of drought and the transient episodes of hunger. The Bambara groundnut is a case in point. It is now the third most important legume in sub-Saharan-Africa. In Sudan this crop gained popularity and economic value after the famine of 1984.

Another food security crop, which had been exposed to the Sudanese public opinion, is mukheit, the hidden harvest of Western Sudan. It saved lives in 1984 and alleviated the suffering in 1990 when harvest failed again. The technique of collecting the berries and removing the undesirable substances is a woman speciality. Woman make better use of non-cultivated species than men do. Woman draw most of their plant material (for food, fibre and medicinal purposes) from wild plants. In many areas women derive almost half of their income from these plants.

For numerous ailments indigenous knowledge has a cure. Garlic significantly lowers cholesterol; *Acacia nilotica* pods relieve cold symptoms. Dysentery is cured by the fruits of baobab tree. These are few of many examples where the use of traditional knowledge is working as an incentive to local people.



## **V. Future efforts for conservation and management of SBRB**

15. Future efforts for conservation and management of SERB must derive from a set of clear objectives, mechanisms for action, and commitment from all stakeholders. Local communities who influence conservation, management, and utilisation of biodiversity are major stakeholders in its conservation. In areas where people are involved, incentives for their participation must be identified. Incentives represent a second generation of tools to protect ecosystem functions. Compared to regulatory approaches, incentives are more flexible, easier to adapt to local circumstances, and often more economical. But the transition to using incentives can be difficult and time consuming.

Given our limited experience with incentives, predicting their impact on SBRB is still to be assessed.

## **V. Policy incentives and disincentives to biodiversity conservation**

15. **Pervers** incentives have accelerated the conversion of habitat that would n't have occurred at all without the government interference. The typical example is the dryland farming system which was started in Eastern Sudan in 1944 to meet the increased demand for food created by World War II. From an initial area of 1200 acres, it expanded to reach a record of 11 million acres in 1998. Recent evidence on land degradation and use in Sudan suggests that the country has undergone rapid land conversion. Various studies have showed that the continuous decline in Sudan's forest and woodlands, appear to be mainly due to land conversion for agricultural expansion.

16. Since almost all land in Sudan is state-owned (or extensions of the state, as in the new federal system, such as local authorities and provinces), this implies that the state possesses the property rights. However, the state authorities may transfer temporarily this right to private users. The right to use the land is defined for a period of time which is renewed annually if some basic conditions are fulfilled. Conservation of SBRB has not been a feature of the land tenure system. Extensive land allocation has been made for this type of farming. The continuous expansion has resulted in extensive removal of trees, land degradation, and destruction of habitats.

### **Box 6: Perverse Incentives to farmers in Sudan Mechanised Farming System (MFS)**

As ecosystem degradation of MFS continued and many ecological functions- including soil productivity, nutrient cycling, disturbance regimes such as fire- upon which ecosystem renewal depends, are impaired or inadequate managed, the question raised is what drives a system to degrade its own resource base? Although little information is available to explain the present pattern of behavior within land-users and to understand the causes behind why they perform in such a manner damaging to their own farm businesses and destructive to the entire MFS, some suggest that the absence of secure property rights may have created a bias toward extensification over intensification (environmental conscious farming) by greatly decreasing the incentives for farmers to invest in their leased-lands discouraging them from conserving their own resources. It is argued that the existing tenure system offers little motivation for land-users to maintain or restore ecosystem function or condition.

The "short-term" leasing of land may reinforce the tendency towards short-term time horizons in production decisions. From the land-users' perspective, long-term management strategies are considered a cost rather than investment since the land-holding is limited by the temporarily lease granted by the state.

17. Within the context of price controls and market regulation, prices of other goods and services have been distorted relative to biodiversity, and biological resources themselves have largely been treated as free. The price of most goods and services fail to reflect the value of biological resources and there are few incentives for producers and consumers to carry out economic activities in a way which does not deplete or degrade biodiversity.

#### Box 7: Gum Arabic Prices

The rainfed farming economy of the central clay plains which, because of their soils characteristics, are extremely difficult to work manually and which are therefore farmed using tractors and agricultural machinery. The natural vegetation belongs to the "low rainfall woodland savannah on clay" of the Acacia seyal-Balanites group. The grass cover is mainly Cymbopogon nervatus with the main trees being Acacia senegal, Acacia fistula, Acacia mellifera and Balanites sp. Cropping has brought around major changes where most of the wooded area had been cleared and put under crops. Taking as an example the Acacia senegal or Gum Arabic which serves a variety of valuable ecological functions such as control of erosion/runoff, wind breaks, dune fixation, nitrogen fixation, in addition to its economic benefits. In recent decades, though, a distortionary government exchange rate as well as export and pricing policies have resulted in considerable fluctuations in the real producer price of gum from Gum Arabic, as compared with competing cash crops such as sesame, and even food crops such as sorghum (Barbier, 1998). The decision to incorporate Gum Arabic and/or other trees in the farming system of dryland farming depends on whether or not benefits from those trees exceeds those of cropping systems. No consideration is taken for the environmental benefits of the Gum Arabic trees though they may be significant in maintaining the yields of field crops within the farming systems. From the farmers' perspective, maintaining the real producer price for Gum over the long term is crucial to ensuring that farmers have appropriate incentives to rehabilitate and cultivate Gum gardens as part of their cropping systems (Barbier, 1998).