

THE REPUBLIC OF THE GAMBIA

DRAFT

NATIONAL REPORT ON THE
IMPLEMENTATION OF THE
CONVENTION ON BIOLOGICAL
DIVERSITY

PUBLICATION OF THE AGRICULTURE
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VISION FOR BIODIVERSITY IN THE GAMBIA

Generally, the vision for biodiversity forms an integral part of The Gambia inc. vision 2020: -

“ To transfer The Gambia into a financial centre, tourist paradise,
a trading, export oriented agricultural and manufacturing nation,
Thriving on free market policies and a vibrant private sector,
Sustained by a well educated, trained, skilled, healthy,
Self-reliant and enterprising population and guaranteeing
a well-balanced ecosystem and a decent standard of living
For one and all, under a system of government based on
the consent of the citizenry”.

This very broad vision for the socio-economic development of The Gambia has very serious implications for biodiversity conservation, management and sustainable use. Consequently, the present action plan/strategy will further simplify the broadly based vision 2020 and specifically present a biodiversity vision for The Gambia “of *a society that sees itself as an **integral** part of nature, recognises different life forms, sustainably uses natural resources and maintains for posterity a nurturing and dynamic world rich in biodiversity* ”.

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A: EXECUTIVE SUMMARY

Biological diversity is the richness in variation within and between species and in ecological systems. Apart from being a key element for ecosystem survival and sustenance of all life on earth, all living creatures including humans derive their living from biological diversity and the life-support systems it maintains. Specifically, biological diversity supports human societies ecologically, economically, culturally and spiritually.

Mankind has the right to change and utilize nature but, at the same time, it is our responsibility to prevent serious disturbances to the ecological system.

However, despite the importance of biological diversity, ecosystems are being degraded and species and genetic diversity reduced at an alarming rate due to the impact of our growing human population and increasing resource consumption rates. In a relatively short period of our history (about 90 years) most of our larger wildlife species have disappeared together with much of the original forest cover (75%) which sustained them. The global and the corresponding national decline in bio-diversity is now recognized as one of the most serious environmental issues confronting the Gambia and its people.

In recognition of the urgency of the world-wide biological diversity situation, the global community negotiated the UN convention on Biological Diversity as one of the most significant developments in international law and international relations relating to the environment. The Gambia signed the convention on biological Diversity on June 12, 1992 and ratified it on June 10, 1994 as the 63rd party to the convention.

In accordance with its relevant provisions, the objectives of the convention on biological diversity are as follows:-

- * The conservation of biological diversity
- * The sustainable use of its components
- * The fair and equitable sharing of benefits arising out of the use of genetic resources.

Generally speaking, these broad objectives illustrate the nature and breadth of the convention. The convention, as a global instrument set the stage for each nation to assess the adequacy of current efforts to conserve biological diversity and use its components in a sustainable manner, and to determine whether gaps in our understanding about bio-diversity do exist or not and if they do, how they will be filled and opportunities realized.

In the Gambian context, the evolution of a strategic and policy concept for biological diversity started with the Banjul Declaration and the wildlife conservation Act of 1977. These documents/legal instruments, particularly the Banjul Declaration, provide the basis for the conservation and sustainable use of biological resources in the Gambia. The ensuing years witnessed the creation of a fully fledged Department of Parks and Wildlife Management (1981)

The creation of the then environment Unit (now the National Environment Agency (NEA) and the creation of a Ministry of Water resources and the environment (1981). This was followed in 1987 by the promulgation of a National Environmental Management Act designed to provide the necessary administrative and legal machinery for policy formulation in the environment sector. The Act also created the National Environment Management Council which is served by a technical advisory body (the National Environment Management Committee). Work on the preparation of the GEAP - Gambia Environment Action plan started in 1991 and finalized in 1992. The GEAP is the Gambia's most recent blue print for the conservation, management and sustainable use of the country's biological resources.

The Gambia's post UNCED ecological concept and sustainable development principles are reflected in sectoral statements and developments such as the Gambia Forestry Action Plan and policy documents, the fisheries policy, and the livestock and Agriculture policy documents to name just a few.

To fulfill one of the key obligations for parties that have ratified the convention, the Gambia prepared her national biodiversity strategy and Action plan. The Action plan sets out a strategy for action under the following main headings:- Forestry and forest biodiversity, fisheries and aquatic ecosystems; wildlife and wetlands, agricultural biodiversity, livestock, geology and water resources, policies and legislation, international agreements, economic valuation of biodiversity and social and cultural aspects of biodiversity. Much of biodiversity loss in the Gambia, as elsewhere, is due to economic policy distortions and the resultant poverty that encourage rapid over exploitation of biological resources. The plan recognised that slowing down the rate of biodiversity loss will require policy and institutional reform as well as institutional strengthening for effective action in all the areas. The action plan was prepared with the active participation of local communities from the herder and harberlist to the trader and policy makers through zonal and divisional workshops and a national forum where the document was finalised. It is truly an action plan by consensus. The plan further highlighted the need to strengthen national capacity and identified major gaps in our knowledge and understanding about biodiversity, brought into light the major threats facing biodiversity and proposed strategic actions on how to address them. The key actors for implementing The Gambia biodiversity Strategy and Action plan include the local communities, NGO's, PVO's, the public sector and the

donor community. The active participation and involvement of these key partners will ensure the success of the Action plan.

(B): INTRODUCTION

The Gambia is a sub-tropical country in West Africa with an area of approximately 10,689 km², a population of 1.038 million people (1993 population census final report) and a population growth rate of 4.2 % per annum.

The high population pressure and its resultant increasing demand on the available land coupled with the continuous decline in the average annual rainfall from about 1300mm to about 800mm has negatively affected the forest cover and biodiversity in general leading to declining agricultural yields.

The farming system then diverge from subsistence family food production to extensive cash crop production through deforestation and through shortening of fallow periods. These processes only eroded the interdependent biological resources without any significant increase in farm yields. The 22% area reduction of the forest from 1982 to 1989 (Ridder,199 1) resulted to a corresponding increase in agricultural lands.

With its characteristic **sudan** savanna woodland vegetation, The Gambia has the following main ecosystem types:

- Forest ecosystems (close & open woodland ecosystem)
- Agricultural ecosystems (crop land ecosystems)
- Marine and coastal ecosystems
- Inland water ecosystems (wetlands)
- Terrestrial ecosystems (tree & shrub savanna)

Currently there are 117 species of mammals, 47 species of reptiles and 30 species of amphibians making a total of 194 species of wild animals in The Gambia. However these figures are by and large estimates, the number could be higher if more detail investigations are undertaken.

The estimated total biomass of demersal and pelagic fish resources in Gambian waters is as follows:

Dermersals 22,000 tones (1995) and Pelagics 156,000 tones (1995) giving a total figure of 178,000 tones.(Dr Fridtjof Nansen 1995 cruise report)

However, like all other natural resources, certain fish species are threatened as a result of unsound human exploitation strategies, such species include the lobster (*palinurus spp*), shark, catfish (*Arius heudeloti*) and the white grouper (*Epinephelus aethus*) to name but a few.

The Gambia is endowed with a rich avifauna estimated at a total of over 507 species for its 10,689 km² and one bird species every 21.0 km². It has no **endemics** and only 2 species - the puff-back shrike (*Dryoscopus gambensis*) and spur - winged Goose (*Plectropterus gambensis*) bear its specific epithet.



However, this is an incomplete list and more information on distribution of residents, arrivals and departures of migrants, breeding data (still sparse), and habitat requirements is being accumulated.

Being predominantly an agricultural country and, aware of the pivotal role of agriculture and natural resources in her socio-economic development, particularly, **interms** of improving food security and poverty alleviation, the government of The Gambia (GOTG) views the continuing loss of biodiversity and the unfair and inequitable sharing of benefits arising out of the utilization of genetic resources with great concern. About 85% of the population of The Gambia depends directly on the utilization of biodiversity in its various forms.

Biological diversity refers to the variety of species and ecosystems on earth and the ecological processes of which they are part. The components of biodiversity are ecosystem, species and genetic diversity. From the point of view of The Gambia, biodiversity is not restricted to the wild fauna and flora and associated ecosystems but, it embraces the rich of biological diversity found in our domestic species. This includes plant varieties and land races of domestic animals that have been bred and developed for thousands of years by farmers, as well as species that are dependent on the agricultural systems developed and maintained by humankind.

The convention on Biological Diversity (CBD) as an important global document addressing the global commons presupposes a new contract between people and nature on the one hand and among different peoples and nations on the other. The Gambia participated fully in all the negotiations leading to the adoption of the agreed text of the convention and signed it on June 12, 1992. About two years later, on June 10, 1994, the CBD was ratified by The Gambia as the 63rd party.

As part of the general measures required for the implementation of the convention (Articles 6 and 8), two wetland sites have been gazetted as protected areas (Baobolon

wetland reserve and Tanji River Bird Reserve 1993). A new forestry policy has been developed, the fisheries legislation and policy were reviewed and updated to accommodate the various provisions of the convention on Biological Diversity (CBD) and related international agreements. Through collaboration with IUCN's/the environmental law centre The Gambia biodiversity legal and institutional profile has been elaborated and plans are in progress to prepare the first comprehensive policy document for wildlife and review the currently outdated wildlife legislation to address present day resource management issues and respond to the provisions of the CBD.

Despite the significant advances made towards the implementation of the CBD provisions, The Gambia is still faced with major challenges in the conservation and sustainable use of biological Diversity. Such include but not limited to economic, population, land use, policy, conservation, utilization, scientific and technological challenges.

As The Gambia strives to accelerate socio-economic development and effectively conserve biodiversity through securing new and additional financial resources, natural habitats and biodiversity are being eroded. Present programmes have so far failed to noticeably slow the loss of biodiversity. Such loss is causing havoc to the nation's biotic wealth upon which local communities so much depend. The Gambia biodiversity action plan is, among others aimed at slowing down the rate of biodiversity loss, sustainable utilization and conservation of the resource base and providing an integrated operational framework to set priorities and guide investments. Additionally, the plan aims to enhance national capacities for biodiversity conservation and provided an opportunity for the public sector, NGO's, PVO's and the international conservation organisations to work together as real partners and set a course for biodiversity conservation in the Gambia. The plan equally emphasizes the need for policy reform to support biodiversity conservation and sustainable use, institutional reform and strengthening to make new investment effective. Due emphasis is placed on the implementation of field based activities in the areas of research, ecotourism, forestry, Wildlife, fisheries and water resources to consolidate and augment ongoing and proposed conservation projects in The Gambia. Although the plan is directed to all strata of Gambian society (from decision makers to rural farmers) recognising that conservation and sustainable use of bio-diversity is the duty of every Gambian, the projects and programmes proposed are designed for local communities as important stake holders whose livelihood depend on the conservation and sustainable of biodiversity.

C: BACKGROUND TO THE BIO-DIVERSITY COUNTRY STUDIES

C1: Introduction

In recognition of the urgent need to maintain and improve its biological diversity, The Gambia ratified the International Convention on Biological Diversity in 1994. By signing and ratifying this legally binding Convention, The Gambia has accepted responsibility for implementing its various provisions.

Article 6 of the Convention on Biological Diversity which deals with general measures for conservation and sustainable use of biological diversity requires each Contracting Party, in accordance with its conditions and capabilities to, among others, develop strategies, plans for the conservation and sustainable use of biological diversity or to adapt, for this purpose, existing strategies and plans which shall reflect, inter alia, the measures set out in the Convention relevant to the Contracting Parties concerned.

As a Contracting Party to the Convention, it has become mandatory for the Gambia to prepare a National Biodiversity Action Plan. The on-going Biodiversity Country studies are very critical to the implementation of the Convention on Biological Diversity in that they are a prelude to the elaboration of a Biodiversity Strategy and Action Plan.

Recognizing the importance of the Convention, The Gambia has incorporated in 1994 some elements of the Convention on Biological Diversity into its National Environment Management Act making it part and parcel of its country's laws enforceable at the national level. The basic principles of the Convention are reflected in the National Environment Management Act 1994, particularly in sections 32, 33, 34 and 35.

In line with paragraph (a) of Article 6, Section 32(a) of NEMA empowers the National Environment Agency (NEA) in consultation with lead Departments to develop national strategies plans and programmes for the conservation of biological diversity.

Therefore, the mandate and instructions for preparing the NBSAP report for the Gambia emanate from the Convention on Biological Diversity and the revised National Environment Management Act 1994. Furthermore, the country's sectoral policies such as those on fisheries, forestry, agriculture, water resources, wildlife and the Gambia Environment Action Plan (GEAP, 1992) provide a basis for the sustainable use of its biological resources which have a profound influence on the country's attitude and commitment to the provisions of the Convention.

c2: **BIOTIC ASSETS**

Agriculture

The country's biotic assets in relation to agriculture embody agricultural systems, domestic, wild plants and animals, soil organisms and pests. The country's land and water resources are important resources which support the life systems necessary for producing crops, livestock, wildlife and forestry resources. Agriculture, being the main source of food for the country's peoples as well as the major foreign exchange earner has a pivotal role in the country's resolve to maintain, preserve and improve its biological diversity. The issue of providing food to a rapidly growing population while mending our already fragile terrestrial ecosystem is indeed quite daunting.

Fifty two per cent (52%) of Gambia's total land area (5,558 km²) is arable while 28-36% of this arable land area is cultivated annually (1997). Agricultural production depends on soil characteristics which, in the Gambia, have varying qualities. Soil fertility in the Gambia today is generally regarded as low, which is the unfortunate result of rapid population growth and poor agricultural management practices. Plant nutrient depletion rate is considered moderate and the loss of soil through erosion is estimated at 12.5 tons per hectare per year (1993). The loss of soil is due to erosion, a consequence of the loss of the country's vegetative cover and associated animal species and also due to the lowering of the soil retention capacity resulting from the leveling of flood plains for irrigation as well as due to wind erosion.

Based on aerial photographs taken in the land use study 1976, the total range land is 604,100 hectares. Agricultural production depends predominantly on water from rain which falls for only four months of the year. The rainfall pattern has changed in recent decades to a unimodal pattern barely exceeding 800 mm, which is a result of the Sahelian drought the country has been experiencing since the late sixties. The water resources are largely provided by the River Gambia and the underground aquifer systems spanning the entire country. Good drinking water is estimated at 80,125 Mm³, both from deep and shallow sources. Increasing water and land use to cater for the growing population, has adversely affected biological diversity, a matter of grave concern to Gambians. The country's water resources are replenished primarily by rain.

The domestic animal resources of agricultural importance are quite considerable and the potential for further development of the livestock resources is bright. According to the Livestock Census 1993/1994, the Gambia has the following livestock population: cattle 287,376 ; sheep 115,589 ; goats 213,732 ; horses 17,556 ; donkey 33,448 ; pigs 14,000 ; poultry 740,000. In spite of the increase in these figures, the demand for livestock is still greater. An important strategy to meet this demand which exploits the biological diversity of the animal resources is to boost production through the application of genetic engineering and by introducing fast breeding domesticated wild animals which are socially acceptable to the Gambia, such as the grass cutter.

Fisheries

The Gambia has a 80Km long coastline and an Exclusive Economic Zone (EEZ) extending 200 nautical miles from the low water mark. Fisheries resources are provided from two sources, the river covering an area of 2,000km² and the ocean covering the continental shelf to an area of 5,000km². Total fish potential from the maritime fisheries is estimated at about 88,000 tons with pelagic and demersal fish resources constituting 78% and 21% respectively. Total annual fish production is around 38,000 tons in 1996, clearly indicating a surplus potential. Information on the size of the river fish resources and annual fish landings from the river fisheries are not available.

Fish is an important source of cheap protein to the population and is believed to have potential for greater contribution to addressing the country's food security policy objective and the economy in general. Based on the current production levels there is considerable scope for exploiting the marine pelagic fisheries and aquaculture. In contrast, there is great need for tighter and more effective control of the threatened demersal resources.

Forestry

Forests, apart from their crucial importance to the biological diversity of several life systems, are also important natural resources by providing energy, materials for the construction industry, food and medicine to the population. 43% of the country's total land area (505,300 hectares) is under forest cover with woodland accounting for 10% and the remainder - consisting of Savanna woodland and mangroves which are found along the Gambia river. The mangroves system is estimated to cover 60,000 to 67,000 hectares. There are 66 forest parks covering a total area of 34,029 hectares. There are currently 6,462 hectares of forest land under community management. The forest ecosystem has dramatically changed in the last two to three decades from being a dense and highly biological diverse environment to its present bare state. Rapid population growth is the single most important cause of the state of deterioration of the forest ecosystem. The Forest Policy (1995-2005) intends to reserve, maintain and develop 30% of forest land resources of the country ensuring that 75% of these forest lands are managed by local communities.

Wildlife

Wildlife resources form an important component of the country's biotic assets from both ecological and economic viewpoints. Recent inventory studies of wildlife species report 117 species of mammals, 47 species of reptiles and 30 species of amphibians making a total of 194 species of wild animals. Five hundred and seven species of birds have been recorded as of 1997. There are 6 wildlife Protected Areas, occupying a total land area of 37,772 hectares, approximately 3.5% of Gambia's total land area. Wetlands, which include marine, coastal, inland waters, seasonal fresh water ponds/marshes are distributed country-wide and constitute about 20% of the total land area. Bao Bolong wetland reserve, the first Ramsar site and the largest protected area is approximately 22,000 hectares. Detailed information on species and distribution of wild life in the country is absent/limited.

c3: CAPACITIES

The population (CSD, 1993) is 1,038,145 of which 385,400 live in the urban and 652,745 in the rural areas. The Gambia has a very young population with 54% of the population aged under 20. The fertility rate (CSD,1993), defined as the total number of children a woman would bear during her child bearing years of 15-49 years is 6.04. Average life expectancy at birth throughout the country (CSD, 1993) is recorded at 55 years with urban Gambia registering 54.5 and rural 46.3. The population which has doubled during the inter-censal period 1973-1993 is estimated to grow at 4.2% annually.

The institutions described below, which are also responsible for promoting the conservation and sustainable use of biological diversity, have varied capacities. A study of the institutional capacities indicates the existence of the basic requisite capacities in most of the departments which can be built on to ensure that they can fully carry out their institutional mandates as well as those dictated by the requirements of the Convention on Biological Diversity. As can be seen below, there is however, a common shortfall of trained manpower and equipment to enable them to fully execute their mandates.

Department of Water Resources (DWR). The DWR has a broad mandate encompassing water resources assessment, monitoring and management, and weather and climate observation, recording, assessment and monitoring. It operates six Divisions: Administration

and Directorate; Hydrology; Meteorology; Rural Water Supply; Water Quality and Control; Communications and Data Analysis. The department's human resources include 18 senior managers, 51 middle level and 183 junior staff.

It is currently equipped to provide basic information on ground and surface water resources and weather and climate. However, its human resource requirement of . . . as compared with the present 252 staff roll indicates a shortage. The study also highlights the need for increase in resources such as equipment, facilities and funding. For instance, the operational budget for the Department, as provided in the Recurrent and Development Estimates 1995/6 shows the development budget reduced to D350,000 from D490,000. The average annual allocation to the Department of DM3.78 represents 14.6% of its estimated annual budgetary requirement.

Department of Parks and Wildlife Management (DPWM).

The DPWM is in charge of the conservation, management and development of the wild life resources and protected areas of the country. For the purpose of implementing the Convention on Biological Diversity, it is the lead government institution (focal point). There are five functional units as follows: Directorate; Conservation, Education and Extension Unit; Parks and Protected Area Management Unit; Research, Crop damage Assessment and Control Unit; and Surveillance Unit.

The staff enrollment at the DPWM is 39 of which one is professional. Based on its human resource requirement estimate of 106, the current staffing level is much inadequate in both numbers and skills. There is also a dire need for vehicles and to a less extent equipment. Its recurrent budget and expenditure from 1996/7 Government Estimates is D423,306.00 while total expenditure including funds from multi-lateral and bi-lateral sources is approximately DM5.3 (1996) The level of revenue that accrues directly from the protected areas, though presently lower than the size of its recurrent and development expenditure, has potential for growth. The total contribution of wildlife to the country's economy exceeds the reported level as an unquantified portion of the earnings generated by Tourism is also attributable to the parks and wild life resources. From the approximated US\$ 60.1 million foreign exchange earnings generated from Tourism, parks and wild life played a contributing role.

Department of Fisheries.

Fisheries Department is responsible for planning, management, and development of the fisheries sector. The development of the sector is to be achieved by the sustainable exploitation and utilization of the country's fisheries resources to achieve increased food security, increased employment and enhanced foreign exchange earnings. The Department plays a pivotal role in the management of the resources by providing scientifically based advice on the requisite exploitation rate of the resources. It has four functional units as follows: Administration, Research and Development, Inspectorate, and Extension.

Its staff roll is presently 93 with most of the professional being highly trained. There is need for increased trained manpower, equipment and funding to enable it to better come to terms with issues of the fisheries resource base and aquaculture development. The annual budgetary allocation is D1,252,320 in 1996/97 and the total revenue from licenses etc. is around D4.5 million.

Department of Forestry.

It is responsible for promoting the rational management of the forest resources. An important area of the current forest policy (1995) ensures the sustainable management of forest resources through the active participation of the rural population who are the immediate stakeholders. The Department has four functional units as follows: Natural Forestry Management, Extension, Community Forest, and Technical Services.

The staff roll presently stands at about 140. Following downsizing of the staff in 1986, there was hardly an improvement until recently which has been made possible by multi-lateral assistance. Even though Government's budgetary allocation to the Forestry Department has increased over the years much greater funding has been provided from multi-lateral sources to boost its financial and human resource capacity. Nonetheless, the total financial and human resources mobilized by the Department are regarded as insufficient taking into consideration its expanded functions as per the 1995 Forest Policy. Government expenditure in Forestry (1996/7 Estimates) is D1.7 million which is roughly of the same order of magnitude as its funding from bi/multi-lateral sources (The Gambia Development Co-operation Report 1995). Current revenue collected by the Forestry Department is around D1.5 million.

As an intervention measure the Forestry Department through the technical co-operation from the German Government focuses greater attention on natural forest management in the form of:

- Protection
- Improve silvicultural practices
- Testing of models to new concept
- Involvement of the local population.

The aim is to increase the total land area of managed forests.

- The Department has developed an action plan, the National Forestry Action Plan (NTFAP) which centres around 15 themes:
 1. Ensure development of policy institutional implementation tools;
 2. Classification of forest lands;
 3. Development of community forest management;
 4. Refine principles for forest management planning for state, community and private forests;
 5. Develop new strategies for the prevention and control of bush fires;
 6. Ensure sustainable supply of forest produce for urban and rural population;
 7. Ensure licenses, permits, royalties, stumpage fees reflect replacement cost of forest produce;
 8. Ensure streamlining of all forestry activities at all levels in Forestry Department;
 9. Contribute to coordinating and harmonizing of forestry activities and related sectors;
 10. Support applied forestry research to acquire baseline data;
 11. Support tree planting in urban areas;
 12. Promote extension for development of forestry sector;
 13. Institutionalize in-country training for forestry staff, villagers and NGOs;
 14. Improve Forestry department's capacities in personnel, infrastructure and facilities;
 15. Provide adequate funding for the forestry sector

Department of Livestock Services (DLS).

The DLS is responsible for providing veterinary services and animal production. Its mandate includes the provision of advice with respect to livestock, to enhance the capacity of livestock producers, disease control, veterinary public health services and to work with private sector and communities to develop the industry and enhance sources of animal protein. This department has 6 divisions as follows: Directorate ; Extension, Training and Field Services; Tsetse and Vector Control; Investigations; Industries/Marketing and Veterinary Public Health; Range and Feed Management.

DLS has a staff roll of a total of 204 personnel comprising of 6 animal scientists, 22 middle level, 70 livestock assistants and various categories of support staff. Budgetary allocations were D5.09 million, D4.78 million, D4.39 million and D4.24 million in 1993, 1994, 1995 and 1996 respectively. The Department's funding from bi/multi-lateral sources registered D1 1.65 million much of which was spent on institutional capacity building. Its recurrent budgetary requirement is estimated to be 50-60 % greater than the present which would enable it to implement its envisaged programme and activities.

The Department routinely collects information on disease outbreaks, slaughter figures, vaccination records and clinical treatments. As mentioned earlier, livestock censuses are conducted from time to time. The last census data has been computerized and the data base is kept at the DLS headquarters and also with the International Trypanotolerance Centre (ITC) located in the Gambia.

The International Trypanotolerance Centre (ITC) has been engaged in research work in The Gambia and the sub-region in the field of trypanotolerance and the productivity of Ndama cattle since its inception in 1984. The ITC has modern research laboratories at Kerr Sering (headquarters) and at the Centre's field station in Keneba and Sololo. The centre is currently staffed by 15 research scientists, 10 middle level staff and about 30 support staff. Most researchers at ITC. have access to electronic mail and the Internet.

Recently, the Centre's mandate has been broadened to encompass all aspects of livestock production and health. The Centre has various databases including information on health and productivity of Ndama cattle, distribution and tsetse population dynamics and the epidemiology of trypanosomosis in The Gambia.

Department of Agricultural Services (DAS)

The DAS is responsible for reducing the deterioration of the country's soil and water resources and to improve agricultural production through conservation practices and crop protection by pest control. It has two units namely, the Soil and Water Management Unit (SWMU) and the Pest Management Unit (PMU).The Department has information on the country's agricultural production systems, soil insect pests and other plant diseases. The DAS works very closely with the country's farmers providing extension and training services and collaborates with the NGO's that work in the sector.

The nominal roll is 480 staff with about 40 % serving as support staff to the Agricultural Services Project (ASP).The department's annual recurrent budget is D8,077,970 with about 80 % constituting the cost of staff salaries. The department is short of trained manpower in agricultural engineering, soil science, crop pests and crop diseases in addition to information and technological equipment.

National Agricultural Research Institute (NARI)

NARI, created in 1993 to take over the activities of the former Department of Agricultural Research and Agricultural Engineering Unit, is presently responsible for research on agriculture and natural resources which include livestock, forestry, fisheries etc. The broad mandate requires the reorganising of the existing research programme to incorporate the other components. It has a staff complement of 149. Research is conducted at two main stations- Yundum and Sapu assisted by four out-reach stations for multi-location trials. The policy of the institute is applied client-oriented in crops, forestry, fisheries and other natural resources.

National Environment Agency (NEA)

The NEA, which was created in 1993 is mandated, according to the National Environment Management Act (NEMA) to coordinate and implement the Gambia Environmental Action Plan (GEAP) as well as being responsible for all environment related issues in the country. With a nominal roll of about 40 comprising of approximately 50 % professional staff and 50 % support staff, it has three functional centres namely Administration and Finance, Technical Services network (TSN) and the Inter-sectoral Network (ISN).

The Agency executes its functions through programmes (listed below) manned by eight Working Groups drawn from representatives of Governmental, Non Governmental Organisations and Private Sector Institutions. Each of the working groups has an agenda appropriate to its programme, develops strategies and action plans which it also implements. The Agency is the Secretariat for all the eight working groups.

The TSN has working groups in these areas

1. Environmental Impact Assessment
2. Environmental Quality
3. Environmental legislation
4. Pesticides and Hazardous Chemicals
5. Ozone Layer
6. Contingency and Disaster Preparedness
7. Inspectorate

The working groups under the ISN have the following programmes

1. Environmental Education and Communications
2. Environmental Information Systems
3. Agriculture and Natural Resources
4. Coastal and Marine Environment

The Agency has a Documentation Centre and an Environment Information Centre (EIC) for Geographic Information System (GIS) application together with an Environment Award Scheme. It has set up an electronic communication network system by e-mail known as the Gambia Environmental Information System Network, "GEISNET" which serves all institutions involved in environmental management in the Gambia. Its office and Working Groups are also generally well set up and equipped in information technology.

The Agency in collaboration with other government departments is responsible for ensuring that all projects have undergone an Environmental Impact Assessment (EIA) prior to clearance.

NEA's recurrent annual expenditure is financed through a Gambia Government annual subvention of about D1.5 million while the GEAP is funded by multilateral assistance to the tune of US\$ 2.6 million annually. Revenues accruing from pesticide registration and royalties from sand mining are quite limited.

Even though the agency may not be expected to be responsible for a large complement of staff, it however, needs to be allowed to develop its manpower resources until it has obtained the required number and quality of staff. The present inadequacies in this area include trained manpower in Policy Analysis and Development, Inspection Services and Environmental Economics

The institutional arrangements for implementing the strategic recommendations are not spelled out in the reports. It must however, be presumed that the action plans put forward will be implemented by those that proposed the Plans and some key stakeholders such as the communities and other non-governmental institutions. Thus; the institutions described below are each responsible for implementing the action plan generated by it and relevant to it. In the cases where more than one of the institutions is implicated, it is expected that a collaborative joint action will be employed as indicated in the action plans. It is also presumed that the Department of Wildlife and Parks Management will continue to be the lead institution for the overall implementation of the Convention. For monitoring and evaluation purposes, the Directorate of Planning of the Department of State for Agriculture proposes representatives from each of these departments:

Department of Wildlife	1 staff
Department of Forestry	1
Department of Livestock	1
Department of Agriculture	1
Department of Fisheries	1
Department of Water Resources	1
Department of Planning	1
Department of C. Statistics	1
NEA	1
NARI	1
NGOs	1

D: GOALS, SPECIFIC OBJECTIVES AND STRATEGIES:

D1: Goals

The overall goal of the national biodiversity action plan is to conserve and manage and develop, as much as possible of the biodiversity with a view to contributing to the protection of the livelihood and prosperity of the Gambian population and so far contributing to the general environmental protection both at the national and international levels.

D2: Objectives:

The specific objectives of the national biodiversity action plan are among others to:

1. conduct a national biodiversity inventory in which information is compiled in a usable format, recorded, stored and made available to policy- and decision-makers and the general public;
- 2. Identify current state of knowledge and important gaps on biodiversity resources, management and pressures, and their trends on exploitation of biodiversity in The Gambia.
3. Protect and conserve the remaining but rich biodiversity of the country by expanding and consolidating the system of nature reserves, national parks and other potential conservation areas; establish national parks and nature reserves covering at least 5% of the total land area for conservation, protection and management capacity of the Department of Parks and Wildlife Management and increase revenue generation from biodiversity resources.
4. To conduct research into and develop technology for the non destructive use of biological diversity;
5. Carry out in-depth assessment of the cost of conserving, on a sustainable basis, the national biodiversity, and identify and prioritize conservation methods; and
6. Enhance public awareness and encourage understanding of the importance of the conservation of biodiversity; propagate these topics through media and include them in the educational programmes;

D3: Sector-Specific Objectives

1. To reserve, maintain, develop and manage land resources covering at least 30% of the total land area which is capable of environmental protection through minimising soil degradation and erosion, maintaining river bank stability, protecting wetland and improving, conserving and preserving biodiversity;
2. To diversify agricultural production with a view to reducing the vulnerability of the sector to exogenous shocks and minimising natural resources deterioration and degradation;
3. Provide an information base to water resources and climate monitoring so as to enhance conservation of biological diversity address the requirements of the convention on Biological Diversity;

4. Control environmental degradation and pollution in both natural and human ecosystems through firm regulations and applications of Environmental Impact Assessment (EIA);
5. Establish National Parks and Nature Reserve covering at least 5% of the national land area for the conservation, protection and management of Fauna and Flora with a view to improve the management capacity of the Parks and Wildlife Management department, promote community involvement and sustainable utilization and increase revenue generation from the wildlife resource;
6. Ensure efficiency and balance between livestock and the fragile environment by embarking on the rational and sustainable exploitation, management and conservation of range resources (grasslands/pastures, soil and water).

D4: Strategies:

The strategies to make the goals and objectives identified in the preceding paragraphs achievable include the following.

1. Enhance and strengthen the present conservation efforts in nature reserves, national parks, and protected areas, and introduce and promote such conservation practices outside of these areas, particularly in resource based economic sectors such as agriculture, forestry, water resources, and fisheries;
2. Rehabilitate and restore degraded ecosystems, develop or maintain appropriate legislation for the protection of threatened species and populations, adopt measures for the recovery and rehabilitation of endangered ones, for possible re-introduction into their natural habitats;
3. Integrate the sustainable use and conservation of biological resources in the national planning and decision making process, protect and encourage indigenous knowledge and cultural practices that are friendly to sustainable use and conservation of biodiversity resources, and support local populations in their efforts to accept, develop and implement new methods and technologies geared to sustainable use and conservation of biodiversity;
4. Develop the institutional and human resources capacity of stakeholder institutions through training and conduct research in the identification of the various habitats and of their functions and values, enable zoning, catchment area management and environmental planning; encourage greater interaction between stake holder institutions;
5. Promote interaction between scientists, planners and policy-makers so as to develop a friendly and transparent medium for scientists to operate;
6. Assign responsibility for the creation of operational biodiversity data banks and information centres; and
7. Identify effective monitoring and evaluations components both at the national and sectoral levels.
8. Promote collaboration with the local NGO's and the national and international donor community to ensure the successful implementation of the action plan.

E: STATUS AND TRENDS OF BIO-DIVERSITY COMPONENTS

About 90 years ago one used to see in certain places in the Gambia water buck, kob, Roan and hartebeest occasionally in their season. The smaller antelopes have not significantly decreased in numbers during this period probably due to the size of the human population, and that game birds have not decreased at all, except near Banjul and a few spots easily and constantly accessible to resident shooting parties. The toll taken by local people is infinitesimal and it is therefore unlikely to have any significant impact on the population. Whatever may be the case with the game animals and birds, many of those outside this category i.e beasts of prey and other creatures were to some degree actually on the increase, certainly not decreasing, especially during the last few years since the introduction of the "Wild animals, Birds and fish preservation ordinance 1901", and more so since the purchase of gun powder had become more difficult. There were always a few leopards about, but they were rarely killed and hyenas in certain districts got every day bolder and more troublesome, frequently killing cattle quite close to settlements. However, this apparent stable and healthy wild animal populations status was not a recipe for inaction. Notwithstanding the visible good indicators about the status of the wildlife resources, legislative measures governing the exploitation and management of wild animals were put in place.

Specifically, regulations were made under section III of "The wild animal, Birds and Fish preservation ordinance 1901" with the following schedules:-

SCHEDULE 1 - ABSOLUTE PROTECTION		
<u>ENGLISH NAME</u>	<u>MANDINKA NAME</u>	<u>LATIN NAME</u>
Elephant	Samo	Elephant/Loxodonta Africans
Hippo	Malo	Hippopotamus Amphibious
Giraffe	Tero	Giraffe Camelopardalis Peratta
Congo Buffalo	Seu Wullengho	Syncerus caffer nanus
Senegambian Buffalo	Seu Fingho	Bos Caffer Planicero
West African Eland	Jinki Janko	Tanrotragus debianus
West African Hartebeest	Tankong Koio	Alcelaphus buselaphus (major)
Korrigum Hartebeest	Tankogho	Damaliscus corrigum
Red Flanked Duiker	Kuntangho	Cephalus rufilatus
Maxwell's Duiker	Mankaro	Cephalus Maxwell
Growned Duiker	Mankara Wullengho	Cephalus Coronatus
Gambian Oribi	Mankara Koio	Oribi Nigricandata
Waterbuck	Sinsingho	Cobus Deffasa Unctuosus
Buffoons Kob	Wont0	Cobus Kob
Nagor Reedbuck	Konkotongho	Cervicapra Redunca

Roan antelope	Da Koi	Hippotragus equinus
West African Sitatunga	Bato minangho	Tragelaphus gratus
Worthog	Seio	Tragelaphus gratus
Red River Hog	Seui Wullengho	Phagoceros ethipicus

Schedule 111 - Birds protected from 30th June - 31st December and eggs protected at all times.

Marabout stork, Egrets, Bustards, Francolins (Bush fowls) Guinea Fowls, Sand Grouse, Quail and Crown Birds (Crested Cranes).

Presently, all the larger animals are not resident with us, but come in for water and food (grass) towards the end of the dry season when the whole countryside is dried up.

So much of the country is given up to cattle or cultivation because of the increasing livestock and human populations that the bush left is by no means the unvisited peaceful sanctuary large game requires for all of it is netted with paths, and frequently visited by wood cutters, bamboo collectors and other suppliers of the people's daily and periodic needs.

The country is therefore, undoubtedly as a whole quite unsuitable to both big and small game in its present condition, and these have decreased considerably over the years.

The downward plunge of the wildanimal populations we are witnessing now is not mainly due to excessive hunting, as our people (except perhaps for the Jolas) are anything but good hunters or sportsmen by instinct.

Most of our wildlife species have disappeared because there is now no room for them owing to increased numbers of people, cattle and farms.

This social phenomenon exerts increasing pressure on the vegetation which contribute substantially to the fertility of the land and above all to the habitat of vast numbers of wild creatures.

The swamps where formerly one might see some of the larger antelopes are now either barren due to draught and saline conditions, occupied by livestock or placed under rice irrigation which so far has not resulted in the much talked about food self sufficiency.

The swamps being irrigated for rice cultivation or providing livestock, as formerly they did wildlife with only water and grass available at the season, the rest of the country being brown and bone dry. It is no doubt a pity, but when it is a question of limited food and space, the weaker party (wildlife) must fall before the stronger and more cared for (livestock and rice).

Marabou storks are protected by native customs in the neighborhood of all Muslim towns and villages, and it is in trees standing in the town in which they nest in the

Gambia. They are therefore amply provided for, although during the non-breeding season, boys or other people may kill a few when away from towns without wounding their elder's susceptibility or feeling. These storks are also protected during the breeding season or rather during the rains.

One bird much sought after and always fetching, as a skin, a good price is extremely rare in The Gambia. This is the Golden Cuckoo of Foni and other wooded areas. Its decrease in civilized Africa is said to be due to these skin haunts, but nonetheless, it has always been a rare bird, though no doubt its attractions have helped to make it so.

The increasing human population coupled with production practices which do not take into account conservation, have led to the loss of a heavy proportion of The Gambia's forest cover together with most of our wildlife species.

For Example, the elephant which used to be the country's national emblem was last seen and shot in 1913. The Giant Eland, the African record trophy for this species was shot in The Gambia early this century (1903).

The buffoon kob which used to be a common species in The Gambia has long since disappeared, together with other species like the buffalo, korrigum hartebeest, yellow-backed duiker, chimpanzee, topi, lion and possibly the red river hog to name just a few. The West African Manatee and the Sitatunga are also probably nearing extinction.

The Roan Antelope, together with the water-buck and bubal hartebeest are now rare visitors from neighboring countries. Unfortunately, however, it seems that whenever any of these species are known to have crossed into The Gambia, the local hunters harry them ceaselessly until they are either shot or forced to migrate.

Of the 117 species of animals known to occur in The Gambia about 13 have become extinct, and a similar number is threatened with extinction. The status of two species is unknown.

<u>Extinct</u>	<u>Threatened species</u>	<u>Status unknown</u>
Bubal/West Africa		
Hartebeest	West African Manatee	Pied Colobus
African/congo Buffalo	Humped backed dolphins	
	yellow-backed	duiker
Buffoons kob	Hippo	
Chimpanzee	Oribi	
Elephant	Leopard	
Water-buck	Serial	
Korrigum Hartebeest	Caracul	
Roan antelope	African Wild Cat	
Giant Eland	Nile Crocodile	

Giraffe	Pygmy Crocodile
Wild-dog	Slender snorted crocodile
Tiang	Rock Python
Lion	All species of Marine turtles

However, the avifauna situation is promising and has improved over the years. To date, over 507 species of birds have been recorded in The Gambia. This is by no means a comprehensive checklist - there can be many more surprises if a more thorough survey can be conducted. Because of our rich avifauna The Gambia is becoming a popular destination for ornithologists/bird watchers.

The results of the 1981-1983 national forest inventory revealed that the total forest area in 1980 was 505,300 ha which represents 45% of the total land area of the country. The largest proportion of the forest land was tree and shrub savanna (347,700 ha) see table below.

Table: . . 1. . .Areas of land use classes per division (1000 ha)

Land use	WD	LRD	NBD	MID	URD	Total
High mangrove	4.7	4.3	5.5	0.5	0.0	15.0
Low mangrove	16.8	12.4	22.6	0.1	0.0	57.9
Gallery forest	1.3	0.2	0.8	3.4	1.4	7.1
Closed woodland (including Gmelina)	16.3	0.6	1.7	1.9	0.4	20.9
Open woodland	29.1	16.0	4.9	11.3	1.4	62.7
Tree and shrub savanna	15.0	52.3	38.8	136.6	105.0	347.7
Total Forest Land	83.2	85.8	74.3	153.8	108.7	505.3
Fallow land	11.3	12.5	27.4	28.1	22.8	102.1
Wooded upland crops	12.3	2.6	2.6	0.5	0.0	18.0
Upland crops	60.6	27.0	68.0	70.7	47.8	247.1
Swamps cultivated	1.8	7.9	9.4	12.2	2.2	33.5
Swamps incleared	1.2	11.2	15.8	29.8	12.7	70.7
Barren flats	6.0	5.8	6.4	1.8	1.8	21.8
Water surface	4.9	1.8	5.1	8.2	1.8	21.8
Gambia river						52.7
Town villagers	7.2	1.2	2.4	2.3	1.6	14.7
Total non-forest land	105.3	70.0	137.1	153.6	90.1	609.4
Total	188.5	155.8	211.4	307.4	198.9	1114.7

Source: forster 1983.

In 1983 philip Alirol compared the land use distribution between 1980 and 1988 and came up with the following conclusions:

The agricultural land areas were increased by 13.2% and fallow lands on the country decreased by 12.2%.

This implies that within a space of approximately 12 years some former fallow lands were put under permanent agricultural production and that the fallow period was shortened. The results of the 1991 study on changes in land use classes indicated a reduction of the total potential forest areas from 59% to 53% within a space of 8 years, and the rate of total forest area reduction of 1% per annum. There were significant reductions of both the closed and open forests (see table 2 below):

Table..2...:- Changes in land use classes (1000 ha)

Land use	1980		1988	
	(ha)	(%)	(ha)	(%)
Mangrove forest	66.9	6.3	66.9	6.3
Closed forest	28.0	2.6	16.2	1.5
Open forest	80.7	7.6	52.3	4.9
Forest area	175.6	16.5	135.4	12.7
Savanna	449.8	42.3	426.9	40.2
Potential forest area	625.4	58.8	562.3	52.9
Cultivated areas	274.1	25.9	336.0	31.7
Other	162.5	15.3	163.7	15.4
Total	1062.0	100.0	1062.0	100.0

Source: Ridder (1991), forster (1983).

F: MAJOR CAUSES OF BIO-DIVERSITY LOSS

The nature and significance of environmental problems obviously vary from country to country, but in the most general terms and within the Gambian context, the destruction of natural habitats encompasses a wide range of problems that have a direct effect on the viability of natural ecosystems, including the loss of diversity in animal and plant species, in terrestrial and aquatic ecosystems and the destruction of areas of scenic beauty.

In The Gambia, relatively high levels of terrestrial ecosystems, species and genetic diversities exist alongside a troubled economy and a large, growing and mobile human population more than 70% of which is rural and engaged in agriculture. The extent of natural habitat conversion is substantial approaching 80 %. It is therefore no coincidence that The Gambia has a relatively long list of species that have become extinct or threatened with extinction, including 26 mammals either extinct or threatened with extinction and the status of two species unknown. People who live by

traditional lifestyles, as part of their ecosystems, have developed ways of living with nature that do not result in over use of the resources upon which they depend. Once such lifestyles are lost, it is most unlikely that they will ever be recreated, though it is most desirable that traditional knowledge, especially of the various uses of species of plants and animals, should be recorded before it is lost.

Overall, about 43% of the total land area of The Gambia is covered with forest, -however, administrative areas like the North Bank Division have lost about 80% of the forest cover and others are experiencing significant deforestation problems. In the Gambia, the primary direct causes of biodiversity loss are habitat clearance and alteration through cultivation, expansion/establishment of settlements, bush fire, timber and firewood extraction and deforestation which leads to fragmentation and changes in the geographical area of habitats and state of habitats. Due to the rapid destruction of preferred habitat, the range of some species for example, the hyena, leopard, sitatunga and the west african manatee have become drastically reduced. Bush fires are the most important threat and are probably already resulting in the extinction of many species and loss of area available for biodiversity. About 80% of the standing biomass is usually consumed by bush fires. Agricultural encroachment, construction activities etc. also play an important role in habitat loss and fragmentation.

Agricultural ecosystems or agro ecosystems are ecosystems in which naturally occurring plants and animals have been replaced by crop plants and livestock animals deliberately selected by human beings. Loss of agricultural biodiversity and the impact of agriculture on ecosystem functions can be grouped as follows:

- * Soil compacting, the loss of complex vegetation and the elimination of landscape features such as wetlands and streams, reduce infiltration of water into the ground where it would be available for plant growth. Lack of infiltration also results in flooding and the reduction of ground water recharge which can affect water supplies for human use both in the agricultural system and far beyond.
- * The simplification of agricultural systems by removal of multi storeyed vegetation, particularly trees and ground cover, results in the exposure of soils to erosive forces of sun, rain and wind, and subsequent loss of top soil.
- * Larger mechanized mono-cultural production units require homogeneous topography. Consequently, wood lands, fallow fields and individual trees are eliminated and features such as wetlands, streams etc. are smoothed over resulting in a major loss of habitat for wild relatives of domesticated plants and animals.
- * Intensive agro ecosystems that rely on fewer species and varieties have become more susceptible to diseases and pests, and to climate change variations.
- * The replacement of natural vegetation by a cropping system with lower primary productivity can result in the release of Co₂, methane, and nitrogen dioxide which

diminishes atmospheric carbon and nitrogen fixation. These impacts link the concerns over biodiversity with those of climate change.

Mangroves and other wetland ecosystems throughout The Gambia are threatened by lots of factors some of which are complex in nature (climate change, mangrove die-back) and some anthropogenic in nature (destruction of mangroves and other wetlands by man) for various human needs. In any case, the consequence is a catastrophic decline or disruption of the very vital service functions, for example fish breeding, for these unique ecosystems.

Poverty, human population increase (1,038 million people) and a growth rate of 4.2% per annum requires that more space be provided for human settlement, more land be placed under cultivation to feed every individual. From the perspective of poverty the human population depends entirely on natural resources for their basic requirements which are often exploited irrationally. Such demands and unsustainable levels of exploitation and utilization put undue pressure on virgin lands and other wilderness areas thereby considerably impacting negatively on the forest cover and biodiversity for that matter.

Currently, sand mining is the only known type of mining activity in The Gambia. While the Bijilo sand mines have been closed, new areas at kartong, (Western Division) and Ntorro (North Bank Division) have been opened. Other areas throughout the country are being operated illegally as well. The estimated volume of sand extracted per year from Bijilo before the ban was approximately 100,000 - 150,000 m³ resulting in a very serious erosion and associated environmental impacts on the associated coastal area.

Efficient discharge from industries such as the Gam Tan factory into nearby tributaries e.g Lamin bolon (tributary) are hazardous to health and might have probably contributed to the drastic decline of marine mammals such as the West African manatee (Trichechus Senegalensis) and most of the crustaceans.

One of the most, if not the most, important factor responsible for the degradation of The Gambian coastline is coastal erosion. The rate of erosion of The Gambian coastline has been estimated, on the average, to be 1 or 2 metres per year amounting to a land loss averaging 2.5 -3.0 ha of land per year or 200,000 - 300,000 m³ per year (Delft hydraulics, 1992).

Due to the increasing livestock population (685,327) and high stocking densities particularly, during the dry season, overgrazing of the natural range land is contributing to soil erosion and other forms of resource degradation in areas of high livestock populations, for example, Central River Division and Upper River Division.

G: MEASURES TO ADDRESS LOSS OF BIO-DIVERSITY

In recognition of the urgency of the biodiversity situation, particularly the extinction of species and the serious threats facing them, The Gambia Government declared its intention to encourage the protection of the remaining wildlife species (fauna and flora) by setting aside protected natural habitats for them and simultaneously promote conservation education to increase public awareness about wildlife and other general -environmental issues.

The protected area system dates back to 1916, when the Abuko Nature Reserve was accorded protection as a water catchment area. In consecutive order, the following protected areas were established:- Abuko nature reserve (105 ha) 1916, River Gambia National Park (570 ha) 1978, Nuimi National Park (1986) - 4,940 ha, Kiang West National Park (1987) - 11,000 ha, Tanji River Bird Reserve (1993) - 612 ha and Baobolon wetland Reserve (1996) - 22,000 ha. This brings the total number of current protected areas to six (6) with a land area of approximately 37,777 ha, which equates to about 3.5% of The Gambia's land area. The proposed wildlife policy aims to increase the protected area coverage to about 5% of the land area. Three of the protected areas are currently opened to the general public, namely Abuko Nature Reserve, Tanji River Bird Reserve and Kiang West National Park (KWNP). However, apart from KWNP, no other protected area has a management plan or any guiding document to assist in management. There is therefore an urgent need to prepare a general wildlife/biodiversity policy document for the balanced development of present and future protected areas.

Likewise, habitats and ecosystems have been protected through the establishment of forest parks for purposes of protection (natural forests), production and utilization. Currently, there are about (66) sixty six forest parks of different categories covering a total land area of about 34,029 ha. **Interms** of active management there are about (12) twelve state forest parks with a total area of approximately 5,400 ha. The concept of community forestry was introduced a few years ago and is in general term designed to create an environment for the active participation of local communities in forest management, protection and utilization and to empower communities to take charge of their own affairs and accrue benefits from the forest resource through revenue retention or direct use. The community forestry concept is highly successful and is being replicated in other parts of the country. Discussions are underway to initiate (CBNRM) community base natural resources management programmes for the wildlife sub-sector for the effective participation of local communities in wildlife schemes and the generation of revenue at the local level.

The new forest policy (1995 - 2005) aims to significantly increase the total land area of managed forests to 30% of the total land area of The Gambia and that 75% of this 30% be properly managed. It also aims to develop 17000 ha of forest park and put 200,000 ha of land under community forest management. Schematic representation of the status and trends of bio-diversity in The Gambia can be seen in annex 1.

H: STRATEGY

Gaps, goals and objectives that are common to all sectors are summarised. Then those that are sector specific are summarised below under the relevant sectors. This approach is necessitated by the fact that although there are common gaps and constraints, the goals, strategies, and activities proposed for implementation are largely different and sector specific.

- 1) Population, health and education
- 2) Agriculture
- 3) Forestry
- 4) Wildlife
- 5) Water Resources
- 6) Livestock
- 7) Fisheries
- 8) Legislation
- 9) Conventions
- 10) Land, mineral and minning resources

I: SUMMARY OF COMMON CONSTRAINTS

- i) Lack of transport and difficulties with fuel and spare parts
- ii) Ineffective community participation
- iii) Lack of relevant and appropriate equipment
- iv) Poor roads and difficult terrain and poor communication facilities.
- v) Lack of resources and funding for implementation of **sectoral actioivities**.
- vi) Lack of adequate equipment and material resources.
- vii) Lack of data on status of resources
- viii) Absence of knowledge and data on the River Gambia and other aquatic resources.
- ix) Inadequate number of trained staff to achieve goals and objectives.

J: SUMMARY OF SECTOR SPECIFIC GAPS, GOALS AND STRATEGIC RECOMMENDATIONS AND STRATEGIES FOR ADDRESSING THE GAPS

Presented below are the goals, gaps, strategies, activities (tasks) and recommendations that are specific to the various sectors that manage, utilize and conserve biodiversity.

1. POPULATION, HEALTH AND EDUCATION

A Population goals

A comprehensive national population policy adopted in 1992 with an overall goal of improving the quality of life for all Gambians has the following specific goals:

- i). To achieve a reduction in the rate of population growth in order to attain a balance between population growth and the pace of economic progress, thereby ensuring sustained development.
- ii). To ensure a balanced spatial distribution of the population.
- iii) To promote the health and welfare of all Gambians.
- iv) To enhance the status of women, enabling them, among other things to participate in decision-making in respect of child-spacing and family size.

Strategies

To achieve the above goals, the policy outlined a set of strategies the most important of which are as follows:

- a). Increasing the voluntary use of traditional and modern methods of contraception.
- b). Reducing the number of women marrying before age 16.
- c) Improving the management of high risk pregnancies.
- d) Improving the nutritional status of women and children.
- e Addressing the harmful and promoting helpful cultural attitudes and practices affecting the status of women.
- f) Slowing the pace of rural-urban migration.
- g) Regulating the effects of population growth on natural resources.
- h) Send females to school

B Goals for the health sector

The goals of the national health policy are to strengthen inter-sectoral collaboration, community participation and other actions which are essential elements for planning, management and sustainability of health services. The thrust of the policy is two fold:

- a). Consolidation of existing services to ensure optimum functionality to improve quality of care, effectiveness and efficiency. This, it is envisaged, can be achieved by strengthening the existing health institutions and systems by the provision of essential human, financial and logistical resources.
- b) Selective expansion of services to ensure better coverage and access. This process includes the expansion of village health services to provide primary health care to the rest of the country and the upgrading of selected health institutions to make facilities more accessible.

C Goals for the education sector

The Education Policy, 1988 to 2003, seeks to provide educational opportunities for all citizens and develop the country's human resources..

The major objectives of the Education Policy, 1988-2003 are as follows:

- a) To increase access to basic education in Grades 1-9;
- b) To radically improve the quality of learning at the Grade 1-9 levels;

- c) To increase access to post-secondary and vocational training;
- d) To increase opportunities for training for out-of-school youth, school leavers and adults, in order to enhance employment, especially self-employment prospects;

Strategies

To achieve these objectives, the following strategies are considered essential:

- i) Restructuring of the school system;
- ii) Training education sector personnel/Teacher
- iii) Improving the management of the education sector.
- iv) To increase access to post-secondary and vocational training and to improve the coordination of its provision;

Recommendations

For effective protection and preservation of our biological diversities the following measures are recommended:

- a). A rigorous information, education and communication (IEC) programme be pursued to increase awareness and therefore concern for the protection and preservation biodiversity;
- b). Emphasize and enforce the integrated approach to environmental issues by the line State Departments of Health, Education, Population Officers and Central Statistics Department through an informed data base.
- c) Government should reduce taxes on imported forest products to make their prices competitive enough to encourage the importation of such products, hence protecting the country's forest cover.
- d). Costs for alternatives to fire wood such as gas and electricity should be subsidized to make them more affordable to encourage wide usage by the general public.

2. AGRICULTURE

Goals for the Agricultural sector are to:

- i) improve nutritional standards in rural areas
- ii) limit bulk cereal imports
- iii) increase cash crop production and
- iv) diversify the agricultural base

The policy objectives are:

- a) To diversify the agricultural production base with greater attention to horticulture and livestock development;

- b) To increase ground nut production and productivity in order to increase rural cash incomes and foreign exchange earnings;
- c) To develop functional rural credit markets;
- d) To improve access to inputs, research and seed multiplication;
- e) To increase production and productivity of cereals;
- f) To improve the income generating capacities of rural women.

Strategies

- a) Encourage efficient cotton growing and sesame production.
- b) Improve commercial poultry farming.
- c) Expand commercial horticulture production.
- d) Encourage mobilization of rural savings and harmonize NGO agricultural lending.
- e) Introduce and multiply improved varieties of maize, millet, sorghum and groundnut.

Recommendations

- a) Maintain crop diversity, there must be a thorough study of the crop and its environment.
- b) Soil and Water conservation must be promoted and encouraged for all farming systems
- c) A more holistic and environmentally sound Integrated Pest Management Program must be developed to reduce crop ravage due to pests.
- d) Establishment of crop gene bank

3. FORESTRY

The main goals of the forest policy are:-

- i) to reserve, maintain and develop forest land resources covering at least 30% of the total land area which is capable of protection.
- ii) To ensure that 75% of forest lands are managed and protected according to forest management principles.
- iii) To ensure that sufficient supply of forest produce needed by both urban and rural population is available through the rehabilitation of forest lands and the establishment of fast growing plantations and woodlots.

Strategies

- a) Promote multiple-use of forest, apply better extension methods, intensify community forestry.
- b) Identify campaign issues on bush fires, promote public, government and NGO institution participation, use political influence.
- c) Promote community forestry agreements through support to communities and legislation.

Activities

- a) Include multiple use forestry in community forestry sensitization and implementation programmes and involve women in the development and implementation of multiple-use forestry.
- b) Prepare guidelines for the preparation of management plans for community forests.
- c) Assist communities to set priorities and time tables for community forestry activities.
- d) Bush fire control

4. WILDLIFE

Gaps in wildlife:

- a) Lack of a system plan/general management plan for the DPWM
- b) No up-to-date checklist of faunal species in The Gambia
- c) Outdated Wildlife Act and lack of policy for Wildlife.
- d) Buffer zone not demarcated in all protected areas.
- e) Lack of private initiatives in establishing protected areas.
- f) Absence of environmental impact assessment and comprehensive awareness programme
- g) Non involvement of local communities in Wildlife schemes

Strategies

- a) Develop draft wildlife policy document
- b) Increase protected areas to 5% of natural land
- c) Prepare an updated fauna inventory/checklist by conducting basic ecological research
- d) DPWM to coordinate, review improvement and expansion on current Wildlife Act (1977) involving communities.
- e) Identify compatible approaches to land use in buffer zones
- f) Initiate captive breeding programmes in Abuko Nature Reserve and other suitable protected areas.
- g) Design and develop environmental education and extension programmes and activities to improve on negative attitude towards wildlife

Activities

- a) Prepare and implement a general wildlife management policy and plan document.
- b) Increase total area under protection.
- c) Inventorize and research on marine mammals in coastal and inland waters.
- d) On the job and university training of wildlife staff
- e) Research on level of poaching and use of wildlife; and the effect of habitat and environmental changes; and possibility of reintroducing extinct fauna species.

- f) Enrich protected area buffer zones with trees and other activities: vegetable gardens, bee keeping and planting of rare species.
- g) Conduct nationwide awareness campaigns on biodiversity and sustainable natural resources management and utilization.
- h) Set up ecotourism development unit within DPWM to promote the non-consumptive utilization of the Wildlife resource.

-Strategic recommendations

- a) Community participation, ownership, cost sharing and investment in the management of protected areas should be encouraged.
- b) Issues relating to Wildlife/human conflict, particularly in the area of agriculture, should receive due attention.
- c) Legal and enforcement measures to control illegal use of wildlife should be done in consultation with the local communities.
- d) Strike a balance between people's legitimate needs and the conservation of biological diversity.
- e) Cultural diversity issues and bio-diversity conservation should be seen to be complementary to each other.

5. WATER AND WIND RESOURCES

The overall long-term goals are:

- a) Provision of adequate and safe water;
- b) Water resources assessment; and
- c) Contribution to the socio-economic development of the country through:

CONSTRAINTS

- a) lack of upper air monitoring station and marine meteorological station.
- b) Lack of a Provincial Headquarters to facilitate timely monitoring of the hydrological situation in the eastern half of the country.

Strategies

- a) Improve analysis of climate and hydrological aspects of drought and desertification monitoring;
- b) Identify, select and adopt basic software and hardware for the required processing
Activities
- c) Replace obsolete equipment and mend broken down structures in the Meteorological and Hydrological station Network.
- d) Identify, select and adopt basic software and hardware for the required processing

6. LIVESTOCK

Goals of the livestock Policy are:

- i) To progressively diversify the livestock sub-sector by broadening the number of species, variety of breeds, products and by-products.
- ii) To improve the traditional production system and promote the development of a modern sector.
- iii) To enhance food security and self sufficiency goals in terms of animal protein consumption.
- iv) To ensure efficiency and balance between livestock and the fragile environment by embarking on the rational and sustainable exploitation, management and conservation of range resources.

Strategies

- a) Promotion of livestock fattening schemes and artificial insemination programmes .
- b) Promotion of active community participation in management and utilization of range resources..
- c) Promotion of involvement of livestock professionals in private sector activities related to the development of the industry.

Activities

- a) Domestication of certain Wild Species
- b). Support to farmers in terms of training and inputs.
- c) Inventory of Range Resources.
- d) Demarcation of Rangelands.
- e) Institutional and capacity building
- f) Introduction of exotic species
- g) Farmer training in feed resources management and utilization
- i) Establishment of an animal gene bank

7. FISHERIES

The long term goals are:

- a) Increased food security;
- b) Increased employment opportunities;
- c) Enhanced government revenue earning capacity and;
- d) Increased foreign earnings.
- e) Improve the diversity of fish resources

The broad policy objectives of the fisheries sector are:

- i) To improve the nutritional standards of the population;
- ii) To effect a rational and long term utilization of the fisheries resources;
- iii) To expand the participation of private Gambian entrepreneurs in the fishing industry.
- iv) To optimize production by reducing post harvest losses.

Gaps

- a) Unavailability of information on biological characteristics of fish species.
- b) Inadequate knowledge of the mangroves as breeding and feeding grounds and habitats for juvenile and adult fish,
- c) Inadequate definition and delineation of protected areas
- d) Inadequate knowledge of the potentials of aquaculture.

Strategies

- a) Develop research capacity of Fisheries Department
- b) Conduct studies and inventory on biology, taxonomy and ecology of species
- c) Develop and implement a research plan on ecology of mangroves
- d) Develop a 5 year master plan for fisheries resources survey to establish reliable biomass estimates and MSY
- e) Strengthen regional and sub-regional cooperation in fish stock assessment
- f) Involve communities in management through publicity, information and education

Activities

- a) Develop and implement a 3 year fisheries research plan preceded by species inventory.
- b) Conduct on job and university training of staff in aquatic biology, ecology of running waters, **ichthyology**, oceanography and environmental ecology at all levels
- c) Conduct studies on mangroves and fisheries
- d) Define and identify and demarcate protected areas for fisheries purposes
- e) Institute fisheries resources co-management and conduct public awareness campaigns.
- f) Develop and implement 5 year research master plan for the River Gambia
- g) Implement pilot coastal and inland aquaculture projects

8. LEGISLATION

CONSTRAINS

- 8.1 Legal background in the area of bio-diversity and related issues not sufficiently strong .

STRATEGY:

Train environmental Lawyers

8.2 Forestry

- a) The Forestry Act does not specifically cater for the means of combatting desertification.
- c) The National Environment Agency has not established management procedures as stipulated by the National Environment Management Act.

8.3 **Wildlife**

- a) There does not seem to be any collaboration at all between the Department of Wildlife Conservation and the Non-Government Organisations (NGOs).

8.4 **Environment**

- a) **No** prosecutions have been brought under the National Environmental Management Act.

Strategic Recommendations

- a) A revision of the Forest Act is needed to address gaps in legislation and environmental issues and biodiversity.
- b) Emphasis is to be made on the need to train more lawyers and the National Environmental Agency staff to have a functional legal department with at least two lawyers for a start.
- c) There is an urgent need to increase staff at the Attorney-General's Office and at the same time to strengthen the capacity of police prosecutors through training.
- d) There is a need to further expand and train the staff at the State Department for Justice in environmental law.

9. CONVENTIONS

Gaps

- a) **No** twinning of protected areas indicated in any of the convention documents

- b) There is no information on staff exchange under any of the given International Conventions.
- c) There is no information relating to the transfrontier protected areas in which staff exchange was conducted.
- d) There is no information available on joint management agreements on the transfrontier protected areas under any of the relevant international Conventions.
- e) There is no information on joint research and monitoring, and harmonization of management planning, joint facilities and costs.

Strategic recommendations

- a) There is a need for staff exchange to foster closer collaboration in the management of on the existing transfrontier protected areas.
- b) Twin the Nuimi National Park and the Sine Saloum Delta National Park to form an international Biosphere Reserve.
- c) A joint Ramsar site and Biosphere Reserve should be established with the Delta du Saloum National Park. Joint planning between the two parks should be developed, in particular joint management of mangrove, joint protection of fish and shrimp stocks, and joint surveillance of the Parks and especially the adjacent marine areas.
- d) All the Conventions are very relevant and are recommended to be ratified by The Gambia for the preservation of biodiversity.

10. LAND, MINERALS AND MINNING

Gaps

- a) Topographic maps (contour maps or digital elevation models) are not available from either the Department of Lands and Surveys or the National Environment Agency.
- b) The Unit's technological facilities are extremely limited.
- c) Lack of knowledge on coastal dynamics
- d) No links with regional, sub-regional and international geological institutions (international cooperation)

Activities

- a) Prevention of illegal sand mining in coastal zone and to prevention indiscriminate mining activity country wide so as to prevent environmental degradation.
- b) Review and update Minerals Act to take into account current situation including environmental concerns.
- c) Monitoring of coastal erosion and coastal dynamics to provide necessary information on coastal dynamics for effective coastal zone management.

- d) Establishing closer cooperation with other government institutions involved in soil, hydrogeological and other geology related matters - e.g Soil and Water Management Unit, Department of Water Resources.
- e) Establishing links with geological establishments within and outside the sub-region including international geological organisations.
- f) Upgrading skills of the Unit's personnel through training to ensure sufficient technical and managerial expertise and understanding to properly develop and manage all aspects of The Gambia's earth resources.

Strategic recommendations

- a) A massive and timely training programme should be launched to build up capacity in the Unit.
- b) Detailed mineral resource assessment through field investigation and laboratory analyses need to be undertaken.
- c) Detailed mapping and assessment of the Kudang clays with a view to establishing a ceramic industry in Basse should be conducted .
- d) Promotion of the mineralised beach sands (i.e. the ilmenite, r-tile and zircon) for foreign investment.
- e) Strengthening the technical capability of the Geological Unit through academic training, attachment programmes .
- g) There is an urgent need for a review of the State Lands Act and forestry to resolve land ownership and private/community tree tenure issues.

(K) PARTNERS AND PARTICIPATION IN PLANNING AND REPORTING PROCESSES

It has all along been stressed in this report that The Gambia biodiversity Action Plan was designed for the grass roots eighty five percent (85%) of which depend directly on the utilization of biological resources for their survival. Consequently, conservation programmes and projects cannot succeed without their active involvement. The Gambia NBSAP process took off with the formation of a multidisciplinary task force comprising of about twenty two (22) representatives/institutions (including NGO's & PVO's) with a stake in the environment. The task force is designed to give advice and guidance to the NBSAP process and also recruited national consultants to undertake the substantive data collection. The aim here is to improve national capacities in data collection, report writing and to hear directly from the de factor biodiversity managers about the status of and threats facing biodiversity in The Gambia and what joint actions are needed to reverse the trend.

After the formal constitution of the multidisciplinary National Task Force, one of its first activities under the frame work of the NBSAP project is the 3 - day orientation workshop. The main objective of this workshop is to sensitize members of the Task Force and the consultants about the NBSAP process and develop guidelines for the preparation of the strategies, Action Plan and National Report.

As part of the sensitization and data collection process, a one - day divisional sensitization workshop was held in each of the six administrative Divisions of the country. These workshops drew from the experience and materials of the previously sixteen zonal meetings held in all the major ecologies of the country. The objective of the zonal meetings was to sensitize the general public about the provisions of the three international conventions on climate change, biodiversity and desertification and to draw up a local environment action plan together with local level action plans for the three international conventions.

The data and venue for the divisional biodiversity meetings under the framework of the NBSAP were decided upon by the various divisional co ordinating committees (DCC) and participants were drawn from a wide range of professions including traders, herders, herbalists, fishermen, farmers, hunters etc. with a stake in biodiversity conservation and sustainable use. Logistics and food was provided by the project. Between 100 - 160 participants were registered at each workshop. Meetings were held at the following places:

DIVISION	DATE	# OF PARTICIPANTS
Upper River Division	12.4.97	120 (40 female, 80 male)
North Bank Division	14.4.97	160 (100 male, 60 female)
Lower River Division	15.4.97	150 (100 male, 50 female)
Western Division	22.4.97	120 (95 male, 25 female)
Kanifing Municipal Council	23.4.97	120 (100 male, 20 female)
Central River Division	29.4.97	126 (100 male, 20 female plus 6 district chiefs)

Divisional workshop participants were urged to consider any of the following areas from the biodiversity point of view with relevance to their particular locality:-

- Agricultural biodiversity (crops and livestock)
- Forest biodiversity (wildlife and forests)
- Marine/coastal, inland waters and other aquatic ecosystems and resources
- Terrestrial ecosystems and resources

Each workshop was conducted in the local language most widely spoken and understood by the majority of participants present. However, interpretation facilities were provided for those who could speak only one local language. This is to ensure the full and active participation of all participants. The workshops were either chaired by the Divisional commissioner or his deputy who would introduce the subject and urge for their effective participation. The role of the task force was to facilitate the process.

The participants were requested to reflect over any or all of the topics presented as they relate to their respective localities, compare the status of the resources today with what it was like 50 - 80 years ago, determine whether things have improved or worsened and the factors responsible for the changes. After having identified the

factors, participants then moved onto recommended strategies and actions which may range from policy and legislative reforms to practical field action. The divisional reports including the strategies and action plans were developed by the DCC in close consultation with the participants. Before the closure of the workshop the report is readout to the participants in the local language to make sure that it is a true reflection of the days deliberations and to further confirm the ownership right over the document.

One of the important features of the process is that PVO's, and locally based NGO's have played an active role in stimulating public interest on biodiversity issues, advocating for the strengthening of conservation and biodiversity issue in national legislation, policy documents and development activities. This did not come as a surprise as Gambian NGO's and PVO's are respected for their readiness to work in the remotest and most isolated parts of the country, assisting local communities to resist and counter destruction and simplification of habitats and loss of species. The divisional reports were made available to the national consultants to enrich their reports and include aspects of local knowledge on biodiversity that could not be found in the available literature. The draft NBSAP reports were presented at a national forum where representatives from each of the divisions were given the opportunity to comment on the document and make inputs into it as appropriate before being finalized. The process was truly participatory and transparent involving all stake holders at all levels of the Gambian society.

L: ACTIVITIES TASKS AND POLICIES:

L1: Population, Health and Education in Relation to Sustainable Use and Conservation of Biological Diversity.

For sustainable use and conservation of our biological diversity the following measures are recommended and must be given priority attention:

- L1.1:** A rigorous information, education and communication (IEC) programme be pursued to increase awareness and therefore concern for the protection and preservation of bio-diversity;
- L1.2:** Emphasize and enforce the integrated approach to environmental issues by the line Ministries of Health, Education, Population Officers and Central Statistics Department through an informed data base.
- L1.3:** Government should reduce taxes on imported forest products to make their prices competitive enough to encourage the importation such of products, hence protecting the country's forest cover.
- LJ.4:** Costs for alternatives to fire wood such as gas and electricity should be subsidized to make them more affordable to encourage wide usage by the general public.

L2: Social and Cultural Factors Affecting the Conservation and Sustainable Use of biodiversity

Since land is an important factor in overall resource allocation, management and sustainable development, it is important that issues surrounding land tenure, -ownership, allocation, utilisation etc. becomes crystal clear in the minds of all the stakeholders involved in the process of planning for the sustainable use and conservation of the nation's biological diversity. The following are suggested activities to improve on the present scenario.

- L2.1: Review State Lands Act in consultation with all stakeholders to produce a comprehensive document that takes into cognizance the views and contributions of other government institutions, non-governmental organisations, the private sector, community based organisations, etc.
- L2.2: Conduct research into mechanisms of land ownership/land tenure involving all stakeholders.
- L2.3: Gender issues as regards land ownership should be thoroughly reviewed and integrated to ensure that women are given opportunity to own land.
- L2.4: Sensitise traditional rulers i.e. the chiefs and district tribunal on state land policies and legislation on land matters so that they can judge and arbitrate fairly in land disputes.
- L2.5 Government should put concern for human welfare at the centre of efforts to combat land degradation by giving much attention to issues like poverty, food insecurity, migration and demographic matters
- L2.6: Government needs to provide a flexible and integrated framework for identification of measures and actions needed for land allocation and utilisation, their implementation and subsequent review and adjustment
- L2.7: Government should give fresh impetus to mechanisms of land and natural resources management, that is, popular participation, decentralisation, land tenure review and reforms, etc.
- L2.8: Since land is a sensitive issue in a society where population is growing fast as compared to the fixed land available, the respective roles of government, civil society, organisations, and especially the local level actions and actors should be clearly defined and understood.

L3: Water Resources and the Sustainable Use and Conservation of Biological Diversity.

The strategic plan to upgrade the knowledge base and build capacities for sustainable use, monitoring and conservation of biodiversity in the water sector include the following actions and policy measures.

L3.1 Capacity building in water resources and climate monitoring, and assessment of the potential impacts of climate change, climate variability and drought on the biological diversity of The Gambia. This will require the acquisition and development of well equipped, geographically representative and operational meteorological and hydrological network of stations, and reliable national and international telecommunications systems

L3.2 Enhance the capability of the application of the knowledge of the climate system, hydrology, drought and desertification in the assessment, monitoring and conservation of biological diversity of the country. Hydrological and climate indices, variations and trends will be developed for use in the monitoring and projections of the change in the status of the nation's biological diversity and assist in the conservation process.

L3.3 Process acquired data and information and develop a centralized, accessible and operational data bank.

L3.4 Conduct assessment and monitoring of atmospheric processes and pollution. In the Gambia the major environmental and atmospheric issues that merit assessment and monitoring in preparation for inventorying, assessing and conserving biological diversity are:

(a) Land degradation:

A variety of societal pressures and natural effects are causing increases in the extent of land degradation. Mineral aerosols, rate of emission of soil material into the atmosphere and radiation are the major elements to be assessed and monitored. All of these elements contribute negatively to conditions of a healthy biological diversity.

(b) Biomass Burning:

Extensive burning of vegetation (forests, tropical savannas) injects into the atmosphere several chemical species which may interfere with natural chemical cycling or cause local/regional pollution problems. These are expected to affect the national biodiversity. The sulfur species (SO_2 , SO_4/a), black carbon, Volatile Organic Compounds(VOC), nitrogen oxides, tropospheric Ozone, radiation, W-B, carbon dioxide (CO_2), methane (CH_4) and carbon monoxide (CO) are the major elements to be assessed and monitored.

(c) Tropospheric Ozone

Emissions of anthropogenic chemicals are causing a depletion of the stratospheric ozone layer. Possible consequences include changes in the global radiation balance and increases in ultraviolet-B (W-B) radiation at the surface which have direct and indirect impact on life forms on the surface of the earth. On the other hand, increasing emissions of nitrogen oxides and volatile organic species are causing increases of tropospheric ozone. Resulting changes in atmospheric oxidizing capacity will have profound effects on chemical cycling in the atmosphere, chemical reactivity

and vegetation and hence on the biological diversity at the national, regional and global level. Major elements to be assessed and monitored include ozone (surface, total, profile), CO, CH₄, nitrous oxides (NO_x), and UV-B radiation.

(d) Deposition/acidity:

The deposition of acidic species released from fossil-fuel combustion, biomass burning, vehicles and other industrial processes may harm surface waters, soils, -vegetation, materials, buildings and humans. The atmosphere is an effective delivery system for many natural and contaminant substances to surface ecosystems. Quantifying inputs aids in understanding biochemical cycling and loading of surface ecosystems. Assessment and monitoring should cover sulfur and nitrogen species and associated alkaline species in gas, aerosol and precipitation phases, N,P,K, trace metals and synthetic organs. These assessments will be useful in gathering and analysing data and information relevant to the assessment, monitoring and conserving biological diversity at the national, regional and global level.

L3.5 Conduct abstraction inventory and aquifer modeling leading to establishment of a database of wells and bore holes for water supply and demand projections, prediction of the behavior in terms of spatial and temporal changes in the movement of water and contaminant distribution, and enhanced capacity in portraying the direction and rate of flow of groundwater within the aquifer ;

L3.6 Conduct a survey of the groundwater resources of the Gambia with the ultimate objective of upgrading the knowledge base of aquifer and develop strategies for its development. A well defined hydrogeological database for water resources planning and management will be developed. The focus will be on research to understand structure, function and composition of resource base and ecological services they provide in order to improve policy development and integrate multiple water-use to conserve biological diversity.

L3.7 Conduct hydrometric and ecological monitoring of the River Gambia so as to enhance the hydrological knowledge base to meet the challenges of water resources management and integrated development of The Gambia River Basin. A well equipped hydrological and water quality network and data base capable of providing a framework to manage the surface water on a sustainable basis and predict environmental impact of projects in the Gambia River Basin will be established. New technologies and methodologies will be acquired to develop bio-indicators that are meaningful, scientifically defensible, practical and compatible with regional and international programs. Cost-effective biodiversity inventory and monitoring methods and programs will be developed to detect and monitor changes in water quality and species diversity.

L4: Agriculture and Sustainable Use and Conservation of Biological Diversity.

L4.1: Halt inappropriate farming practices and soil erosion: Farmers have the practice of ploughing parallel to the contours of the field and also literally striping the

land of any form of vegetation cover during land preparation. Overland flow of rain water is encouraged by the parallel ridges and washes away most of the top soil of the fields along with the young plants growing on the ploughed ridges. In addition, the flow also carries along most of the nutrients in the top soil resulting to impoverishment of the soil and stunted crops. Future yields are reduced and the species availability reduces with time. The most appropriate actions to be followed is for farmers to plough their fields such that ridges are perpendicular to the overland flow of water. Efforts should be made to divert or slow down overland flow through farms by planting trees and grass in the upper reaches and farmers must be encouraged to stop clearing all the land cover on the farmland during land preparation. Sustainable agricultural practices can be maintained through nutrient cycling, biological nitrogen fixation through legumes, green manures and Nitrogen fixing trees (NFTs), traditional agro-forestry practices, and inoculation of rhizobium bacteria to leguminous crops.

L4.2: Identify and adopt drought mitigation measures: The Sahelian drought of the seventies and eighties has rendered most swamp lands barren and useless for any meaningful agricultural practice. Salt has appeared at the surface of many arable lands and the saline front has advanced further upstream of the river. A large percentage of the upland swamp rice fields of the Division are useless for cultivation. Rice species that were cultivated in these fields are no more cultivated and this has led to loss of these species. Due to the effect of the drought, the development phases of both swamp and upland crops are affected. Crops do not reach maturity, tillering/fruiting is severely affected, and crops become stunted. Thus, high quality seeds are not available for cultivation in the following cropping season and this leads to reduction in the availability of the affected species of crops. Potential drought mitigation measures include the construction of anti-saline dikes and introduction of salt tolerant, drought tolerant and short cycle species of crops. Institutionalized seed production by establishment of a seed bank and seed technology unit under the National Agricultural Research Institute (NARI). Develop new types of agricultural crops from the wild in collaboration with bilateral and international organizations, through joint research and monitoring programs, and exchange of genetic materials and information. To maintain crop diversity, there must be a thorough study of the crop and its environment to enable crops to grow in areas best suited for them.

L4.3: Soil and Water Conservation both at the lowlands and uplands: Conduct reconnaissance for proposed site, and carry out detail soil studies, characterization and preparation of intervention maps, and land evaluation on the site. Assess the civil works/engineering, agronomic follow-up, and monitoring and evaluation activities needed for the site. Identify and train farmers in appropriate conservation practices

L4.4: Develop the horticultural sub-sector to a high potential through the identification, introduction and development of market incentives and storage facilities. The horticultural sub-sector has not developed to its full potential. Species are not diversified to allow a large population and varieties of species. Indigenous species such as 'bush yam' are not fully exploited. Availability of storage facilities is limited and are required for practically all agricultural products, but particularly so for perishables

from the horticultural sub-sector. The Department of Cooperation, the Gambia Cooperative Union and the Gambia Groundnut Corporation should be revived and fully involved in the horticultural sub-sector. The institutions listed above should work with the community level societies to purchase farm implements, give them on loan and institute appropriate recovery methods through purchasing the products from the farmers and using the profits realized from the purchase of commodities to provide the appropriate storage facilities.

L4.5: Assess the incidence of pests and striga and develop appropriate mitigation measures. A significant number of animal and insect pests have been identified, e.g., warthogs, primates, weaver birds and blister beetles. Some fish has also been identified as a pest to young rice seedlings and Striga as an alien weed. These inflict varying degrees of damage on agricultural crops at various stages of their development, resulting in some cases to retardation in the maturity of the crops and/or total loss or failure of the crop concerned. The end results are unavailable of healthy and adequate seeds for cultivation in the following year and, in the long term, reduction in the future availability of the particular crop species. To mitigate the effects of pests the communities should establish wildlife buffer zones and should avoid encroaching onto traditional grazing lands of wild animals. For farm lands, pest scaring devices, such as battery operated and timed toy guns and explosives, should be employed to scare away agrarian pests. A more holistic and environmentally sound integrated Pest Management Program must be developed to reduce crop ravages due to pests.

L4.6: Regulate the use of chemical fertilizers and encourage the adoption of the use of organic manure. Low soil fertility of the country has meant that farmers have to rely on chemical fertilizers to boost their agricultural yields. Inappropriate application of chemical fertilizers has damaging effects on soils and living organisms in the fields and the soil. The chemicals deteriorate soil conditions by reducing the presence of soil invertebrates, micro-organisms and soil insects responsible for decomposition and nutrient cycling and most of the biological diversity in the fields is, therefore, lost. Nitrogen fertilizers are emitters of greenhouse gases and hence are one of agents responsible for the potential climate change. Farmers and agricultural extension agents should manage crop residues and other organic material for conversion and use as organic fertilizers. Composting of organic waste should be introduced at the village level. Advise on the applications of chemical fertilizers must be sought from extension workers. Sustainable crop production through low input approaches e.g. use of green manure in rice production, and development of low input farming systems through participatory research should be adopted and developed.

L4.7: Discourage continuous cropping and encourage crop rotation: About 30-40 years ago, farm lands used to lie fallow for at least 2-5 years or more before being put back to active cultivation. Due to the high demand on land caused by the increasing human population and mechanized agriculture, this practice is no longer possible. The continuous cropping system has led to drastic decline or total loss in soil fertility as the soils are exposed to erosion by wind and water, nutrients are lost and the soils impoverished and are, thus, unable to support viable native tree cover or crops. The

increase in population should be regulated to avoid catastrophe in the future. In consultation with local communities, effective population control measures should be identified and instituted at the local level. Alternate cropping should be practiced and farm lands should be allowed to fallow to regain fertility. Agro-forestry should be introduced as a viable land use system to alleviate the situation. Some of the basic components of a sustainable agro-ecosystem as seen from a management view point must include: regular supply of organic matter through regular addition of crop residues manure and compost, and promotion of soil biotic capacity; and nutrient cycling through crop rotation, agro-forestry, crop/livestock mixed systems, inter-cropping and/or mixed cropping.

L4.8: Enhance and encourage the unconditional access to land all members of the community at the beginning of the rainy season: The problem of land tenure relates to the uneven distribution of farm land within the community. Efforts of those farmers that do not own land within the community are frustrated.

L4.9: Develop and implement appropriate public awareness campaigns for effective management of all resources by the community. Most of the problems identified above, particularly inappropriate agricultural practices, are caused and compounded by lack of awareness. Potential public awareness programmes include utilization of the mass media, local level workshops, farmer visits to regions of “success stories,” and farmer level field trials of scientifically tested and approved practices.

L5: Livestock Services and Sustainable Use and Conservation of Biological Diversity:

For sustainable use and conservation of biological diversity in the Livestock Sub-sector the following actions are proposed.

L5.1: Enhance the genetic potential of the local breeds such as the Ndama cattle, Djallonke sheep and West African Dwarf goats.

L5.2: Keep livestock numbers in balance with the available fodder resources and improved production of cattle and small ruminants through better management, disease control, nutrition, and genetic improvement through selection and breeding.

L5.3: Introduce domestication of fast breeding wild animals that are socially acceptable, in order to meet the substantially increasing demand for meat. The possible candidates for domestication include but not limited to the Giant rat or pouched rat (*Cricetomys gambianus*), the Cane rat or Grass cutter (*Thryonomys swinderianus*) and the Spurs winged goose or Gambian goose (*Plectropterus gambiensis*). Diversification of animal protein source on a commercial basis would entail rearing of short-cycled species including ducks, guinea fowls, turkeys, geese and rabbit for both the domestic

market and the tourist industry.

L5.4: Establish peri-urban dairy industry as a promising avenue to boost domestic milk production in order to meet the growing demand for dairy, meat and other livestock products in the expanding urban centres. This would involve introduction of exotic dairy breeds of cattle and goats and improved feeding, health and management packages which are capable of improving productivity in a biologically efficient and financially profitable manner.

L5.5: Promote the production of these smaller species through integration in the traditional production system, establishment of commercial farms, increased investment both from local and foreign entrepreneurs and the availability of cheap feeds and feed supplements. Whilst availability of feeds for the species could be ensured through establishment of feed mills and utilisation of locally produced grains and agricultural by-products, establishment of hatcheries will enhance availability of day old chicks. Commercial traits in maize production and greater exploitation of agro-industrial by-products and smoked fish could be promoted to minimize reliance on imported feeds. Slaughtering, processing and cold storage facilities could also be constructed to increase the supply of products on the market. Efforts could be intensified to improve traditional poultry production through disease control, better feeding, housing, selection, management of chicks and through effective extension services.

L5.6: Organise and sensitise farmers on the desired activities to be undertaken for the conservation of biological diversity as sustainable use of biodiversity can be achieved through the many farmer and herder associations such as the Livestock Owners Associations (LOA).

L5.7: Promote the rational use of the range resources in the Gambia,

L5.8: Provide adequate and well distributed watering points throughout the country.

L5.9: Inventorise, evaluate and analyse range resources in order to classify range sites, determine forage production and utilisation, determine the carrying capacity, and document range conditions and trends. Quantification of such information would assist in developing sound grazing management systems that would ensure sustained animal production and perpetuation of soil-plant base resources.

L5.10: Develop a range management strategy and plan which will consist of grazing management, fire control, rangeland improvement, fallow land improvement, animal health and improved animal feeding techniques. Improved grazing management (e.g. deferred grazing of certain rangelands) will increase ground cover, stabilise soils, increase soil organic matter and reduce noxious plant species as well as increase total plant biomass. Improved range management will result in improved biomass production with subsequent ability of the range to carry more livestock

through the dry season

L5.11: Alternate periods of grazing and rest to manage and maintain the forage resource base. Having determined the carrying capacity of each range unit, develop sound grazing management systems that ensure optimum dry matter and nutrient intake by the grazing animal while maintaining continued vigour and survival of the forage species.

L5.12: Conserve feed resources (crop residues) and the use of fodder trees for dry season feeding to alleviate pressure on range during the season of low feed quality.

L5.13: Demarcate cattle tracks and establish boundaries of cultivation in order to restrict cropping and reserve rangelands for their best use. This will be done in collaboration with farmers and Livestock Owners Associations (LOA).

L5.14: Increase access ways to avoid the irreversible deterioration of the grossly inadequate existing access ways through trampling of vegetation and permanent trails. Access to the river and swamps is particularly difficult during the dry season when the natural level of the river is lower and the nutritional level of the animals is also lower, causing many of the more feeble to lose their footing, falling into the river and drowning.

L5.15: Sensitise and educate the public on the methods to mitigate and control bush fires as reduction of or elimination of these environmental hazards will increase forage and tree biomass and diversify plant species.

L5.16: Adopt de-stocking as viable strategy to lighten the use of the grasslands. Low-quality stock which are grazing to no apparent economic purpose should be culled. Purchase of young animals for fattening and sale should be encouraged. A good market outlet is needed to purchase the animals. The Tobaski Ram Sales is a good market outlet for sheep and goats in the country.

L5.17: Promote cow-calf herds to increase production of milk and young animals for marketing or fattening. The number of cows which no longer produce calves or milk should be reduced. Productivity of the herds is most dramatically improved through better nutrition, breeding and selection, lower calf mortality, increased calving rate, and animal disease control.

L5.18: Use the kind of livestock most suited to the forage supply and the objectives of management. Identify and classify plants and range sites in accordance with their relative forage value and match to various classes of livestock. On a free choice, different kinds of stock (cattle, sheep, goats, donkeys and horses) have different preferences for various types of vegetation and/or plant morphological units within a range.

L6: Fisheries and Sustainable Use and Conservation of Biological Diversity:

The proposed Fisheries Management Action Plan centres on the following as its major task areas:

- the resource base,
- the artisanal sub-sector,
- the industrial sub-sector,
- the legal and institutional frame work,
- investment strategy
- human and financial resources requirements, and
- economic policy.

Suggested actions include:

L6.1: Encourage all stakeholders to take more proactive approaches to fisheries management by involving them in major activities of the sector from planning to implementation stages. This will help achieve a balance between utilisation and regeneration rate of stocks and lead to the achievement of the objectives of the sector. The Government's image of fisheries management which is more of the department enforcing, regulating, strategy development, etc. with little or no involvement of other stakeholders should change. A more participatory approach which rest on two way documentation, dialogue and sharing should be instituted. Mechanism of assuring ownership is crucial for future advancement of community or group involvement in the sector. Involve local fishermen and their communities in the control, production and management of our fisheries resources.

L6.2: Effort to integrate and harmonise indigenous knowledge of the sea/river, type of species, their regeneration capacities and trends are crucial and should be researched into and adopted when found necessary.

L6.3: Establish a fisheries consultative committee to provide timely corrective management measures, ensure better understanding of fisheries policies and promote and maintain a balanced public and private sector management.

L6.4: Conduct periodic inventory of fish species and their quantities. These studies should critically examine fish habitat and other factors inhibiting and or promoting fish regeneration. This should be tied to fish eating habits of the people and their geographical spread and availability

L6.5: The role of women in fish processing and smoking should be critically examined and mechanisms be sought to support such activities.

L6.6: Illegal harvesting and smuggling of mangroves should be halted. Mangroves are ideal and conducive in fish breeding areas and their over- exploitation has an impact on fish availability for local consumption.

L6.7: There is an urgent need for the review of the issuance of license especially in the execution of appropriate differential treatment of citizens as a way of motivating them to venture into the fishing industry.

L6.8: Commercial fishing by trawlers should be adequately regulated and controlled as it involves the killing and dumping of fish species not considered appropriate or important. Moreover, artisanal fishermen should be supported so that they may not be easily marginalised and disturbed by big industrial firms with sophisticated fishing gear.

L6.9: Fish breeding site should be identified and their use be restricted at certain times to encourage fish regeneration.

L6.10: Fish farming ventures should be piloted and the private sector should be encouraged and supported to indulge in this

L6.11: General sensitisation efforts in the fishing industry should be strengthened to create awareness of all stakeholders. This would help increase knowledge, skills and help change attitude and beliefs for the better.

L6.12: The Gambia, evidently has a wealth of biologically diverse fisheries resources which when properly managed and conserved can sustainably benefit present and future generations. This will also require the management of threats to habitats, protected areas and the biological resources. However, appropriate management and conservation measures for resources demand that there is minimum scientific knowledge.

L6.13. The planning and implementation of in-depth and tailored research activities and programmes is recommended. These and the conduct of appropriate surveys at reasonably regular intervals will form the basis for adequately establishing resources sizes, location and or biological characteristics of individuals and groups of species and habitats as essential basic tools for managers. This will require the availability and development of material and human resources.

L6.14: It is also recommended that there is work to establish biomass and potentials of individual species, particularly the highly commercial species that are under more intense fishing pressure. Additionally, management and conservation would require to establish comprehensive plans and strategies for conservation management.

L6.15: Bearing in mind the nature of the resources (multi-species) shared stocks, there is a high need for collaboration in research and management planning at the regional level. Protected areas must be adequately defined and legislated and should have their respective systems management plans. Habitat changes cannot be established and would hence require research studies and monitoring programs/systems to enable prediction of likely changes, pollution levels and their effects. Buffer zones must also be establish for protected areas.

L6.16: Participatory management is an ideal management approach in the open access nature of the fishery resources of The Gambia. There are at present, traces of traditional management systems and consultations are in progress for the involvement of communities in management of resources. The approach must be refined and intensified with increased involvement of resource users in participatory planning and implementation. In the short to medium term, communities and resource users must be adequately sensitised about the state of the resources and measures legislated for purposes of legalising community based management mechanisms and the establishment of co-management systems.

L6.17: The introduction of alien species by whatever means must, of significance to biological pollution, be legislated and prevention mechanisms established, especially in inland waters that are more closed systems.

L6.18: Aquaculture and its social and economic benefits should be developed bearing in mind environmental issues. Hence it is recommended that aquaculture in the freshwater zones of the River Gambia should be developed and geared towards salvaging threatened fish species and establishing means for restocking the River with some of the rarer fish species.

L6.19: Mangroves are important ecological habitats in the realms of the River Gambia, providing valuable nursery and feeding grounds for a variety of fish species. However, the resources are being destroyed for a variety of uses. Hence it is recommended that in-depth studies of mangroves in relation to their biology, function and regulated exploitation; hence their full protection must be taken up as future management basis. A mangrove committee could increase public awareness and establish co-management linkages for the protection and conservation of this important fisheries ecosystem.

L6.20: The technical competence of the Department of Fisheries and other concerned parties should be reinforced in terms of research, management and surveillance to improve the information base for the effectiveness of management actions and monitoring activities.

L7: Forestry and Sustainable Use and Conservation of Biological Diversity.

L7.1: Make efforts to reverse the present trend of over exploitation by having forest policies place much emphasis on the immediate needs and wishes of the local people and allowing the policies to encourage the forest administration and individual forest officers to see beyond trees and become more concerned with people and the multiple use potential of forest land.

L7.2: The traditional approach of forestry policing needs to be changed in favour of involving the local communities in the management and rational utilisation of forest resources. The community should have a voice in management decisions and practices from policy formulation level right through designing, implementation, and evaluation of forest programmes and projects.. Such approach calls for returning the

ownership rights to the local communities. Their needs and even technical knowledge on conservation techniques ought to be taken on board. The role of forestry agents, in this type of new relationship, should naturally change from control to facilitation.

L7.3: The economic value of biodiversity stems from the many benefits derived directly from it including the opportunities for tourism, education, research, food security, medicine and energy for domestic use and also habitat security for our -fauna and marine life. The socio-economic potentials and values of our biodiversity stem from a variety of sources some of which are difficult to attach economic value to as they provide both the services and goods which are non marketed or they are economic externalities. There is therefore a need to develop standard criteria for valuing benefits from the biodiversity in order to arrive at indices which can then be used as a bases for future biodiversity evaluation.

L7.4: Even though the importance of biodiversity cut across many institutions and agencies in The Gambia, only forestry department has so far produced clear policy statements on the protection and conservation of this natural heritage. Departments of Parks and Wildlife and Fisheries, along with other sectors continue to put emphases on it. As sectoral policies review continues, there is ample opportunity for harmonization with a view of coming up with a clear biodiversity national policy to be backed by an enforceable legislation.

L7.5: In addition to the destruction of the vegetation, bush fires have led to the unprecedented impoverishment of the habitat resulting in a serious decline in species composition and density. The phenomenon has also led to the ultimate extinction of locally-adapted populations and species, loss of land cover and erosion. To reduce incidence of bush fires it is necessary to ban smoking in all public places and in vehicles and increase the price of cigarettes, introduce and encourage the use of modern methods of honey extraction, sensitize herders and hunters about the dangers of tire and the need to refrain from lighting unnecessary tires, reintroduce prescribed burning, create fire belts, strengthen the spirit of community ownership of the forest, set up Village Fire Fighting Committees and provide them with fire fighting equipment and mobility for effective monitoring of fires, and institute stiffer penalties for culprits.

L7.6: One of the major agents of forest ecosystem loss and fragmentation is the conversion of forests to agricultural systems. High human population factors are in most cases associated with unsustainable levels of harvesting forest products (wood and non-wood forest products), including wild fauna and flora of commercial and subsistence value. Illegal tree felling occurs due to the need to establish new settlements. It is also not uncommon to fell trees for commercial purposes, i.e., poles and fuelwood for sale. During the dry season after rangelands have been destroyed by bush fires, herdsman provide browse for livestock by lopping the branches of pterocarpus erenaceous and other preferred species. This unsustainable levels of harvesting forest products (wood and non-wood forest products), including wild fauna and flora of commercial and subsistence value has adverse impacts on genepool

diversity, population viability, the ecological balance of natural communities, and ecosystem processes and functions. Illegal tree felling significantly contributes to the loss of forest biodiversity. To remedy this trend it is necessary that communities be empowered to monitor illegal activities, establishment of new settlements should be stopped, lopping of branches to provide browse for livestock should be discouraged and offenders should be punished, every member of the community should be encouraged to actively participate in tree planting activities, the public should be continuously sensitized through media campaigns on the importance of the tree and the maintenance of vegetation cover and clearing of virgin forest should be banned.

L7.7: Licenses are issued to individuals or communities for specified activities with time limits. However, greed and other personal motives in most cases led license holders to ignore the conditions as stipulated in the license. Abuse includes the use of the same license by several people, the use of licenses outside the area of validity and beyond the time limit authorized, and for different activities and species altogether. The Department of Forestry and all its agents responsible for the issue and monitoring of the use of licenses should endeavour to establish Village level licensing Committees, empower these committees to enforce the law and provide effective monitoring of the activities of license holders, applicants and applications for the issue of licenses should be thoroughly scrutinized paying particular attention to equipment to be used in the exploitation of the biodiversity resources, and the number of licenses to be issued should be limited and regulated to minimize abuse.

L7.8: The Department of Forestry lacks the required human resources to adequately police the forests and associated resources. Local communities are dissatisfied because they have been left out of the management and decision making process of the very forests they have lived within and protected from time immemorial. Suggested solutions to provide adequate Surveillance include increase in the extension staff of the Forestry Department, local communities should be involved through the establishment of Forest Committees, and these Committees should be provided with means of mobility to effectively manage their forests.

L7.9: In most cases people are ignorant of or disdain for the long-term consequences of some of the unsustainable forest resources exploitation they carry out for their personal benefits. For remedial measures public awareness programmes on sustainable management and exploitation of our natural resources should form part of all projects that are to be implemented at the grassroots level. These could be in the form of farmer/extension agent training workshops at the community level.

L8: PARKS AND WILDLIFE MANAGEMENT

L8.1: Develop an effective and people-based policy and legislation which take into account the socio-economic picture of the country, the relationship between people and protected areas, the multiple use concept and the role local communities play in managing resources as the ultimate protectors and beneficiaries.

L8.2: Identify, demarcate and encourage the protection of our cultural and natural heritage sites such as sacred graves, traditional circumcision sites, and areas renowned for bio-diversity as well as for idol/traditional worship including “Kachikally” in Bakau, “Folunko” in Kartong, and “Mbulumanoto” in Dankunku, to name just a few.

L8.3: Indigenous knowledge on the heritage sites mentioned above should be documented, preserved and spread. Also, indigenous knowledge on the relationship between families or clans and specific species of animals and birds should be well researched and preserved since it has a direct impact on the killing and consumption of several species and ultimately on the long term sustainability of bio-diversity.

L8.4: For sustainable utilisation and conservation of bio-diversity resources the Department of Parks and Wildlife Management should take into account the following social considerations:

- Leave habitation intact but limit the use of natural resources, which are the cornerstone of local population equilibrium.
- Management should be such that household economic and property systems are not upset.
- Interference or conflict with value pertaining to nature and places of important cultural and religious cohesion should not arise.
- A balance between people’s legitimate needs and the conservation of biological diversity should be sought and maintained.

L8.5: Community participation, ownership, cost sharing and investment in the management and conservation of protected areas should be reviewed. Policies and regulations on the killing of animals and birds, that are regarded as pests, should be critically reviewed, putting into consideration the needs and aspirations of local communities.

L8.6: Update the current Wildlife Act and prepare legislation in line with environmental and socio-economic objectives of other national programmes and international conventions and agreements in the area of bio-diversity.

L8.7: Prepare, update and implement a general Wildlife Management Policy and Plan for present and future protected areas in line with environmental and socio-economic objectives of The Gambia’s programme for sustainable development.

L8.8: Improve access to wildlife resources on the basis of existing management policy and legislation.

L8.9: Increase total area under protection to achieve a regional balance especially in selecting an appropriate site in the eastern part of the country with potential high ecological value.

L8.10: Prepare and update, as and when found necessary, fauna and marine mammals inventory check list to ascertain number of fauna species represented in The Gambia.

L8.11: Train staff of the Department of Parks and Wildlife Management for sustainable implementation of activities leading to sustainable conservation of biodiversity.

L8.12: Conduct research and produce documentation on levels of hunting, poaching, and various other uses of bio-diversity resources, for example ecotourism.

L8.13: Enrich present buffer zones and create new ones around all protected areas to act as corridor for wild animals and for protection against encroachment and intensive use.

L8.14: Identify and develop land use practices, such as woodlots, vegetable gardens, bee keeping to improve the income base of peripheral village communities, and planting of rare species to provide communities with valuable source of traditional medicines while enhancing biodiversity in the protected area buffer zone.

L9: Geology and Sustainable Use and Conservation of Biological Diversity.

L9.1: Conduct a detailed Mineral Resource Assessment Programme integrating all the identified sand reserves with a view to expanding the resource base and aim at establishing a larger glass industry for both domestic and foreign markets. The Mineral Resource Assessment shall provide adequate technical information and resource maps required for investment promotion at international Conferences, Workshops and Tradefairs. This project should be followed by a thorough market research and feasibility studies for the establishment of a glass industry similar to the 1984 CFTC studies. The Geological Unit and the Industrial and Investment Promotion Divisions of the Ministry of Trade should work closely to achieve this objective.

L9.2: Carry out a detailed mapping and assessment of the Kundam clays with a view to establishing a ceramic industry in Basse. Both kaolinitic and plastic clays exist in industrial and commercially viable quantities to be exploited by the private sector. The Kundam clay would require additional field and laboratory investigation to increase tonnage. Although Kundam is rather remote but (between Basse and Fatoto), with Government's interest and commitment to improve the living standards of the rural areas, attention should be paid to both this deposit and the Alounghari plastic clay deposit.

L9.3: Strengthen the technical capability of the Geological Unit through academic training, attachment programmes and establishment of links with Geological Surveys such as the Geological Survey of Ghana.

L9.4: Environmental degradation associated with quarrying of construction materials has become apparent in The Gambia. A typical example is the effect of Sand Mining on our beautiful beaches. Therefore while efforts are being made to check

indiscriminate sand mining in the coastal areas, the Geological Unit, in its expansion strategy would recommend the establishment of an Engineering and Environment Division. This Division with full human and material resources support would conduct researches on these industrial rocks and minerals, promote alternative building material such as burnt clay bricks in order to minimise the use of sand in brick making and manage all quarrying activities in the country. The Division would also carry out site investigations for major Civil Engineering Projects and Waste Disposal sites.

L9.5: The mining code of this country “The Minerals Act” cap 64 was essentially geared towards precious and metalliferous minerals and therefore poses critical operational problems for the Unit to manage and control stone and sand quarrying. This act needs urgent attention for review and revision to bring it in line with modern mining legislation and investment objectives of this country as well as cater for construction and earth material. It should be noted that many countries are now giving more priority to the local production and supply of bricks and tiles, lime and stone, sanitary ware and refectories and local manufacture of cups, saucers, and glasses. These are items which are basic to a country’s growth, providing increased local employment, improvement in know how and skills, and a better life for the people generally.

M: RESOURCES NEEDS.

The reports that emanated from the NBSAP process, namely, the Country Study and the Strategy and Action Plan clearly showed the existence of major gaps in our knowledge about the status and trends of Gambian biodiversity. The present state of knowledge about Gambian biodiversity is just the tip of the ice-berg. Consequently, the biodiversity strategy and action plan document recommended a variety of actions the implementation of which is sine qua non of our drive towards the conservation and sustainable use of biodiversity in the Gambia-The national biodiversity strategy and action plan [NBSAP] further identified key limitations which presents serious hurdles in the way of implementing the plan itself. The following constraints have been highlighted in various forms in the report:

- * Lack of funding.
- * Lack of capacity/training
- * Inadequate infrastructure /equipment
- * Institutional weaknesses
- * Absence of a policy framework
- * Inadequate donor support and collaboration

It should be pointed out from the onset that any genuine move towards overcoming the constraints as outlined above, with a view towards ensuring the successful implementation of the

action plan, will undoubtedly require additional resources, especially funding and training.

Most agencies lack adequately trained or qualified staff to implement the action plan and the provisions of the -biodiversity convention. For example, the department of Parks and Wildlife Management with a total staff roll of about 36, is -responsible for the development of wildlife and protected areas in the country. Out of the number only one is a professional and another three are middle level technicians. The rest are support staff of various categories and at various levels. Under normal circumstances, this level of staffing is just adequate for the operational needs of a single protected area. A similar situation is true for most other natural resources agencies responsible for the implementation of certain aspects of the action plan.

Out of the total budgetary allocation of D900,000,000-bythe central government for 1998,only D9,000,000, about 1% is earmarked for the entire natural resources sector. Compared to the resources needs of biodiversity related institutions, this level of funding are grossly inadequate for any meaningful biodiversity development programmes. The present government moratorium on new recruitment, the policy of zero growth and the continuous budgetary cutbacks to meet IMF conditionalities means that personel, equipment, infrastructure and other needs for new projects could only partially or not be met at all. Increase funding and training for Gambian conservation agencies, be they government, NGO, national institutions, local groups, etc., is urgently needed to build the Gambia's capacity and expertise in areas like taxonomy, research, natural resource management and planning, environmental law and resource economics to name but a few. This is required to put in place sound biodiversity conservation and management policy and legislation based on upto date scientific information from the field to squarely deal with the environmental, biodiversity, social, economic and other aspects of projects and programmes recommended in the action plan. In as much as funding and training are crucial to the succesful impementation of the action plan, initial donor support and collaboration will be a move in the right direction. Most donors have a tendency to focus their attention and resources in biodiversity rich areas of the globe paying only lipservice to those areas like the Gambia with aspects of biodiversity which are least appealing from the donor's pont of view. Such an attitude really frustrates the efforts of the Gambia, particularly under the present austere economic environment, with catastrophic consequences on biodiversity in general, and particularly, at the national level.

**N: SCHEDULE OF IMPLEMENTATION OF THE VARIOUS
SECTORAL ACTIVITIES:**

N1: SOCIAL AND CULTURAL FACTORS

ACTIVITIES	YEAR OF IMPLEMENT													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<ul style="list-style-type: none"> Review State Lands Act in consultation with all stakeholders to produce a comprehensive document that takes into cognizance the views and contributions of other government institutions, non-governmental organisations, the private sector, community based organisations, etc. 														
<ul style="list-style-type: none"> Conduct research into mechanisms of land ownership by different actors. 														
<ul style="list-style-type: none"> Review and integrate gender issues as regards land ownership to ensure that women are given opportunity to own land. 														
<ul style="list-style-type: none"> Sensitise traditional rulers i.e. the chiefs and district tribunal on state land policies and legislation on land matters so that they can judge and arbitrate fairly in land disputes. 														
<ul style="list-style-type: none"> Put concern for human welfare at the centre of efforts to combat land degradation by giving much attention to issues like poverty, food insecurity, migration and demographic matters 														
<ul style="list-style-type: none"> Provide a flexible and integrated framework for identification of measures and actions needed for land allocation and utilisation, their implementation and subsequent review and adjustment 														
<ul style="list-style-type: none"> Give fresh impetus to mechanisms of land and natural resources management, that is, popular participation, decentralisation, land tenure review and reforms. etc. 														
<ul style="list-style-type: none"> Define the respective roles of government, civil society, organisations, particularly local level actions and actors. 														

N2: LIVESTOCK AND RANGELAND MANAGEMENT.

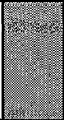







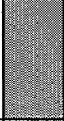







ACTIVITIES	YEAR OF IMPLEMENT													
	1	2	3	4	5	6	7	7	8	10	11	12	13	14
• Keep livestock numbers in balance with the available fodder resources and improved production of cattle and small ruminants through better management, disease control, nutrition, and genetic improvement.														
• Enhance the genetic potential of the local breeds such as the Ndama cattle, Djallonke sheep and West African Dwarf goats.														
• Introduce domestication of fast breeding wild animals that are socially acceptable and expand the rearing of short-cycled species including ducks, guinea fowls, turkeys, geese and rabbit for increase in availability of meat products for both the domestic market and the tourist industry.														
• Establish peri-urban dairy industry as a promising avenue to boost domestic milk production in order to meet the growing demand for dairy, meat and other livestock products in the expanding urban centres.														
• Organise and sensitise farmers on the desired activities to be undertaken for the conservation of biological diversity as sustainable use of biodiversity can be achieved through the many farmer and herder associations such as the Livestock Owners Associations.														
• Promote the rational use of the range resources in the Gambia.														
• Provide adequate and well distributed livestock watering points throughout the country..														
• Inventorise, evaluate and analyse range resources in order to classify range sites, determine forage production and utilisation, determine the carrying capacity, and document range conditions and trends.														
• Develop a range management strategy and plan which will consist of grazing management, fire control, rangeland improvement, fallow land improvement, animal health and improved animal feeding techniques..														
• Conserve feed resources (crop residues) and promote the use of fodder trees for dry season feeding to alleviate pressure on range.														
• Demarcate cattle tracks, increase access ways and establish boundaries of cultivation in order to restrict cropping and reserve rangelands for their best use.														
• Sensitise and educate the public on the methods to mitigate and control bush fires in a bid to reduce their environmental hazards.														
• Adopt de-stocking as viable strategy to lighten the use of the grasslands and encourage purchasing of young animals for fattening and sale.														
• Promote cow-calf herds to increase production of milk and young animals for marketing or fattening.														

N3: WATER RESOURCES

ACTIVITIES	YEAR OF IMPLEMENT													
	1	2	3	4	5	6	7	7	8	10	11	12	13	14
<ul style="list-style-type: none"> Capacity building in water resources and climate monitoring, and assessment of the potential impacts of climate change, climate variability and drought on the biological diversity of The Gambia. 														
<ul style="list-style-type: none"> Develop climate indices, variations and trends for use in the monitoring and projections of the change in the status of the nation's biological diversity and for use in the conservation process. 														
<ul style="list-style-type: none"> Process acquired data and information and, develop and update, as and when necessary, a centralized, accessible and operational data bank. 														
<ul style="list-style-type: none"> Conduct, on a regular bases, assessment and monitoring of atmospheric processes and pollution such as desertification, biomass burning, tropospheric Ozone and deposition/acidity, for use in inventorying, assessing and conserving biological diversity. 														
<ul style="list-style-type: none"> Conduct abstraction inventory and aquifer modeling leading to establishment of a database of wells and bore holes for water supply and demand projections, prediction of the behavior in terms of spatial and temporal changes in the movement of water and contaminant distribution, and enhanced capacity in portraying the direction and rate of flow of groundwater within the aquifer ; 														
<ul style="list-style-type: none"> Conduct a survey of the groundwater resources of the Gambia with the ultimate objective of upgrading the knowledge base of the aquifer system in order to understand the structure, function and composition of the resource base and ecological services they provide with a view to improving policy development and integrating multiple water-use to conserve biological diversity.. 														
<ul style="list-style-type: none"> Acquire new technologies and methodologies to develop bio-indicators that are meaningful, scientifically defensible, practical and compatible with regional and international programs and those that can be used in a cost-effective biodiversity, inventory and monitoring 														

N4: FISHERIES RESOURCES.

ACTIVITIES	YEAR OF IMPLEMENT													
	1	2	3	4	5	6	7	7	8	10	11	12	13	14
• Encourage all stakeholders to take more proactive approaches to fisheries management by involving them in major activities of the sector from planning to implementation stages.														
• Adopt, Integrate and harmonise indigenous knowledge of the sea/river, type of species, their regeneration capacities and trends.														
• Establish a fisheries consultative committee to provide timely corrective management measures, ensure better understanding of fisheries policies and promote and maintain a balanced public and private sector management.														
• Conduct periodic inventory of fish species and their quantities paying particular attention to fish habitat and other factors inhibiting and or promoting fish regeneration.														
• Examine and promote the role of women in fish processing and smoking and mechanisms should be sought to support such activities.														
• Conduct in-depth studies of mangroves in relation to their biology function, regulation of its exploitation, establish a mangrove committee, and halt the present illegal harvesting and smuggling of mangroves.														
• Review the issuance of license especially in the execution of appropriate differential treatment of citizens as a way of motivating them to venture into the fishing industry.														
• Provide adequate regulation and control on commercial fishing by trawlers, while at the same time providing adequate support to artisanal fishermen.														
• Identify fish breeding sites and restrict their use at certain times to encourage fish regeneration.														
• Conduct fish farming on pilot basis and encourage and support the private sector to indulge in it.														
• Strengthen the general sensitisation efforts in the fishing industry to create awareness of all stakeholders and help change attitude and beliefs for the better.														
• Conduct appropriate surveys at regular intervals and carry out in-depth and tailored research activities and programmes in order to develop a basis for adequately establishing resources sizes, location and or biological characteristics of individual and groups of species and habitats as essential basic tools for managers.														
• Conduct studies to establish biomass and potentials of individual species, particularly the highly commercial species that are under more intense fishing pressure; and establish comprehensive plans and strategies for conservation management.														
• Encourage and promote regional level collaboration in research and management planning.														
• Define and legislate protected areas and develop management plans for all so defined. Establish habitat changes through research studies and monitoring programs/systems to enable prediction of likely changes, pollution levels and their effects. Buffer zones must also be established for protected areas.														

<ul style="list-style-type: none"> • Refine and intensify consultations on the involvement of communities in management of resources and integration of traditional management systems into the broad based management system. 																	
<ul style="list-style-type: none"> • Establish preventive mechanisms and legislation to curb the introduction of alien species in the fisheries resources especially in inland waters. 																	
<ul style="list-style-type: none"> • Develop and promote aquaculture and its social and economic benefits and should be geared towards salvaging threatened fish species and establishing means for restocking the River with some of the rarer fish species. 																	
<ul style="list-style-type: none"> • Strengthen the technical competence of the Department of Fisheries and other concerned parties in terms of research, management and surveillance to improve the information base for the effectiveness of management actions and monitoring activities. 																	

N5: FORESTRY AND FOREST RESOURCES MANAGEMENT:

ACTIVITIES	YEAR OF IMPLEMENT													
	1	2	3	4	5	6	7	7	8	10	11	12	13	14
<ul style="list-style-type: none"> Reverse the present trend of over exploitation of forests by having forest policies place much emphasis on the immediate needs and wishes of the local people, and allowing the policies to encourage the forest administration and individual forest officers to see beyond trees and become more concerned with people and the multiple use potential of forest land. 														
<ul style="list-style-type: none"> Involve local communities in the management and rational utilisation of forest resources from policy formulation level right through the design, implementation, and evaluation of forest programmes and projects. 														
<ul style="list-style-type: none"> Develop standard criteria for valuing benefits from the forest biodiversity in order to arrive at indices which can then be used as a bases for future biodiversity evaluation. 														
<ul style="list-style-type: none"> Include multiple-use forestry in community forestry sensitization and implementation programmes; involve women in the development and implementation of multi-use forestry; prepare guidelines for the preparation of management plans for community forests into working groups; assist communities to set priorities and timetable for community forestry activities. 														
<ul style="list-style-type: none"> To reduce incidence of bush fires ban smoking in all public places and in vehicles, increase the price of cigarettes, introduce and encourage the use of modern methods of honey extraction, sensitize herders and hunters about the dangers of fire, reintroduce prescribed burning, create fire belts, strengthen the spirit of community ownership of the forest, set up Village Fire Fighting Committees, provide the Committees with fire fighting equipment and mobility for effective monitoring of fires, and institute stiffer penalties for culprits. 														
<ul style="list-style-type: none"> To halt the unsustainable levels of harvesting forest products, including wild fauna and flora of commercial and subsistence value communities should be empowered to monitor illegal activities, establishment of new settlements should be stopped, lopping of branches to provide browse for livestock should be discouraged and offenders should be punished, the community should be encouraged to actively participate in tree planting activities, and clearing of virgin forest should be banned.. 														
<ul style="list-style-type: none"> The Department of Forestry and all its agents should endeavour to establish Village level licensing Committees, empower these committees to enforce the law and provide effective monitoring of the activities of license holders, applicants and applications for the issue of licenses should be thoroughly scrutinized and the number of licenses to be issued should be limited and regulated to minimize abuse. 														
<ul style="list-style-type: none"> To provide the necessary capacity for surveillance, increase extension staff of the Forestry Department, establish Forest Committees and provide them with means of mobility to effectively manage their forests. 														
<ul style="list-style-type: none"> Integrate public awareness programmes on sustainable management and exploitation of our natural resources in all projects that are to be implemented at the grassroots level. These programmes could be in the form of 														

farmer/extension agent training workshops at the community level.

N6: PARKS AND WILDLIFE MANAGEMENT:

ACTIVITIES	YEAR OF IMPLEMENT													
	1	2	3	4	5	6	7	7	8	10	11	12	13	14
<ul style="list-style-type: none"> Develop an effective and people-based policy and legislation which take into account the socio-economic picture of the country, the relationship between people and protected areas, the multiple use concept and the role local communities play in managing resources as the ultimate protectors and beneficiaries. 														
<ul style="list-style-type: none"> Identify, demarcate and encourage the protection of our natural heritage sites such as scare graves, traditional circumcision sites, and areas renowned for idol/traditional worship including “Kachikally” in Bakau, “Folunko” in Kartong, and “Mbulumanoto” in Dankunku. 														
<ul style="list-style-type: none"> Document, preserve and spread indigenous knowledge on the heritage sites mentioned above. Also, indigenous knowledge on the relationship between families or clans and specific species of animals and birds should be well researched and preserved since it has a direct impact on the killing and consumption of several species. 														
<ul style="list-style-type: none"> Review the system of community participation, ownership, cost sharing and investment in the management and conservation of protected areas. Policies and regulations on the killing of animals and birds, that are regarded as pests, should be critically reviewed, putting into consideration the needs and aspirations of local communities. 														
<ul style="list-style-type: none"> Update the current Wildlife Act and prepare legislation in line with environmental and socio-economic objectives of other national programmes and international conventions and agreements. 														
<ul style="list-style-type: none"> Prepare, update and implement a general Wildlife Management Policy Plan for present and future protected areas in line with environmental and socio-economic objectives of The Gambia’s programme for sustainable development. 														
<ul style="list-style-type: none"> Improve access to wildlife resources on the basis existing management policy and legislation. 														
<ul style="list-style-type: none"> Increase total area under protection to achieve a regional balance especially in selecting an appropriate site in the eastern part of the country with potential high ecological value. 														
<ul style="list-style-type: none"> Prepare and update, as and when found necessary, fauna and marine mammals inventory check list to ascertain number of fauna species represented in The Gambia. 														
<ul style="list-style-type: none"> Train staff of the Department of Parks and Wildlife Management for sustainable implementation of activities leading to sustainable conservation of biodiversity. 														
<ul style="list-style-type: none"> Conduct research and produce documentation on levels of hunting, poaching, and various uses of biodiversity resources. 														
<ul style="list-style-type: none"> Enrich present buffer zones and create new ones around all protected areas to act as corridor for wild animals and for protection against encroachment and intensive use. 														
<ul style="list-style-type: none"> Identify and develop land use practices, such as woodlots, vegetable gardens, bee keeping to improve the income base of peripheral village communities, and planting of rare species to provide communities with valuable source of traditional medicines while enhancing biodiversity in the protected area buffer zone. 														

N7: POPULATION, HEALTH AND EDUCATION FACTORS:

ACTIVITIES	YEAR OF IMPLEMENT													
	1	2	3	4	5	6	7	7	8	10	11	12	13	14
• A rigorous information, education and communication (IEC) programme be pursued to increase awareness and therefore concern for the protection and preservation biodiversity;														
• Emphasize and enforce the integrated approach to environmental issues by the line Ministries of Health, Education, Population Officers and Central Statistics Department through an informed data base.														
• Subsidized costs of alternative sources of energy or fire wood such as gas and electricity to make them more affordable and encourage wide usage by the general public.														

N8: POPULATION, HEALTH AND EDUCATION FACTORS:

ACTIVITIES	YEAR OF IMPLEMENT													
	1	2	3	4	5	6	7	7	8	10	11	12	13	14
• Conduct a detailed Mineral Resource Assessment Programme integrating all the identified quartz sand reserves.														
• Carry out a detailed mapping and assessment of the Kundam clays with a view to establishing a ceramic industry in Basse.														
• Strengthen the technical capability of the Geological Unit through academic training, attachment programmes and establishment of links with Geological Surveys such as the Geological Survey of Ghana.														
• Establish an Engineering and Environment Division within the Department.														
• Review and revise the Minerals Act to bring it in line with modern mining legislation and investment objectives of this country as well as cater for construction earth material														

N9: AGRICULTURAL SERVICES:

ACTIVITIES	YEAR OF IMPLEMENT													
	1	2	3	4	5	6	7	7	8	10	11	12	13	14
• Halt inappropriate farming practices and soil erosion by ploughing perpendicular to the overland flow of water; planting trees and grass in the upper reaches of farms, encouraging farmers to stop clearing all the land cover on the farmland during land preparation, and maintaining other sustainable agricultural practices such as nutrient cycling.														
• Identify and adopt drought mitigation measures which may include the construction of anti-saline dikes, introduction of salt tolerant, drought tolerant and short cycle species of crops, institutionalization of seed production by the establishment of a seed technology unit under the National Agricultural Research Institute (NARI), and development of new types of agricultural crops from the wild.														
• Soil and Water Conservation both at the lowlands and uplands through the conduct of site reconnaissance, detail soil studies, characterization and preparation of intervention maps, assessing the civil works and engineering requirements, and training of farmers in appropriate conservation practices														

12: COST OF IMPLEMENTING LIVESTOCK AND RANGELAND MANAGEMENT ACTION PLAN.

ACTIVITIES AND TASKS	DALASI	US DOLLAR
• Domestication of Wild Species: Support to farmers in terms of training and inputs. 3 Species (Gambian Geese, Giant Rat and Grass Cutter). 30 Farmers (5 selected per Division) to involved in the pilot scheme	200,000	20,000
• Inventory of Range Resources. To update the Range Resources Inventory elaborated by the Mixed Farming Project in 1986	2,000,000	200,000
• Demarcation of Rangelands using concrete pillars	200,000	20,000
• Institutional and capacity building, and outreach programmes.	100,000	10,000
• Introduction of exotic species: 30 farmers introduced to the production of exotic breeds of cattle and poultry.	100,000	10,000
• Farmer Training on Soil Fertility Maintenance: Train 300 farmers on compost pens and farmyard manure utilisation.		
• Farmer Training in Feed Resources Management and Utilisation: Train 300 farmers in Feed Resources Management.		

13: COST OF IMPLEMENTING WATER RESOURCES ACTION PLAN:

ACTIVITY	DALASI	US DOLLAR
1: Capacity Building in Water Resources and Climate Monitoring for Assessment of Potential Impacts of Climate Change and Variability, Drought, Desertification on Biological Diversity in The Gambia.		
• Expert/consultancy services	480,000	48,000
• National Counterparts to Expert/Consultant	360,000	36,000
• Fellowships in hydrology, Meteorology and Data Processing	2,680,000	268,000
• Public Awareness and Group Training	480,000	48,000
• Equipment	3,010,000	301,000
- Non-expendable	2,560,000	256,000
- Expendable	450,000	45,000
2: Capacity Building in Atmospheric Monitoring		
• Expert/consultancy services, with support from national staff	480,000	48,000
• Personnel and Training (2 Supervisors and 6 Operators in Atmos. Monitoring)	1,800,000	180,000
• Equipment, Infrastructure and Annual Cost:		
- Monitoring of Tropospheric Ozone	115,000	11,500
- Monitoring of Precipitation Chemistry	70,000	7,000
- Monitoring of Solar Radiation	423,000	42,300
- Monitoring of Carbon Monoxide	560,000	56,000
- Monitoring of Aerosol Black Carbon	170,000	17,000
- Monitoring of UV-B Radiation	700,000	70,000
3: Abstraction Inventory and Aquifer Modeling:	2,530,000	253,000
• Expert/Consultancy Services	570,000	57,000
• Fellowships in hydrology and Data Processing	810,000	81,000
• Public Awareness and Group Training	1,150,000	115,000
• Equipment		
- Vehicle	300,000	30,000
- Drilling Equipment	600,000	60,000
- Computers	250,000	25,000
4: Ground Water Survey of The Gambia	9,860,000	986,000
• Training of Personnel		

- 2 Hydrological Assistants	300,000	30,000
- 1 Water Engineer	200,000	20,000
- 1 Hydro. Technician	100,000	10,000
- 1 Pump Solar Technician	100,000	10,000
• Equipment		
- Drilling	7,500,000	750,000
- Surveying	80,000	8,000
- Vehicles	1,000,000	100,000
- Monitoring	380,000	38,000
- Miscellaneous	200,000	20,000
5: Hydrometry and Ecological Monitoring of the River Gambia	8,790,000	879,000
• Expert/Consultancy Services	1,000,000	100,000
• Training of Personnel:	2,990,000	299,000
- 1 Hydrologist Class I,	840,000	84,000
- 2 Hydrologist Class II	560,000	56,000
- 1 Ecologists	600,000	60,000
- 1 Chemist	230,000	23,000
- 1 Electronic engineer	560,000	56,000
- 3 Laboratory Assistants	200,000	20,000
• Equipment: Motorized survey boat, 5 rubber dinghies with outboards (SHE), 5 current meters, 5 portable Salinity/ conductivity meters, 6 fixed conductivity meters with data loggers, automatic water level recorders, Atomic Absorption Spectrophotometer, Environmental Samplers, BOD, COD equipment, pH and specific ion meters. Vehicle 1 4WD and 2 Personal Computers with Software.	4,000,000	400,000
Operation and maintenance	800,000	80,000

14: COST OF IMPLEMENTING FORESTRY ACTION PLAN:

ACTIVITIES AND TASKS	DALASI	US DOLLAR
• Environmental Education: Identify sustainable multiple-use forestry. Identify special extension topic.	30,000	3,000
• Bushfire control & prevention: Create a working group. Identify means to bring the extension message to the grass root.		
• Community Forestry: Include multiple-use forestry in community forestry sensitization and implementation programmes; involve-women in the development and implementation of multiple-use forestry; prepare guidelines for the preparation of management plans; assist communities to set priorities and timetable for community forestry activities.	250,000	25,000
• Reverse the present trend of over exploitation of forests by having forest policies place much emphasis on the immediate needs and wishes of the local people, and allowing the policies to encourage the forest administration and individual forest officers to see beyond trees and become more concerned with people and the multiple use potential of forest land.		
• Involve local communities in the management and rational utilisation of forest resources from policy formulation level right through the design, implementation, and evaluation of forest programmes and projects.		
• Develop standard criteria for valuing benefits from the forest biodiversity in order to arrive at indices which can then be used as a bases for future biodiversity evaluation.		
• Include multiple-use forestry in community forestry sensitization and implementation programmes; involve women in the development and implementation of multi-use forestry; prepare guidelines for the preparation of management plans for community forests into working groups; assist communities to set priorities and timetable for community forestry activities.		
• To reduce incidence of bush fires ban smoking in all public places and in vehicles. increase the price of cigarettes, introduce and encourage the use of modern methods		

of honey extraction, sensitize herders and hunters about the dangers of fire, reintroduce prescribed burning, create fire belts, strengthen the spirit of community ownership of the forest, set up Village Fire Fighting Committees, provide the Committees with fire fighting equipment and mobility for effective monitoring of fires, and institute stiffer penalties for culprits.		
To halt the unsustainable levels of harvesting forest products, including wild fauna and flora of commercial and subsistence value communities should be empowered to monitor illegal activities, establishment of new settlements should be stopped, lopping of branches to provide browse for livestock should be discouraged and offenders should be punished, the community should be encouraged to actively participate in tree planting activities, and clearing of virgin forest should be banned.		
The Department of Forestry and all its agents should endeavour to establish Village level licensing Committees, empower these committees to enforce the law and provide effective monitoring of the activities of license holders, applicants and applications for the issue of licenses should be thoroughly scrutinized and the number of licenses to be issued should be limited and regulated to minimize abuse.		
To provide the necessary capacity for surveillance, increase extension staff of the Forestry Department, establish Forest Committees and provide them with means of mobility to effectively manage their forests.		
Integrate public awareness programmes on sustainable management and exploitation of our natural resources in all projects that are to be implemented at the grassroots level. These programmes could be in the form of farmer/extension agent training workshops at the community level.		

15: COST OF IMPLEMENTATION OF THE FISHERIES RESOURCES ACTION PLAN.

ACTIVITIES	DALASI	u s DOLLAR
Adopt, Integrate and harmonise indigenous knowledge of the sea/river, type of species, their regeneration capacities and trends.		
Establish a fisheries consultative committee to provide timely corrective management measures, ensure better understanding of fisheries policies and promote and maintain a balanced public and private sector management.		
Conduct periodic inventory of fish species and their quantities paying particular attention to fish habitat and other factors inhibiting and or promoting fish regeneration.		
Examine and promote the role of women in fish processing and smoking and mechanisms should be sought to support such activities.		
Conduct in-depth studies of mangroves in relation to their biology function, regulation of its exploitation, establish a mangrove committee, and halt the present illegal harvesting and smuggling of mangroves.		
Review the issuance of license especially in the execution of appropriate differential treatment of citizens as a way of motivating them to venture into the fishing industry.		
Provide adequate regulation and control on commercial fishing by trawlers, while at the same time providing adequate support to artisanal fishermen.		
Identify fish breeding sites and restrict their use at certain times to encourage fish regeneration.		
Conduct fish farming on pilot basis and encourage and support the private sector to indulge in it.		
Strengthen the general sensitisation efforts in the fishing industry to create awareness of all stakeholders and help change attitude and beliefs for the better.		
Conduct appropriate surveys at regular intervals and carry out in-depth and tailored research activities and programmes in order to develop a basis for adequately establishing resources sizes, location and or biological characteristics of individual and groups of species and habitats as essential basic tools for managers.		

• Conduct studies to establish biomass and potentials of individual species, particularly the highly commercial species that are under more intense fishing pressure; and establish comprehensive plans and strategies for conservation management.		
• Encourage and promote regional level collaboration in research and management planning.		
• Define and legislate protected areas and develop management plans for all so defined. Establish habitat changes through research studies and monitoring programs/systems to enable prediction of likely changes, pollution levels and their effects. Buffer zones must also be establish for protected areas.		
• Refine and intensify consultations on the involvement of communities in management of resources and integration of traditional management systems into the broad based management system.		
• Establish preventive mechanisms and legislation to curb the introduction of alien species in the fisheries resources especially in inland waters.		
• Develop and promote aquaculture and its social and economic benefits and should be geared towards salvaging threatened fish species and establishing means for restocking the River with some of the rarer fish species.		
• Strengthen the technical competence of the Department of Fisheries and other concerned parties in terms of research, management and surveillance to improve the information base for the effectiveness of management actions and monitoring activities.		

16: COST OF IMPLEMENTATION OF THE PARKS AND WILDLIFE MANAGEMENT ACTION PLAN:

ACTMTIES	DALASI	u s DOLLAR
• Develop an effective and people-based policy and legislation.		
• Identify, demarcate and encourage the protection of our natural heritage sites.		
• Document, preserve and spread indigenous knowledge on heritage sites.		
• Review the system of community participation, ownership, cost sharing and investment in the management and conservation of protected areas.		
• Update the current Wildlife Act and Legislation.		
• Prepare, update and implement a general Wildlife Management Policy Plan for present and future protected areas.		
• Improve access to wildlife resources on the basis existing management policy and legislation.		
• Increase total area under protection.		
• Prepare and update, as and when found necessary, fauna and marine mammals inventory check list.		
• Train staff of the Department of Parks and Wildlife Management for sustainable implementation of activities.		
• Conduct research and produce documentation on levels of hunting, poaching, and various uses of biodiversity resources.		
• Enrich present buffer zones and create new ones around protected areas.		
• Identify and develop land use to improve the income base of peripheral village communities, and planting of rare species to provide communities with valuable source of traditional medicines while enhancing biodiversity in the protected area buffer zone.		

-17: COST OF IMPLEMENTING THE ACTION PLAN ON POPULATION, HEALTH AND EDUCATION FACTORS:

ACTIVITIES	DALASI	u s DOLLAR
• Increase awareness and concern for the protection and preservation of biodiversity through the development and implementation of a rigorous information, education and communication (IEC) programme.		
• Emphasize and enforce the integrated approach to environmental issues by the line		

Ministries of Health, Education, Population Officers and Central Statistics Department through an informed data base.		
Subsidized costs of alternative sources of energy or fire wood such as gas and electricity to make them more affordable and encourage wide usage by the general public.		

18: COST OF IMPLEMENTING ACTION PLAN ON GEOLOGICAL FACTORS:

ACTIVITIES	DALASI	u s DOLLAR
• Conduct a detailed Mineral Resource Assessment Programme integrating all the identified quartz sand reserves.		
• Carry out a detailed mapping and assessment of the Kundam clays with a view to establishing a ceramic industry in Basse.		
• Strengthen the technical capability of the Geological Unit through academic training, attachment programmes and establishment of links with Geological Surveys such as the Geological Survey of Ghana.		
• Establish an Engineering and Environment Division within the Department.		
• Review and revise the Minerals Act to bring it in line with modern mining legislation and investment objectives of this country as well as cater for construction earth material		
• Prevention of illegal sand mining in coastal zone Management of existing and proposed mining sites		
• Review of Minerals Act		
• Monitoring of Coastal Erosion and Coastal Dynamics (Banjul to Kartong), (National Environment Agency 1996)		178475

19: COST OF IMPLEMENTING AGRICULTURAL SERVICES ACTION PLAN

ACTIVITIES	DALASI	US DOLLAR
<ul style="list-style-type: none"> • Halt inappropriate farming practices and soil erosion by ploughing perpendicular to the overland flow of water; planting trees and grass in the upper reaches of farms, encouraging farmers to stop clearing all the land cover on the farmland during land preparation, and maintaining other sustainable agricultural practices such as nutrient cycling. 		
<ul style="list-style-type: none"> • Identify and adopt drought mitigation measures which may include the construction of anti-saline dikes, introduction of salt tolerant, drought tolerant and short cycle species of crops, institutionalization of seed production by the establishment of a seed technology unit under the National Agricultural Research Institute (NARI), and development of new types of agricultural crops from the wild. 		
<ul style="list-style-type: none"> • Soil and Water Conservation both at the lowlands and uplands through the conduct of site reconnaissance, detail soil studies, characterization and preparation of intervention maps, assessing the civil works and engineering requirements, and training of farmers in appropriate conservation practices 	6,900,000	690,000
<ul style="list-style-type: none"> • Develop the horticultural sub-sector to a high potential through the identification, introduction and development of market incentives and storage facilities, diversification of species, exploitation of indigenous species, encouraging all stakeholders to fully work with the communities in the sub-sector. 		
<ul style="list-style-type: none"> • Assess the incidence of pests/weeds and develop appropriate mitigation measures such as establishment of wildlife buffer zones, employing pest scaring devices, and development and implementation of a sound Integrated Pest Management Program 	33,490,000	3,349,000
<ul style="list-style-type: none"> • Regulate the use of chemical fertilizers and encourage the adoption of the use of organic manure through the management of crop residues and other organic material, provision of advise on the applications of chemical fertilizers by extension workers and adoption and development of sustainable crop production through low input and participatory. 		
<ul style="list-style-type: none"> • Discourage continuous cropping on the same land and encourage crop rotation. This will involve effective population control measures, alternate cropping and fallowing, and agro-forestry. 		
<ul style="list-style-type: none"> • Enhance and encourage the unconditional access to land of all members of the community at the beginning of the rainy season. 		
<ul style="list-style-type: none"> • Develop and implement appropriate public awareness campaigns for effective management of all resources by the community. Potential programmes include utilization of the mass media, local level workshops, farmer visits to regions of “success stories,” and farmer level field trials of scientifically tested and proven practices. 		

P: MONITORING AND EVALUATION OF ACTION PLANS OF THE GAMBIA NATIONAL BIODIVERSITY STUDY.

Pl : Introduction.

Monitoring and evaluation is a very important tool that helps to keep track of success and failures of the programmes. A programme for evaluation must be clearly defined and the plan must include milestones and criteria for measuring success. Evaluation not only ensures implementation, it also provides the feedback needed to improve the plan in response to changing circumstances and new data.

Implementation depends not only on the commitment of real programmes and funds by governments, but also on citizen participation. Just as keen public interest is necessary at the front end of planning exercise, citizens are also needed as watchdogs as the plan is implemented.

P2: TERMS OF REFERENCE GIVEN:

The TOR is based on Section “j” of UNEP Suggested Guidelines for National Reporting on the implementation of Article 6 as follows.

P3: MONITORING AND EVALUATION:

To indicate measures to be used for tracking the results of the Action Plan;
To indicate measures for monitoring changes in the Economy, Environment, and Society;
To give the indicators that will be used; and
To give the individuals and organizations who will carry these responsibilities and how they were selected.

This document contains Monitoring and Evaluation of the following **Departments:-**

- Forestry
- Fisheries
- Parks and Wildlife Management
- Water Resources
- Agriculture, covering Soil and Water Management Unit, Agricultural Sector.
- Agricultural Planning and Monitoring Unit, covering Wildlife, Fisheries, Forestry, and Agriculture.
- Livestock

A. DEPARTMENT OF FORESTRY

Action Plan on Bush fire Control and prevention	Measures for tracking results in the action Plan	Measures for monitoring changes in economy, environment, and society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
1.1 .Identify sustainable multiple use forestry and extension topics	-extension messages identified and developed -extension materials identified -Environmental groups formed	Economy: -cost to economy Environment: -improvements in the environment Society: -level of awareness on the issue. -attitudinal changes in addressing environmental degradation.	-number of extension workers identified and involved -number of extension messages developed -number of extension materials acquired -content of the messages in relation to the activities	-forestry extension workers, Wildlife Park Rangers, NEA POEE&C, DCC members. . selection based on the exigency of the service. -village groups selected by the villages -NGOs in each area selected by Forestry Dept.
1.2. Create a working group and identify means to bring extension messages to the grass roots	-extension messages identified -working groups formed -messages received at grass roots	Economy: -increase in yield of forest products -- financial benefits gained from bushfire reduction or its eradication Environment: -number of bushfires put off -number of years with no bushfire. Society: -level of awareness on developed messages at the grass roots. -number of working groups formed. -number of community radio programmes produced by the community -effectiveness of community radio programmes -number of drama/theatre/songs produced by the various groups	-number of bushfires put off -number of extension messages identified and used. -number of working groups formed. -level of public, NGOs and government participation -public acceptance of the political influence -how well was the message received by the public	-forestry extension workers at each area selected by the Dept. of Forestry. -Wildlife Park Rangers at each area selected by the Department. -members of the DCC selected by the Commissioner. -village community groups selected by the village -local NGOs at each area selection upon their involvement by the Forestry Dept. -Local Government Authorities at each area selection based on position.
1.3. Inclusion of multiple use forestry in community forestry involving	-additional community forests identified -number of community forest management	Economy: -less cost to government -more money to communities in fees paid -improvement in living standards	-number of groups involved -frequency of radio programmes -extent of targets covered -kinds/levels of participation	-forestry extension workers at each area selected by Forestry Dept. -community members selected by their communities -women groups in

women, and prepare guidelines for community forestry management.	agreement signed -increase in the forest land put under community forests -number of forests fully staffed and effectively managed	Environment: -reduced rate and levels of degradation -definite management practices -level of awareness in multiple use community forest management -enhanced community participation due to ownership -enhanced re-afforestation society: -more attitudinal changes -increased participation -increased level of awareness -increased in and control of forest resources.	-extent of forest area increase	each community selected by communities -local NGOs in forestry in each area selected by Forestry Dept.
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B. FISHERIES DEPARTMENT

Action Plan	Measures for tracking results of action plan	Measures for monitoring changes in economy, environment, and society.	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
1.1 Develop and implement a 3 year research plan with studies on mangroves and fisheries, and a master plan for river Gambia	-monitor development of the research plan -monitoring research and studies programmes on mangroves and fisheries, -monitoring research and studies programmes on river Gambia -inventories conducted on Gambian mangroves	Economy: -cost to economy Environment: -availability of environmental information Society: -Availability of data to society -community participation -incentives for participation	-number of vehicles and equipments purchased. -number of fresh and salt water fish recorded, -fish habitat identification, -number of fish population by species -number of research conducted, -total area of mangrove swamps with biomass per ha. -number of mangrove committees formed -methodologies used in study of mangroves and fisheries	-Fisheries Dept. Staff, Fisheries research Assistants and Research Consultants selected by mandate of the Department.
1.2. Training: on	number and	Economy: .	-number of	-individual staff of

<p>the job, and at University in aquatic biology, ichthyology, oceanography</p>	<p>levels of training for staff in aquatic biology, ichthyology, and oceanography</p>	<p>-reliable biomass estimates and Mean Sustainable Yield (MSY) Environment: -enhanced knowledge in marine ecology -management improved in ichthyology and oceanography, Society: -benefits to the Artisanal Fisheries from research results -enhanced knowledge in diversification of fishing sites</p>	<p>training offered on the job & at university. - number and level of staff trained in aquatic biology, oceanography, ichthyology, -number of university training pursued per year -number of specialized areas achieved yearly -progress reports on performance of candidates -number of research offers recruited per planned period</p>	<p>Fisheries Department, -individual fishermen, -members of the established fishing communities, -regional and sub-regional committees. (Their selection based upon mandate or by their own Departments)</p>
<p>1.3 Public awareness campaigns , demarcation of protected areas,</p>	<p>-monitoring programme design and implementation -location of protected areas</p>	<p>Economy: -less burden Environment: -general improvement in the environment -aesthetic value of protected areas increased -increase in fauna and flora Society -increased level of awareness of the community -increased level of participation of the community -increased in income and improvement in living standards of the people</p>	<p>-total number of protected areas defined, demarcated and protected -number of radio, TV programmes produced -number of press releases -frequency of community radios used -number of traditional groups used</p>	<p>-Fisheries Dept, . -Media houses, -Drama/theatre groups, -DCCs, Established fishing communities, selection based on their mandate</p>

C. DEPARTMENT OF PARKS AND WILDLIFE MANAGEMENT

Action Plan	Measures used for tracking the result of the action plan	Measures used for monitoring changes in the economy, environment, and society	Indicators that will be used	Individuals and organizations who will carry the responsibilities and how they were selected
<p>1.1. Preparation and implementation of a general wildlife management policy plan document for present and future protected area.</p>	<p>-Development of the policy document -Enforcement of a legislation -Monitoring of implementation plan -Monitoring of appropriate selected sites</p>	<p>Economy: -accrue income from park entrance fees levied -income from hire of parks facilities Environment: -vast areas would be protected Society: -peripheral communities near the parks would get some percentage of income from fees. -some members of the communities may be employed in the parks -low incidence of bush fires -enhanced eco-tourism</p>	<p>-legislation -number of fees received -number of park visits -total area under (ha) park management -number of community members employed -per cent received by peripheral communities -per cent received by the department -number of peripheral communities involved in the park decision making process.</p>	<p>-peripheral community groups selected because of their proximity, -park management staff selected as they are posted at the site, . Agriculture and Natural Resources Working Group by their mandate.</p>

Action Plan	Measures to be used for tracking the results of the action plan	Measures to be used for monitoring changes in the Economy, Environment, and Society	Indicators that will be used	Individuals and organizations who will carry these responsibilities and how they were selected
<p>2.1. Implementation of a 3 year general inventory/ research to ascertain number of fauna species represented in the Gambia</p> <hr/> <p>2.2. Carry out research to provide baseline information for formulation of management plans</p>	<p>-monitoring of the inventory development or research activities</p> <p>-----</p> <p>-review or questionnaires -implement baseline survey -formulation of a management plan</p>	<p>Economy: -data would be available for all users -cost of the inventory/research adds to the economy Environment: -there will be no changes in the environment Society: data will be available for all users</p> <hr/> <p>Economy: -some cost on the economy Environment: -Nil Society: -available data to the society</p>	<p>-list of inventory -research findings -list of fauna by species -distribution of fauna by species</p> <hr/> <p>-baseline data -management plans</p>	<p>-staff of Department of Parks and Wildlife Management selected by their mandate -researchers, research assistants and enumerators selected by the Department in collaboration with ANR Working Group</p> <hr/> <p>-researchers, research assistants and enumerators selected by the Department of Parks and Wildlife Management -Agriculture and Natural Resources Working Group selected by their mandate</p>

Action Plan	Measures to be used for tracking the results of the action plan	Measures to be used for monitoring changes in the economy, environment and society	Indicators that will be used	Individuals and organizations who will carry these responsibilities and how they were selected
2.3. Inventory / research on marine mammals existing in coastal and inland waters	implementation of research -information available on marine mammals in coastal and inland waters	Economy: -research and training cost -revenue in wild life management Environment: -wild life habitat protected Society: -data available to communities -data useful to educational institutions	-number of research done -methodologies used -number of mammals in coastal and inland waters.	-researchers, research assistants, and enumerators selected by the Department of Parks and Wild life Management
2.4. On the job training and at university for staff on wild life ecology, university staff /students involved in the research	-on the job training schedules -information on training abroad -research activity involving both staff and students	Economy: -research and training cost -increase in wild life regulation Environment: -Nil Society: -wild life ecologists and aquatic biologists trained	-number of people on overseas training -number of staff on-the-job training -number of staff trained	-staff of the Department of Parks and Wildlife Management selection based on training needs assessment

Action Plan	Measures to be used for tracking the results of the Action Plan	Measures to be used for monitoring the Economy, Environment, and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
3.1. Develop a wild life policy in line with environmental socio-economic objectives and take into account conventions and international agreements	-Wild life Act review exercise	Economy: -generate income from fees Environment: Nil Society: -local communities to participate in wild life resource management	Amendments made -number of communities involved in wild life resource management	-staff of the Department of Parks and Wild life Management, selection based on their duties -local communities, selection because of their proximity, ANRWG or its sub-committee.

Action Plan	Measures to be used for tracking the results of the Action Plan	Measures to be used for monitoring Economy, Environment, and Society	Indicators that will be used	Individuals and organizations who will carry these responsibilities and how they were selected
3.2. Research levels of hunting, poaching, level of use of wild life for cultural and nutritional purposes.	-monitoring of research activities on hunting, poaching and use of wild life for socio-cultural purposes	Economy: -available research data -levy on poachers Environment: -enhanced wild life development Society: -income to communities	-number of research conducted -levels of hunting determined -frequency of poaching -number of poachers -levels of increase and decline of wild life	-staff of Department of Parks and Wild life Management, researchers and their assistants -the community -Agriculture and Natural Resources working group by their mandate.

Action Plan	Measures to be used for tracking the results of the Action Plan	Measures to be used for monitoring changes in the Economy, Environment and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
3.3 Enrichment of protected areas buffer zones with trees and other remedial measures that will reduce pressure on national park's and reserve's resources as well as provide surrounding communities with some source of income	-visits to the buffer zones -observation of tree planting -measures taken in protecting the intensive use of the buffer zones	Economy: -fees received from tourists visits could incur some cost Environment: -an attractive environment Society: -ideal for excursions, picnics. And camping -encourages eco-tourism activities	-number of buffer zones created -number of trees planted -variety of tree species established -number of visits by users.	-staff of the Department of Parks and Wild life Management selection based on mandate of Dept. -local communities selection based on their proximity to the sites
Action Plan	Measures to be used for tracking the results of the Action Plan	Measures to be used for monitoring the Economy, Environment, and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
3.4. Establishment of woodlot, vegetable gardens, beekeeping and planting of rare species	implementation plan -physical observation of the agricultural activities	Economy: could generate more income, and provide job for people Environment: -enhanced biodiversity Society: -enhanced community participation -income generation for the community	-number of gardens established -number of rare species planted -number of bee hives used -number of bee keepers involved -number of woodlot established -number of people employed or benefiting	-staff of the Department of Parks and Wild life Management selected by the Department. -local community kafos selected by the VDC or organized village groups
Action Plan	Measures to be used for tracking the results of the action plan	Measures used for monitoring changes in Economy, Environment and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
4.1. Study the possibility of re-introducing extinct fauna species	-procurement of species from abroad -programmes in place for breeding	Economy: -income from tourist visits Environment: -enhanced biodiversity	-number of species procured -increase in number of breeders	Department of Parks and Wild Life Management staff and Dept. of Livestock Services selection by their

		Society: -visits by the public education institutions -promote eco-tourism		expertise
Action Plan	Measures to be used for tracking the results of the Action plan	Measures to be used for monitoring changes in Economy, Environment and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
4.2. Research on the effects of habitat and other environmental changes	-monitoring of research activity -questionnaires developed	Economy: -research cost Environment: -increased biodiversity Society: -community may be involved	-number of research conducted -sample size -impact on the environment	-staff of Dept. of Parks and Wild life Management, -international research consultant -local researchers and assistants, selection by mandate of the Dept. of Parks and Wild life Management
Action Plan	Measures to be used for tracking results of the action plan	Measures for monitoring changes in the Economy,	Indicators that will be used	Individuals and organizations who will carry responsibilities and

		Environment, and Society		how they were selected
5. Initiate global, regional and sub-regional cooperation programmes	-number of contacts made -number of regional and sub-regional meetings attended	Economy: Nil Environment: Nil Society: shared experiences	-number of correspondences made -number of consultative meetings held - number of Donor interventions	-staff of Dept. of Parks and Wild life Management and the community their selection based on mandate of the Department
Action Plan	Measures for tracking results of Action Plan	Measures for monitoring changes in Economy, Environment, and Society	Indicators to be used	Individuals and organizations who will carry responsibilities and how they were selected
6. Communities given opportunity and mandate to manage their own wild life parks and reserves and be responsible for protecting the parks with benefits	-Information on joint community wild life national parks and reserves. -establishment of pilot parks and reserves in areas of high ecological value -amount of involvement by the community	Economy: -may incur cost Environment: -enhanced environmental management practices Society -potential for income generation -community participation in parks and reserve management.	-number of pilot parks and reserves -number of persons employed -number of sources of income generation -number of survey vehicles used -amount and number of equipment used participation	-staff of Department of Parks and Wild life Management selected by the mandate of the Dept. -the community selected by their mandate

Action Plan	Measures to be used for tracking the results of the Action Plan	Measures for monitoring changes in the Economy, Environment and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how selected
7. Study the Environmental impacts and resource survey conducted through multidisciplinary integrated effort to reveal existing degradation problem issues and possible solutions	-Conduct an environmental Impact Assessment on socio-economic factors of the fauna	Economy: -cost to government Environment: -enhanced resource management Society -level of acquired knowledge	-number of impact Assessments conducted -number of surveys carried out	-Agriculture and Natural Resources Working Group selection by mandate of the Department of Parks and Wildlife Management
Action Plan	Measures to be used for tracking results of A/plan	Monitoring changes in Economy, Environment and Society	Indicators to be used	Individuals & Organisation to carry out responsibilities and how selected
8. Public awareness campaign nationwide to inform the general public nationwide	Monitoring of messages on national radio and television Monitoring of	Economy - No change in the economy Environment - Enhanced	Number of radio and television programmes Number of extension workers	Department of Parks and Wildlife Management Media Houses

about the importance of biodiversity and sustainable approaches to utilization of natural resources and implications of poor agricultural practices.	Community radios Monitoring of press releases Listening of media messages Use of extension workers	Environmental Management Society increased knowledge about biodiversity Public have informed choices	involved Number of languages used Number of IEC materials used	DCCs for Community radios Traditional Drama/Theatre groups ACU all selected by their expertise.
Action Plan	Measures to be used for tracking results of Action Plan	Monitoring Changes in Economy, Environment and Society	Indicators to be used	Individuals and organizations to carry out responsibilities and how selected
9. Lobby to have revenue retention scheme put in place	Measures taken to retain revenue Establishment of a revenue retention scheme	Economy Less borden on the Economy Environment -Nil Society -level of benefit	% of revenue to be retained Number of revenue retention schemes	Department of Parks and Wildlife Management selected by mandate
Action Plan	Measures to be used for tracking results of Action Plan	Monitoring changes in Economy Environment and Society	Indicators to be used	Individuals and organizations to carry out responsibilities and how selected
10. Setting up of Eco-Tourism Unit with DPWM Set-up working groups	Establishment of an Eco-Tourism Unit Development of Eco-Tourism Brochures, pamphlets, guide books Set-up community working groups	Economy -adds cost Environment A boost ecotourism Society enhanced community participation	Number of Brochures produced Number of eco -tourism staff recruited Number of eco -tourism guides trained	Department of Parks and Wildlife Management Eco-Tourism Expert Community working groups All selected by mandate

			Kinds of IEC materials developed/ produced	
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D. DEPARTMENT OF WATER RESOURCES-(CLIMATE AND WATER RESOURCES)

Action Plan	Measures for tracking results of the Action Plan	Measures to monitor changes in Economy, Environment, and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how selected
1.1 Capacity building in water resources and climate monitoring for assessment of potential impacts of climate change and variability, drought, desertification on Biodiversity of the Gambia	<ul style="list-style-type: none"> -Build in monitoring and evaluation structures. -Replacement of obsolete equipment relocation of Met. Stations -relocation of Hydro.Stations -see to the establishment of structure in non-service areas -installation of automatic stations in remote areas -replacement of communication equipments 	<p>Economy:</p> <ul style="list-style-type: none"> -cost to be incurred -purchase of equipments and vehicles -training of specialists <p>Environment:</p> <ul style="list-style-type: none"> -specialists expertise in environmental management <p>Society:</p> <ul style="list-style-type: none"> -Available climate and water management specialists now available 	<ul style="list-style-type: none"> -number of intra-divisional briefings/consultations -number of progress reports -number of vehicles purchased -number of quarterly reports -number of annual reviews --percentage coverage of strategy -percentage deviation from targets -number of timely and accurate forecasts of weather -number of timely publications of climatological and agro-meteorological bulletins produced -number of personnel involved -number of monitoring equipments 	<ul style="list-style-type: none"> -Dept. of Water Resources staff -Overseas institutions -Agriculture and Natural Resources Working Group -Climate Committee -selected on mandate

Action Plan	Measures to be used for tracking results of Action Plan	Monitoring changes in Economy Environment and Society	Indicators to be used	Individuals and organizations to carry out responsibilities and how selected
1.2 Hydrometry	-Recruitment and	Economy	-Number of	-Climate and

and Ecological monitoring of the River Gambia	<p>use of specialists in carrying out task. Provision of accurate climate information. -Provision of reliable weather report. -Selection of suitable materials for specialist training. -Ensure adequate budgetary provision. -Ensure provision of necessary infrastructure</p> <p>-----</p> <p>-Development of personnel from both divisions (Climate and Water Resources) -ensure setting up of a Data base and modelling</p>	<p>Nil Environment -Safer environmental management practice indicators</p> <p>Society -safe drinking water available</p> <p>-Available data</p>	<p>personnel involved</p> <p>-Number of monitoring equipments available</p> <p>-Available data</p>	<p>Water Resources division staff;</p> <p>-Climate and Water Resources technical Committee</p> <p>-ANRWG</p> <p>All selected by their mandate</p>
1.3 Abstraction Inventory and Aquifer Modelling		<p>Economy useful data Environment - Nil Society reliable weather and water information</p>	<p>-----</p> <p>Number of Aquifer models developed. Number of items in the inventory</p>	<p>-----</p> <p>Department of Water Resources staff and their extension workers . Selected by their mandate</p>

Action Plan	Measures to be used for tracking results of Action Plan	Monitoring Changes in Economy, Environment and Society	Indicators to be used	Individuals and organizations to carry out responsibilities and how selected
2.1 Capacity Building in Atmospheric Monitoring	Training of staff	<p>Economy some cost Environment - nil Society - Available specialists</p>	<p>Number of people trained -Number that have qualified</p>	Department of Water Resources staff
2.2 Ground water survey of the Gambia	<p>Development of survey questionnaire</p> <p>Sampling</p>	<p>Economy - some cost Environment - vital environmental information Society -</p>	<p>-Number of sample size -Number of respondents -Number of females/males</p>	<p>Department of Water Resources staff</p> <p>Selection based on their mandate</p>

		-data on water availability	-% of ground water available	
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E. DEPARTMENT OF AGRICULTURE:- SOIL AND WATER MANAGEMENT UNIT

Action Plan	Measures for tracking results of Action Plan	Measures for monitoring changes in Economy, Environment and Society	Indicators to be used	Individuals and organizations who will carry responsibilities and how selected
(LOWLANDS) 1.1. Reconnaissance for a proposed site -detail soil studies, characterization and land evaluation for a valley	-identification of propose site -procurement of equipments and development of study instruments	Economy -cost to be incurred Environment. -information on ecology Society. -participation and availability of instruments	-number and kinds of equipments procured -number of sample size selected -number of sample sites -number of studies carried out, number of enumerators involved	- s w M u -District extension workers -ANRWG -consultants Selected by their expertise
1.2. Civil works engineering	-information on engineering work sites	Economy. -costly Environment. -requires EIA Society. -community involvement in planning and implementation	-Amount of civil engineering works involved -number and kinds of equipments used -number of workers involved	-SWMU technicians -Community members -area District Coordinating Committee, Local Government Administrators Selected by their mandate
UPLANDS:- ----- Action Plan	Measures to be used for tracking the results of the Action Plan-	Measures for monitoring changes in Economy, Environment and Society	Indicators that will be used-	Individuals and organizations who will carry responsibilities and how they were selected
1.1.	Same as 1 above	same as 1 above	same as 1 above	- s w M u

Reconnaissance studies of the problem site.				technicians -consultants -community Selected by their mandate
1.2. Soil survey and intervention maps	-same as above and development of maps	Economy. -incur some cost Environment. -same as above Society. -same as above	-number of surveys carried out -development of survey questionnaires -number of maps produced	SWMU technicians , consultants and the community Selected by their mandate
1.3. Engineering survey, staking and construction	-same as I above	-same as 1 above	-same as 1 above	-the same as 1.1 above
1.4. Training of farmers in upland	-information on development of	Economy. -minimal cost	-number of training conducted	SWMU, DAS training Unit

practices	-selection of training sites -selection of farmers	Nil Society. -knowledge and skills acquired	attained -number of trainees per site -number of training materials available or produced -----	Selected by their expertise -----
AGRIC. SECTOR		-----		
-1.1 Establishment of an inter-disciplinary working Group	Correspondences leading to establishment of the group	Economy: .-Nil Environment: - Nil Society: community. Participation.	-Number of persons selected - Number or percentage representation by division	APMU
1.2 Identification of plant species	-location of identification sites.	Economy: - Nil Environment: - Nil Society. location of species identified	-Number of species identified. - Number of places located -Number of persons involved	APMU Selected by their expertise
2.1 Training of Trainers; of village extension agents; farmers- (veg. Growers); farmers (field crop growers)	-development of training materials; identification and selection of extension agents; training site selection; identification and selection of two categories of farmers.	Economy: incur some cost. Environment: transfer of skills on NRM. Society. community participation	- Number of training sites. -Number of extension agents trained. -Number of vegetable growers trained. - Number of field crop growers trained -Number of training modules used	Multi-disciplinary Group Selected by their expertise
2.2 Campaigns: - seed selection; -striga uprooting; - neem berry collection - seed storage	-press releases notifying about the stated plan	Economy .some cost. Environment. - EE Enhanced. Society. -community participation -active community involvement.	- Number of press Releases - Number of other medium used - Number of personnel involved - Percentage of community involvement.	Multi-disciplinary Group. Selected by their expertise
2.3 Research and demonstration. Veg. sites,	-development of research strategies and preparation of	Economy: -some cost -Environment:	-Number of research conducted,	Multi-disciplinary Group

Field crop sites	demonstration sites. -Information to farmers to participate	-EE enhanced Society. -Farmer participation by category	-Number of field demonstrations conducted -Number of materials/equipments used. - Number of farmers who participated.	Selected by their expertise
Action Plan	Measures for tracking results of Action Plan	Measures for monitoring changes in Econ., Environ. And Society	Indicates to be used	Individuals and organizations to carry out the responsibility and how selected
3 . Strengthening of Extension and Specialist Services for improved crop production in the Gambia	preparation of a staff development plan and recruitment of graduates. soliciting of donor funding. processing of applications for technical assistance	Economy: some cost involved. Environment: Enhanced environment Society: Benefits to society	Econ.- some cost Environ.-nil Society.- human resources developed	-Dept. of Agricultural Services through Dept. of State for Finance and Economic Affairs. -Donor Agencies and SWMU -selection based on mandate

DEPARTMENT OF PLANNING: ACTION PLAN ON ECONOMIC VALUES AND BENEFITS OF BIOLOGICAL DIVERSITY (For Departments of wildlife. Fisheries. Forestry and, Agriculture)

Wild life				
Action Plan	Measures for tracking results of the Action Plan	Measures for monitoring changes in Economy, Environment and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
1.1 Inventorise bird species hunted	-monitoring of the inventory development. implementation of inventory results	Economy: -data that would be available for all users -cost of inventory to economy Environment: -hunted species protection. Society: -use of available data.	-list of the inventory -distribution of bird species -number of inventory done	-Staff of Parks and Wildlife Management -Community hunters and birdwatchers All selection based upon their expertise
1.2. Studies on financial and economic losses caused by bird pest	implementation of studies on. -monitoring of study programme -questionnaires developed. -conduct an environmental impact assessment on socio-economic factors of bird pest	Economy: -cost to economy -Environment: -available data Society: -community participation -availability of data to society	-methodologies used in the study -list of crops affected -findings of studies -number of people involved in studies -number of studies done -number and level of crop varieties affected most -list of destructive bird pests -total size of crop land affected	-Staff of Parks and Wildlife Management Farmers and communities Selected by their mandate

FISHERIES

Action Plan	Measures for tracking results of the Action Plan	Measures for monitoring changes in Economy, Environment and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
1.1 Training of environmental	-monitoring preparation and	Economy -cost to economy	-number and levels of training offered	-Staff of the Fisheries Dept.

ecologist	implementation of the training -the level of staff selected	Environment -available reliable information Society: -benefit to the society	-number and level of staff trained -number of university training pursued per year -number of specialized areas achieved -progress reports of candidates -level and amount of funding available	-Institutions and persons responsible for training -possible International consultants -selected by mandate
1.2. Socio-economic studies	-monitoring preparation, development and implementation -assessment of socio-economic factors	Economy: -cost to economy Environment: -Nil Society: -participation by society -available information to society	-number of studies conducted -number of questionnaires developed -results from the questionnaires -number of enumerators involved -level of participation of citizenry	
1.3 Socio-economic surveys	-preparation, development and implementation of survey -review of survey questionnaires	Economy: -cost to the economy Environment: -Nil Society: -participation by the public -data availability to society	-number of questionnaires developed -number of enumerators involved -level of public participation	Staff of Fisheries Dept. -enumerators -communities -selected by their mandate
1.4 Research studies on costs and revenues Use of the media	-monitoring preparation, development and implementation of research/studies -questionnaires that are developed.	Economy: -cost to economy Environment: Nil Society: -participation by the public -availability of data to the society -increase in income and living standards.	-number of vehicles purchased number of research, studies done -methodologies used -number of media used -frequency of media programmes -number of media programmes produced -level of media coverage -number of press	-staff of Fisheries Dept. -Researchers, Research Assistants and enumerators -media personnel -communities -selected by their mandate and or expertise

			releases -number of researchers, assistants, enumerators -sample size of research/study -percent of population covered -total number of people involved	
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FORESTRY.

Action Plan	Measures for tracking results of the Action Plan	Measures for monitoring changes in Economy, Environment and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
1.1. Training of mangrove ecologist	-conduct training needs assessment -identification of institutions and application processes	Economy: -some cost to incur -Environment: -acquisition of knowledge and skills on ecology society: -specialists achieved	-number of mangrove ecologists recruited -number of specialists certificated -number of staff involved in KSA training needs assessment	-overseas institutions -Forestry Dept -selected by mandate .
1..2. Conduct training workshop	-development of training materials, -identification of training site and its suitability	Economy: -in-house Environment: -Nil Society: -attainment of knowledge and skills in natural resource management	-number of training sessions -number of staff trained -percentage of staff by category -number of training modules available or developed.	-Forestry Dept. -international consultant -selected by mandate
2.1 Training of Oyster harvesters through campaigns and use of media	-development of media messages -involvement of media houses -identification of materials and people for the campaign exercise	Economy: -less cost Environment: -enhanced environmental education and sensitization Society: -community participation -receipt of skills training	-number of media messages -content of media messages -level of community participation -duration of campaign	-media houses including community radios -forestry personnel -oyster harvesters -selected by their mandate

Action Plan	Measures used for tracking results of the Action Plan	Measures for monitoring changes in Economy, Environment and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
3.1. Collaboration of forestry and fisheries departments on mangrove ecosystem management	<ul style="list-style-type: none"> -development of joint programmes -identification of training venues -identification of beneficiaries 	<p>Economy: -less cost</p> <p>Environment: -environmental management skills transfer</p> <p>Society: -community involvement and participation</p>	<ul style="list-style-type: none"> -number of joint sessions -number of training venues -number of people involved and trained -number of farmers involved 	<ul style="list-style-type: none"> -forestry and fisheries staff -possible international consultant -selected by their expertise

AGRICULTURE

Action Plan	Measures used for tracking results of Action Plan	Measures for monitoring changes in Economy, Environment and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
1.1. Research, studies, inventory, training of researchers	<ul style="list-style-type: none"> -produced inventory training materials -instruments designed -conduct of training 	<p>Economy: -some cost to economy</p> <p>Environment: -Nil</p> <p>Society: -available data -community participation</p>	<ul style="list-style-type: none"> -number of researchers who received training -category of researchers involved -number of training sessions 	<ul style="list-style-type: none"> -international institutions -research consultant -forestry department -selected by their expertise.
2.1. Public awareness campaigns and use of media	<ul style="list-style-type: none"> --press releases -programmes on air and in print -languages used -commencement of campaign 	<p>Economy: -some cost</p> <p>Environment: -enhanced environmental education and awareness</p> <p>Society: public sensitization and participation -acquisition of knowledge</p>	<ul style="list-style-type: none"> -number of messages -number and kind of media used -percentage of coverage -number of personnel involved 	<ul style="list-style-type: none"> -forestry -media houses including community radios -selected by their mandate and expertise

Action Plan	Measures used for tracking results of Action Plan	Measures for monitoring changes in Economy, Environment and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
3.1 Develop and implement research proposal	implementation of research -funding of research proposal-	Economy: -no cost Environment: -Nil Society: -increased train manpower -available data	-content of research proposal -number of enumerators and researchers used or involved	-international donors -forestry Dept. Staff -selected by their expertise
4.1. Annual production of Monitoring and Evaluation reports	-appraisal of the Agriculture and Natural Resources Working Group and compilation and distribution of reports	Economy: -Nil Environment: Nil Society: -available information	-number of contributors -number of reports produced and compiled -number of reports distributed1 2	Agriculture and Natural Resources Working Group -collaborating institutions -selected by their expertise

DEPARTMENT OF LIVESTOCK SERVICES

Action Plan	Measures for tracking results of Action Plan	Measures for monitoring changes in Economy, Environment and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how they were selected
1.1 Domestication of wild species -support to farmers in terms of training and inputs	-search for wild species -procurement of wild species -availability of wild species	Economy: -possible cost Environment: -enhancement of Biodiversity Society: -community participation	-number of wild species available -% category of wild species -number of species domesticated -number of farmers involved	-Livestock Services personnel and selected farming communities -selected by mandate
2.1. Inventory of Range Resources	-selection of staff or personnel in this exercise -information of the inventory instrument	Economy: No cost Environment: -available information Society: -community participation / involvement -updated range resources .	-number of range resources listed/identified -number of farmers involved -number of personnel who participated	-Livestock Services personnel and farmers -selected by their mandate
Action Plan	Measures for tracking results of Action Plan	Measures for monitoring changes in Economy, Environment and Society	Indicators that will be used	Individuals and organizations who will carry responsibilities and how selected
3.1. Demarcation of rangelands	-information on start of the demarcation exercise -location of range lands	Economy -some cost involved Environment: -environmental management information Society: community participation	-number of concrete pillars used -number of rangelands demarcated -total number of acreage of rangelands -number of personnel deployed -number of percentage of farmer participation	Livestock Services personne and selected farming community -selected by their mandate
4.1 Institutional and Capacity	-on the job training designed	Economy: -some cost	-number of on the job trainings	-Donor Agencies, Government and

building	information of selected personnel; -procurement of training materials -procurement of funds	Environment: Nil Society: -eventual transfer of knowledge and skills	conducted -number of additional staff recruited -number and kinds of modules used. -number of personnel on outreach -number of farmers trained -number and kinds of additional equipments procured -% of Donor/Government support	Livestock Services personnel -selected by their mandate
5.1 Introduction of exotic species	-procurement and display of species. identification and selection of farmers in the Divisions	Economy: -some cost Environment: -Enhancement of Biodiversity Society: Active involvement and participation of the community	-number of exotic species of cattle produced -number of breeds of poultry produced -% representation of the 30 farmers by ethnicity	-Dept. Of Livestock Services personnel and farmers -selected by their mandate
6.1 Farmer Training on Soil Fertility Maintenance	-Information of training schedule;. commencement of farmer training;. Selection of farmers;. Procurement of equipment.	Economy: - less cost Environment.- Enhanced Environmental protection. Society- Received training in soil fertility maintenance;. - Active community participation.	-total number of training sessions conducted;. -number of training sessions by division;. -Number of farmers trained;. -percent representation by division; -number of compost pens prepared;. -tonnage of expected manure produced.	Department of Livestock Services Personnel and farmers, selection based upon their mandate.
7.1 Farmer training in Feed Resources Management and Utilization	-the same procedure as 6.1 above	-the same as 6.1 above	-the same as 6.1 above	Department of Livestock Services and Farmers selection based upon their mandate