REPUBLIC OF CAMEROON

Biodiversity Status Strategy and Action Plan

United Nations Environment Programme

COVER PICTURES

Some forms of biodiversity found in Cameroon

From left to right:

1- The Bongo (*Tragelaphus euryceros*...) A rare but frequently hunted ruminant in the south-east region
2- Non-timber forest products-species for domestic use and commercial importance found in the forest of the southern Cameroon - Courtesy Korup Project
3- Timber exploitation: an activity which drastically affects biodiversity in the tropical ecosystem
4- The butterfly: insects abound in all the ecosystems with some having economic importance to agriculture
5- Fish (*Brycinus macrolepidotus*) commonly found along the steams and rivers in the southern provinces courtesy - Vivian
6- Bird (the crown eagle) - A special and rare bird species found in the Korup National Park - Courtesy Korup project
7- The Mututu cow - A heavily threatened cattle species found in the South West forest zone - Courtesy F. Ekue - MINREST Yaounde
8- The Mangrove forest of the Marine Coastal Environment - Courtesy J. Folack - MINREST Yaounde

Cover designed by AUGUSTINE BOKWE
and
infography by SILICON SOFT AND PICTURES - Cameroon

Yaounde
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Further inspiration for the drafting of this document was drawn from the experiences of other countries in the drafting of their National Biodiversity and Action Plans, such as Canada (Quebec), and New Guinea (Papua).

FOREWORD

Cameroon is endowed with a very rich biodiversity. In recent decades, however, vital ecosystems have been degraded as a result of various anthropogenic disturbances and threats of species extinction through over-exploitation, poaching, overgrazing, uncontrolled bush fires, and shifting cultivation. The rate of vegetation loss, particularly in our forests, can reach irreversible proportions if management is poor and exploitation is not sustainable.

By ratifying the Convention on Biological Diversity (CBD) in June 1994, the Government of Cameroon (GoC) recognised that the implementation of the Convention's provisions could halt and even reverse the loss of biodiversity and degradation of ecosystems for the benefit of Cameroon and the world today and tomorrow. Elaboration of a National Biodiversity Strategy and Action Plan (NBSAP) by signatory countries is one of the obligations to the CBD. In fulfilment of this obligation, the Government of Cameroon established an Inter-ministerial Committee and a Task Force with the mandate:

(i) *to describe the present state of biodiversity in the country as the baseline against which the impact of future actions or non-actions will be assessed and*

(ii) *to make a systematic analysis of biodiversity conservation issues and options, and educate all the stakeholders on the role they could effectively play to meet the common goals of conservation and sustainable use of plants, animals, micro-organisms and associated ecosystems.*

We are pleased to introduce to Cameroon a National Biodiversity Strategy and Action Plan. We take the opportunity to highlight the following:

- *Conservation of biological diversity and sustainable use of its components are not the responsibility of government alone. By involving representatives of different categories of biodiversity stakeholders in the development of the NBSAP, it was recognised that every Cameroonian must feel concerned about biodiversity and that implementation of the NBSAP is fundamental to achieving national development and improving our individual well -being;*

- *The NBSAP is expected to activate a sense of common purpose (Agenda 21, chapter 27) in the nation while recognising the importance of the role, responsibilities and special capacities of each;*
- *Biodiversity is not the responsibility of the Ministry of the Environment and Forestry alone as various decisions taken and activities carried out as part of the portfolio of all other ministries may have impacts on conservation and sustainable use of biodiversity. The Government established an Inter-ministerial Committee to ensure that biodiversity concerns, particularly those concerns now specified in NBSAP, are taken into account in all government policies and actions. It is for the same reason that we of the Ministries of the Environment and Forestry; Livestock, Fisheries and Animal Industries; Agriculture, and Scientific and Technical Research have decided to introduce, jointly, this NBSAP;*
- *The NBSAP is expected to strengthen the implementation of previously ratified international conventions, regional agreements and sectoral plans relating to biodiversity, such as the International Convention relating to Intervention in the High Seas in Case of Oil Pollution Casualties (ratified in May, 1990); The Kano Convention on African Migratory Locusts (signed in July 1963) and the National Forestry Plan.*
- *The NBSAP is expected, furthermore, to guide financial resources allocation and encourage financial institutions to invest in action that we, as a nation, believe will promote the conservation and sustainable use of biological resources in Cameroon;*
- *As we approach the third millennium, we as Cameroonians, must integrate the NBSAP in the way we think and act. Implementation of the NBSAP will have a positive impact on our lives, on our great nation and on the lives of future generations.*

NAAH ONDOA SYLVESTRE,

(Minister of the Environment and Forestry, Cameroon)

LIST OF CONTRIBUTORS

A. MINEF

Joseph MBEDE
The Honourable Minister of the Environment and Forestry, Yaounde.

Augustine BOKWE
Co-ordinator, NBSAP Focal Point, CBD/CHM Cameroon.

B. DRAFTING COMMITTEE

Thomas TATA
Agricultural Economist, Executive Secretary, BDCP-Cameroon, Yaounde.

Tom AGBOR
Chemist / Heavy metal and pesticide residue, Head of Research and Development Division IMPM, Yaoundé.

Horace NGOMO MANGA,
Environmental Chemist, Department of Chemistry, University of Yaounde I.

Bayie KAMANDA
Rural and Environmental Sociologist, Ministry of Scientific and Technical Research, Yaounde.

Martin NGANJE
Ingéniuer des Eaux et Forests, Ministère de l'Environnement et des Forêts, Yaounde.

C. READERS

Johnson JATO
Pioneer President, BDCP Cameroon.

Agnes MAMBE
Director, ATWEED

Wale ADELEKE
Regional Forest Officer, WWF, Cameroon.

David MBAH
Animal Geneticist, Technical Adviser N° 1, Ministry of Scientific and Technical Research/ IRAD, Yaounde.

D. NATIONAL CONSULTANTS

Benoit SATABIE
Botanist, National Herbarium, IRAD, Yaounde.

François TIANI
Economist, Enviro-Protect, Yaounde.

Estherine LISINGE,
Director of Policy and Strategies WWF-CPO, Yaounde.

Catherine OKOTIKO
Biologiste, Sécretaire Executif Projets GEF, Ministère de l'Environnement et des Forêts, Yaounde.

DJOH a NDIANG I
Ingénieur des Eaux, Forets et Chasses, Ministère de l'Environnement et des Forets, Yaounde.

Mary FOSIMBANTENKHU
Legal Expert, Legal Affairs Division, Ministry of Environment and Forestry, Yaounde.

Jean-Claude NJOCK
Ingénieur des Industries Animales/Peches, Ministère d'Elevage, la Peche et des Industries animales, Yaounde.

David MBAH
Animal Geneticist, Technical Adviser N° 1, Ministry of Scientific and Technical Research, Yaounde

Roger FOTEU KAMENI
Head of Planning Unit, Department of Forestry – MINEF, Expert on Forest Biodvversity.

E. INTERNATIONAL CONSULTANTS

Kalemani MULONGOY
Biotechnologist, International Academy of the Environment , Geneva, Switzerland.

Ibrahima TRAORE
Intellectual Property Right, Organisation, Yaoundé.

Carmen TAVERA
UNEP, Nairobi.

EXECUTIVE SUMMARY

Article 2 of the Convention on Biological Diversity (CBD) defines ***biological diversity*** as: "The variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. This includes diversity within and between species, and of the ecosystems".

In lay people's language, the term biological diversity (also referred to as biodiversity) covers domestic and wild plant and animal species of our forests, savannahs, lakes and ocean. Biodiversity thus serves as a source of raw material for our industries, as a source of the state budget for maintaining balance of payments equilibrium; for poverty alleviation and for food security. Unique components of our country's biodiversity include rare resources such as the anti-HIV vine *(Ancistrocladus korupensis)* found in the Korup National Park, *Prunus africana* found in the Mt. Cameroon and Bamenda highlands as well as some rare or endangered animal and plant species.

In recent years, however, and for varied reasons, there has been a steady erosion and an unprecedented loss in biodiversity in Cameroon, including even those biological resources located in protected areas. By ratifying the CBD in 1994, Cameroon accepted to fulfil the Convention's objectives namely: **"The conservation of biological diversity, sustainable use of its components, fair and equitable sharing of benefits arising out of the use of genetic resources".**

This strategy and action plan are derived from data on the status and distribution of biological resources identified and catalogued by a multi-disciplinary, multi-institutional team and the Task-Force working in concert with international consultants. Three workshops constituted the forums for presentation and exchange of ideas in Limbe (June 16-18, 1997), Kribi (August 18-20, 1997) and Limbe (November 3-9, 1997). A participatory approach involving biodiversity stakeholders was adopted. The following were stakeholders: the government, local communities, economic interest groups, scientific communities, non-governmental organisations, tourists and the international community. The objective was to have their input in the NBSAP before a wider discussion of the document in a National workshop.

The Logical Framework Approach (i.e. problem analysis, objectives, the selection of strategies and elaboration of an action plan) was used. Co-ordination was provided by a multidisciplinary unit under a national co-ordinator, whose role is to advise and guide biodiversity enabling activities in the country.

In each of the ecosystems, studies were undertaken in the following fields: marine and coastal biodiversity, agricultural biodiversity, forest biodiversity, faunal/floral biodiversity, and eco-tourism.

The following six major ecosystems were adopted for the NBSAP: Marine and Coastal, Semi-Arid, Tropical Humid Dense Forest, Montane, Tropical Wooded Savannah and Freshwater. This presentation takes into account two earlier studies, the National Environment Management Plan (NEMP) which partitioned the country into four major eco-zones, and the organisation of the Institute of Agricultural Research for Development (IRAD) which stipulated five agro-ecologcal zones.

The six ecosystems referred to above are of particular importance to Cameroon. They support several indigenous professions and occupations: animal production, medicines, forestry activities, fishing, hunting, secondary indigenous professions resulting from the transformation of primary products. Virtually all sectors (urban and rural) of the population use biological resources (plants) for building construction/fuel wood and food while animal resources are used generally for food.

The effort to satisfy these requirements has imposed pressure on biological diversity resulting in the following problems across ecosystems:

- degradation of ecosystem through unsustainable exploitation of biodiversity resources, inappropriate exploitation techniques, pollution by petroleum - mining companies, and agricultural practices;
- inadequate financial resources for the motivation and provision of incentives to the populations, poorly equipped structures, the absence of buffer zones between plantations and biodiversity reserves, and the non respect of regulations on settlement.
- unplanned occupation of forest land, poorly planned urban clustering, problems of insecurity, uncontrolled implantation through plantations and other infrastructure;
- weak enforcement of policy measures, legal and institutional framework to ensure effective resource management and correct the poor human resources deployment and use;

- land tenure and institutional problems through the poor respect of norms (policies) in certain areas, sometimes leading to conflicts of interest among stakeholders such as farmer-grazer conflicts;
- population pressure on biological resources for daily survival, causing unsustainable harvesting of some resources;
- lack of decentralisation in the management of biological resources, compounded by inadequate environmental and conservation information and sensitisation, insufficient participation of indigenous people, particularly women in the management process leading to inequitable sharing of revenues generated by biological resources among different stakeholders;
- little valorisation of resources and their residues resulting from the strong demand for products of biological diversity, insufficient inventory, inadequate forestry research, insufficient manipulation of genetic material, poorly known socio-economic importance;
- lack of information, the non respect of cultural values, the non participation of the population on the management of biological resources.

A problem tree summarises the current status and trends of biodiversity within each ecosystem. The major problems ("top" of the tree) for each ecosystem are:

1). - loss of biodiversity and degradation of the ecosystem for the Marine and Coastal,

2). - Progressive reduction in vegetal cover for the Tropical Humid Dense Forest,

3). - Ecosystem degradation due to loss of biodiversity, mostly through overharvesting of fauna and flora-wild and domestic - for Tropical Wooded Savannah,

4). - Ecosystem degradation due to loss of biodiversity, overharvesting of fauna and flora-wild and domestic - for the Semi-Arid,

5). - Loss of Montane biological resources, including ecosystem degradation for the Montane and

6). - Ecosystem degradation due to loss of freshwater species. These and lower level ("bottom" of tree") problems serve as goals, objectives, strategies and actions in NBSAP.

The vision for the NBSAP was derived essentially from the CBD and agenda 21 as follows: *"A country that exploits or rationally utilises her natural biological resources sustainably to meet the development needs and the well-being of her population, preserves her ecosystem balance, and hands down the riches of her biodiversity to future generations".* This led to the development of five strategic goals. Specific objectives and actions were then

derived from the problems identified in each ecosystem. The objectives were prioritised and associated focal points identified from among the stakeholders. Other stake-holders for each objective were identified and designated as partners. The duration and cost of the implementation of each objective are only indicative. For effective monitoring (preparation of broad year work-plans by institutions/organisations concerned with biodiversity conservation and management, periodic supervisory visits by officials from focal points and annual review to assess progress) and evaluation (periodic) of the implementation of the action plan, criteria, indicators and means of verification were elaborated for each objective and presented in tabular form. The draft action plan was distributed widely among stake-holders within and out of the country. Many enriching comments were received and integrated to produce a final NBSAP.

In principle, periodic (quarterly, half-yearly and yearly) reports on the implementation of the NBSAP will be produced.

ACRONYMS AND ABBREVIATIONS

AGRO-p	Agro-Industrial Plantations
AIDS	Acquired Immiune Deficiency Syndrome
ATWEED	Association of Women in Economic and Environmental Development
BDCP-C	Bioresources Development and Conservation Programme-Cameroon
BSP	Biodiversity Support Programme
CARPE	Central African Regional Programme for the Environment
CBD	Convention on Biological Diversity
CCESD	Consultative Council for the Environment and Sustainable Development
CCD	Convention to Combat Desertification
CDC	Cameroon Development Corporation
CENADEC	National Centre For the Development of Cooperatives
CENADEFOR	Centre National de Development de Foret
CTFT	Centre Technique Forestière Tropicale
CIFOR	Center for International Forestry Research
CITES	Convention on the International Trade in Endangered Species of Flora and Fauna
CNFZV	Centre National de Formation Zootechnique et Vetérinaire
COP	Conference of Parties
CRHOL	Centre de Recherches Halieutiques et Oceanographiques des Limbe
DFID	Department for International Development (former ODA)
EIA	Environmental Impact Assessment
EU	European Union
FONADER	National Fund for Rural Development
FOREXPLTS	Forest (Timber) Exploiters
GDP	Gross Domestic Product
GEF	General Environment Facility
GMO	Genetically Modified Organism
GNP	Gross National Product
GoC	Government of Cameroon
GTZ	German Technical Assistance. (Deutsche Gesellschaft Fur Technische Zusammenarbeit)
HEVECAM	Société des Hévéas du Cameroun
HIV	Human Imminodeficiency Virus
HP	High Priority
HPI	Heifer Project International
ICBG	International Cooperative Biodiversity Group.
ICE	International Commission for the Environment
INTER-ORGS	Bilateral/International Organisations
IRA	Institute of Agrinomic Research
IRAD	Institute of Agricultural Research for Development
IRZV	Institute of Animal and Veterinary Research (Institut de Recherches Zootechniques et Vétérinaires)
ITTO	International Tropical Timber Organisation
IUCN	International Union for the Conservation of Nature
LCs	Local Communities
L-COM	Oil Exploitation/Mining Companies
LMO	Living Modified Organism
MAB	Man and Biosphere
MCP	Mount Cameroon Project
M&E	Monitoring and Evaluation

MIDENO	Northwest Development Authority
MIDEMA	Mission for the Integrated Development of Mount Mandara
MINAGRI	Ministry of Agriculture
MINAT	Ministry of Territorial Administration
MINCULT	Ministry of Culture
MINDIC	Ministry of Industrial and Commercial Development
MINEDUC	Ministry of National Education
MINEF	Ministry of Environment and Forestry.
MINEFI	Ministry of Economy and Finance
MINEPIA	Ministry of Livestock, Fisheries and Animal Industries
MINMEE	Ministry of Mines, Energy and Water
MINREST	Ministry of Scientific and Technical Research
MINESUP	Ministry of Higher Education
MINTRANS	Ministry of Transport
MINTP	Ministry of Public Works
MINTOUR	Ministry of Tourism
MINUH	Ministry of Town Planning and Housing
MINVILL	Ministry of Towns
MOV	Means of Verification
NBSAP	National Biodiversity Strategy and Action Plan
NCCESD	National Consultative Council for the Environment and Sustainable Development
NBDC	National Biodiversity Drafting Committee
NEMP	National Environment Management Plan
NFAP	National Forestry Action Plan
NGOs	Non-Governmental Organisations
NPMB	National Produce Marketing Board
NRMP	Natural Resources Management Project
NRMS	Natural Resources Management Society
OAS	Organisation of American States
OCB	Cameroon Banana Authority
ODA	Overseas Development Administration
ONADEF	National Authority for Forest Development
ONAREST	National Office for Scientific and Technical Research
P	Priority
PALMOL	Cameroon Oil Palm Plantations
PREMIN	Prime Minister's Office
SAFCAM	Societé de Plantation d'Hevea et de Palmier à l'Huile du Cameroun
SASH	Sustainable Agriculture Self-Help
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
SNEC	National Water Corporation
SOCAPALM	Cameroon Oil Palm Corporation
SODECAO	Cocoa Development Corporation
SOSUCAM	Cameroon Sugar Company
U_SITIES	Universities
UCCAO	Union Centrale des Coopératives Agricoles de l'Ouest
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UNESCO	United Nations Education, Scientific and Cultural Organisation

UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nation Fund For Population Activities
VHP	Very High Priority
MOV	Means of Verification
WWF	World Wide Fund for Nature (formally World Wildlife Fund)

PRESENTATION AND PROCESS OF THE REPORT

Various related studies and programmes/plans have been produced and are being implemented. The principal programmes/plans include: the *National Forestry Action Programme (NFAP), the Long Term Agricultural Research Plan (LTARP), and the National Environmental Management Plan (NEMP).* The NBSAP does not attempt to repeat the work done by these programmes but to complement them. It draws inspiration from their output as well as from those of other regional studies, to re-orient the focus on our biological diversity conservation and utilisation attempts.

The introductory background (chapter one) explains the requirements of the CBD and Cameroon's commitment to its provisions. It presents the aim of the report and specifies to whom it is targeted. It explains the process followed to develop the various components then, categorises and describes stakeholder concerns in biodiversity. It also indicates the allocation and management of biodiversity and stakeholder participation in the biodiversity planning process.

This chapter on "The Current Situation" is a systematic assessment of the status and trends of species, genetic materials and major ecosystems in Cameroon. It treats the current status and trends in loss of habitats and ecosystems, species and special genetic traits or strains and the negative factors that warrant attention.

Chapter three dealing with biodiversity problem analysis summarises the underlying causes driving biodiversity loss and their impact. The data is divided into information on the major ecosystems, on species, separating *in-situ* data from *ex-situ* conservation measures, and protected areas.

The workshop held in Limbe (MINEF, 1997a) identified the following core problems:

- In the marine and coastal areas: loss of biodiversity and degradation of ecosystems.
- In the tropical humid dense forest : progressive reduction in vegetal cover.
- In tropical wooded savannah areas: ecosystem degradation due to loss of biodiversity - over-harvesting of floral and faunal wild and pre-and post harvest losses of domestic species.
- In the semi-arid areas: the ecosystem degradation due to loss of biodiversity -over harvesting of floral and faunal wild and domestic species.
- In montane areas: ecosystem degradation due to loss of montane biological resources.
- In fresh water areas: ecosystem degradation due to loss of fresh water species.

January 1994, and in this manner, exploit various components of biodiversity for varied reasons.

- The youths who collect and use biological resources (for food and /or money) their livelihoods, their demand for them today aggravated by the current economic austerity situation.

- Women who represent about 60 per cent of the population (villages): interest in biological resources involves their pre-occupation with agricultural activities.

(c) Handicraft and commercial exploiters: (logging companies, fishing companies, commercial hunters): interest here is economic at various degrees

(d) Scientific Communities: whose major interests are in maintaining, developing and exploring the scientific potential of biodiversity.

(e) Non-governmental Organisations (NGOs): This category is formed in Cameroon under the Law on liberty of Associations (N^{0} 90/053 of 19 December 1990). Their headquarters as well as their funding sources determine whether they are local, national or international. Several NGO's in the country are specifically orientated towards the sustainability of biological diversity.

(f) Tourists: for recreation, the beauty of the environment (eco-tourism), and the satisfaction of the knowledge of the existence of certain species. Places most often visited include national parks, game reserves, botanical/zoological gardens and lakes, beeches and other fascinating sites.

(g) The International Community: with interests generally expressed by some specific technical organisations concerned world-wide with conservation, exploitation and trade (e.g. European Union, UNEP, WWF, IUCN, CITES. The participation of all these groups was ensured by their representation at the various workshops and meetings.

CHAPTER ONE

BACKGROUND AND RATIONALE

1.1 Introduction

Cameroon is located in Central Africa, extending from the Gulf of Guinea to Lake Chad, 2^0 to 13^0 North latitude and 8^0 30' to 16^0 10' East longitude, (Amou'ou *et al.*, 1985.) (Fig. 1) The country covers a surface area of 475,385 Km^2 , and has a coast line of 402 Km (Sayer *et al.*, 1992.). It has a triangular shape with a North-South length of 1,400 Km, and a maximum width from East to West of 800 Km (Amou'ou *et al.*, 1985) and bounded to the South by the Republic of Congo, Gabon and the Atlantic Ocean; to the West by the Republic of Nigeria; to the North by lake Chad; and to the East by the Republic of Chad and the Central African Republic.

The most recent national population estimate (UNFPA, 1999) established a demographic figure of about 14,700,000 inhabitants against 7,663,655 inhabitants in 1976. The annual growth rate between 1995 and 2000 is estimated at 2.7% (UNFPA, 1999). About 65% of the total population lives in the rural areas.

Endowed by nature with diverse ecological zones, the country is one of the richest in biological diversity in Africa (Fig. 2).

1.2 The Rationale for the NBSAP

Given the importance of biodiversity to the country and pursuant to Article 6 of the CBD which requires that "**Each Contracting Party shall, in accordance with its particular conditions and capabilities, develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes which shall reflect the measures set out in this Convention relevant to the Contracting Party concerned**", Cameroon decided to develop a National Biological Diversity Strategy and Action Plan (NBSAP). Cameroon NBSAP is, as such, an invaluable planning tool. Its elaboration provided an opportunity to address the full array of the Convention provisions in the context of national development. Resulting from a participatory approach, the document reflects a consensus for conservation action among those who depend on and/or affect biodiversity.

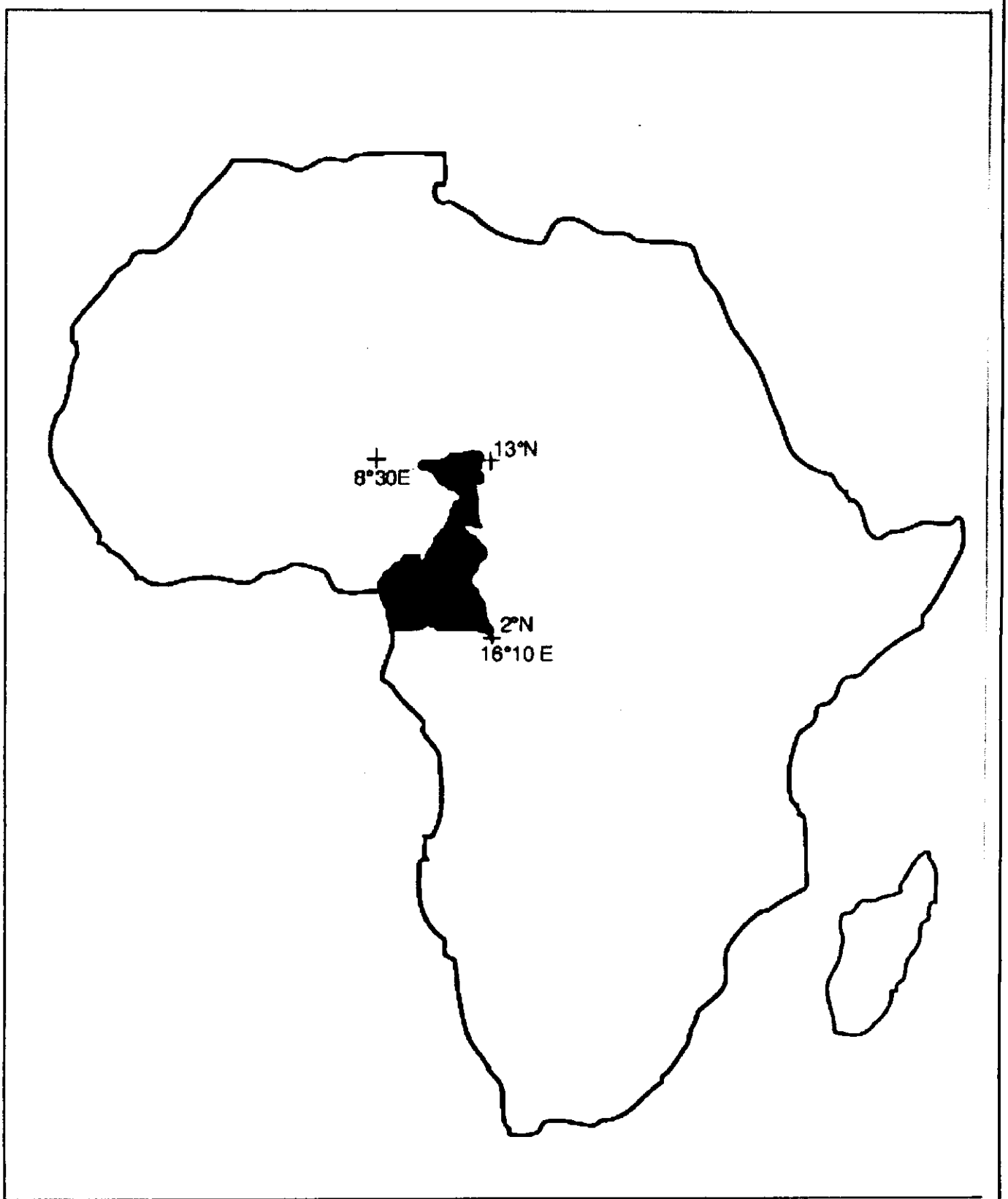

Figure 1 : Location of Cameroon

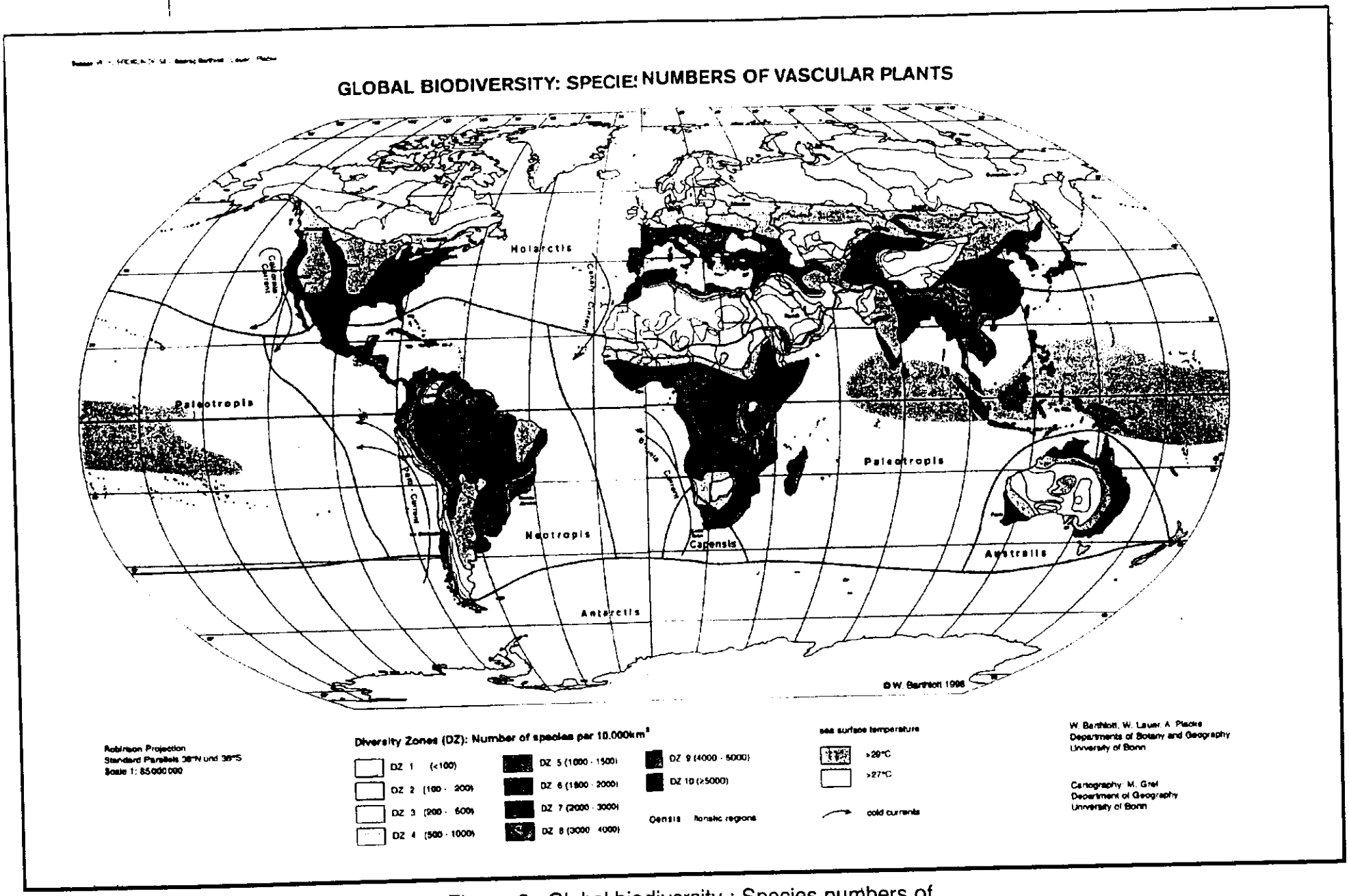

Figure 2 : Global biodiversity : Species numbers of vascular plants

- The document highlights linkages between components of biological diversity and sector issues.
- It recognises, in particular, that policies and actions taken in various national sectors that affect biodiversity such as agriculture, fisheries, health, industry, commerce, livestock, mines, public works, tourism, transport, urbanisation, water and energy.
- The NBSAP is intended to guide all national sectors at the governmental level, through the provincial level down to the village and individual levels so that biodiversity conservation issues can be incorporated in all activities and policies of the society.
- The NBSAP can, furthermore, assist the government and any other donor agencies in allocating funds to the real priorities identified and agreed upon by all the stakeholders.
- Finally, the NBSAP will enhance the awareness of all Cameroonians with respect to the potential and possible consequences of their undertakings on biodiversity, and reinforce everyone's participation in the country's biodiversity conservation and rational use for the benefit of all today and for future generations.
- Cameroon prepared a number of other environmental and biological resources-related plans, programmes and policies which are discussed in chapter two (2.3). The current NBSAP has as one of its objectives to integrate these programmes and studies into the, current biodiversity planning so as to harmonise their implementation.

Cameroon recognises that the NBSAP is a continuous process that is being developed, progressively taking into account information and experience gained. Thus, the belief is that, as some of the objectives listed in the NBSAP are met, Cameroon's capacity and knowledge in the field of biodiversity and related sectors will grow, and as new problems are identified, it will be necessary to revise the strategy and action plan.

1.3 Process and methodologies adopted in the development of the NBSAP

Elaboration of the NBSAP was initiated with the creation of a Co-ordination Unit for NBSAP in the Ministry of Environment and Forestry. With the recommendation of the Co-ordination Unit, a Task-Force, consisting of experts in all domains of biodiversity, was constituted by the Honourable Minister of the Environment and Forestry (Ministerial Order N° 0134/MINEF/CAB/CT1 of 17 February 1997).

1.3.1 The sectoral approach

The Task-Force was mandated to undertake sectoral studies on various aspects of Cameroon's biodiversity. Specifically, these studies covered biodiversity in marine and coastal areas, agriculture, forests, fauna/flora, ecosystems and ecotourism, including institutional and legal frameworks and socio-economic aspects.

The focal point of the Convention on Biological Diversity designated a National Expert Drafting Committee of consultants and the Ministry of Environment and Forestry recruited a Team Leader.

From the various contributions of the Task-Force, the Minister of Environment chaired a three day-workshop in the Limbe Biodiversity Conservation Centre (Botanic Garden) to help MINEF identify the country's vision on biodiversity conservation and management, problems and opportunities for biodiversity endeavours, as well as the criteria for developing strategies and proposals for actions for various goals identified towards the sustainability of her biodiversity. An international consultant guided the deliberations on biodiversity and related intellectual property rights, with the participation of the Task Manager of NBSAP from UNEP Nairobi, Kenya. One of the outputs of this workshop was the recommendation to include three other sectoral studies which were initially not covered by previous consultancy assignments for the NBSAP, namely micro-organisms, non-timber forest resources including medicinal plants and insects. Consultants were therefore recruited and assigned these additional studies.

A workshop involving members of the Task-Force and the National Biodiversity Drafting Committee (NBDC) held in Kribi from18 to 20 August, 1997, still under the supervision of the international consultant on biodiversity. The Kribi workshop identified strategies, streamlined and harmonised the data collected by the Task-Force.

At another workshop (MINEF, 1997b) organised in Limbe 3-7 November, 1997, the Drafting Committee submitted its preliminary draft report. Sector studies presented provided the bases on which Cameroon will implement Article 6 (b) of the CBD which states that each Contracting Party shall **"integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sector or cross-sector plans, programmes and its policies."**

1.3.2 The Ecosystem Approach

Pursuant to a recommendation by SBSTTA, the CoP adopted a holistic approach (CoP decision II/8 (UNEP, 1995)). For her NBSAP, Cameroon adopted the ecosystem approach

following CoP decisions II/9 and II/10 and considered other CoP decisions relating to thematic areas of relevance to Cameroon (CoP decisions II/11, II/12, II/13, II,15 (UNEP, 1995)).

The Convention defines the ecosystem as:

> ***A dynamic complex of plant, animal, micro-organism communities and their non-living environment interacting as a functional unit.***

Using the ecosystems identified for the National Environmental Management Plan (NEMP) and the agro-ecological zones developed by the Institute of Agricultural Research for Development (IRAD), MINREST, 1996 as the basis, six major ecosystems were adopted for the NBSAP (Fig 6 Table 1.1).

- Marine and Coastal,
- Tropical Humid Dense Forest,
- Tropical Wooded Savannah,
- Semi-arid,
- Montane,
- Freshwater.

In Cameroon, the Marine and Coastal ecosystem is the richest in biodiversity, followed by the Tropical Humid Dense Forest ecosystem, and that richness in biodiversity decreases from the marine/coastal area towards the semi-arid zone. Different sector activities take place in each of the ecosystems. It should be noted that the ecosystem approach indirectly emphasises the impact of any sector activity on local communities (affected by all the sector activities at the same time).

Note: It is important to state that while the ecosystems approach is appropriate, there are no hard and fast rules determining the six ecosystems used or adopted. There are some considerations that go across ecosystems and are consequently considered as their relative importance may indicate in each ecosystem (the National Programme on Bird Conservation Zones managed by Birdlife International).

1.4 The objectives of the report

This report provides an analysis of the status and trends in Cameroon's biodiversity, examines the problems and makes proposals on strategies and actions for addressing these problems to:

- expose development activists to the diversity and originality of institutional arrangements (and their effects on biodiversity) that are used in the country to sustain livelihoods;
- expose members of the international and national policy and research community to the daily " real-life" economic situation of grass-roots men and women in Cameroon in order that they gain a better understanding of how Cameroonians are sustaining their livelihoods, and how these activities are affecting biodiversity;
- define the technical management and use aspects of its biological resources to promote strategic thinking for social change towards biodiversity sustainability in Cameroon;
- understand the cultural and societal influences on the conservation of its biodiversity.
- determine the effects of economic, demographic pressure and other demands on the conservation and use of biodiversity;
- valorise the use of indigenous knowledge in biodiversity to reinforce the participation of the local population in biodiversity conservation and management;
- improve tourism;
- contribute to monitoring and evaluating national biodiversity.
- identify options and establish priorities to conserve manage and rationally/equitably use biodiversity.

1.5 The importance of biodiversity to Cameroon

The Convention defines **Biological Diversity** as:

"The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of the ecosystems".

Variability of ecosystems, species, varieties/breeds is of particular importance to the nation, as it provides support to indigenous professions and occupations, directly employing 84.2 % of the country's population as revealed by the last population and housing census. Specifically, about 30 % of the population is involved in animal husbandry, about 55% in crop production and 60 % depend on medicines locally concocted from plant extracts. Some of the components of our country's biodiversity are unique. Biological diversity is important to Cameroon:

(a) as a source of raw material for industries : the country's industrial tissue indicates a significant dependence on the primary sector, especially in agriculture, animal husbandry and fisheries. Plants, through forestry, formally and informally employ 45,000 Cameroonians while aquatic fauna, through fisheries, employs 24,136 fishermen nation-wide. Animals, through hunting, are also known to support 10,000 persons in the profession (MINEF, 1996a), while secondary indigenous professions such as carpentry, leather processing, meat and dairy industries, transportation, and various forms of produce retailing depend on the country's biological diversity.

(b) as a source of the state budget for balance of payments equilibrium : in this respect, the agricultural sector has been and still remains the priority sector in Government's development strategy. It ensures the country's food security, generates foreign and budgetary resources for the Gross National Product (GNP);

(c) for poverty alleviation through employment : this is in response to population growth (of the urban and rural poor who both suffer from the negative growth rate in the country's economy) which increases pressure on the country's biological resources;

(d) at the household economy level, the last demographic census (Republic of Cameroon, (1987), revealed that virtually all domestic housing employed wood for roofing, walling, and farming. In effect, 13.1 %, and 3.7% of all housing units employ wood and leaves in walling against 3.7 % walled with leaves or straw mats. According to the above demographic survey, 79.8 % of all households use plant products for domestic energy supplies.

(e) at the regional or provincial economy level, large agro-industrial complexes dealing in plant genetic resources offer employment to many nationals and non nationals. The Cameroon Development Corporation (CDC), which cultivates plants such as the oil palm, rubber, tea, banana and pepper, employs nearly 15,000 thousand persons (Folack and Galega, 1997), ranking second after the State in employment. Other agro-industrial complexes of considerable magnitude include: SOCAPALM and PAMOL (both cultivating the oil palm), HEVECAM, which cultivates the rubber plant, and SOSUCAM which cultivates the sugarcane plant.

(f) at the national economy level, the rural sector, sustained by food and cash crop production, animal rearing, fishing, and forest exploitation, contributes significantly to the country's Gross Domestic Product (GDP). According to Nami (1997), the sector contributed 32 % of the country's GDP in 1994.

1.6 Socio-economic aspects

According to the National Environmental Management Plan (MINEF, 1996a), ***poverty is at the centre of environmental problems in Cameroon***; the root cause and consequence of environmental degradation. In order to assure their livelihood, the population is forced to exploit natural resources in an unsustainable manner. Constituted essentially by the absolutely poor, this component of the population depends on traditional agriculture, the exploitation of biodiversity for food, shelter and health.

The urban population is expanding at a very high annual rate of 5.57% (MINEF, 1995) calling for additional infrastructures such as roads, and structures for social amenities such as hospitals, schools and equipment.

Main export products are petrol, timber and agricultural products (cocoa, coffee, cotton). Minerals also exist. The exploitation of these resources has an impact on the various components of biodiversity. In 1987, the country entered a period of economic recession which has had devastating effects on biodiversity. International lending institutions in reaction to the situation recommended Structural Adjustment Plans which produced negative socio-economic effects such as unemployment, down- sizing of the public sector and devaluation of the local currency. This situation has contributed considerably in depleting the biological resources.

1.7 Institutions and legal framework

Institutions of primary importance to biodiversity conservation, development and utilisation include:

a) The public sector institutions

Ministry	Attributes
Environment and Forestry (MINEF) and institutions under its control.	• Management and co-ordination of activities related to the environment, • Regeneration of national forests carried out by the National Forest Development Agency (ONADEF), • Coordination of inter-ministerial / multi-sectoral committees established within MINEF on policy issues related to the protection of the environment.
Agriculture (MINAGRI) and institutions under its control	• Elaboration and realisation of government policy in the agricultural sector, • Ensures soil conservation measures and protection of plants through the control of the utilisation of phytosanitary products.
Mines, Water and Energy	• Management of mineral resources, water and energy,

(MINMEE) and institutions under its control	• Control of noxious industrial installations, pollution, hygiene and safety measures.
Livestock, Fisheries and Animal Industries (MINEPIA) and institutions under its control	• Conception and implementation of government policy in the livestock and fisheries sectors, • Ensures management, conservation and development of domesticated animals, • Ensures management, conservation and development of freshwater and marine species.
Town Planning and Housing (MINUH) and institutions under its control	• Improvement of the immediate habitat (livelihood) and rational occupation of land, • Conservation of landed property and natural ecosystems, • Elaboration and execution of land ownership, urbanisation and housing policies, • Ensures management of waste disposal.
Scientific and Technical Research (MINREST) and institutions under its control	• Elaboration of the national policy on science and technology and its implementation
Public Works and institutions under its control	• Ensures less degrading environmental impacts on road construction and maintenance
Higher Education (MINESUP) and institutions under its control	• Elaboration of training programmes on biodiversity and related issues
Transpport (MINTRANS) and institutions under its control	• Recording meteorological data on climate (temperature, rainfall)
Economy and Finance (MINEFI)	• Provides funds for biodiversity activities
Culture (MINCULT)	• Elaboration of policy to promote national cultures
Communication (MINCOM) and institutions under its control	• Facilitation of dissemination / exchange of biodiversity information • Elaboration and implementation of national communication policy
Posts and Telecommunications (MINPOSTEL) and institutions under its control	• Facilitation of electronic communication
Public health (MINSANTE)	• Promotes health of man thereby enabling him to protect biodiversity
Tourism and institutions under its control (MINTOUR)	• Elaboration of national tourism policy

b) The Private Sector Institutions

Institution	Attributes
i) National:	
• Maiscam	Seed Company : import and use
• Friends of the Garden	Conservation Education
• Pelenget (Farmers' House)	Seed/Chemical Company : import, multiplication, distribution
• Living Earth	Conservation Education
• BDCPC	Bioresources Development and Conservation Programme
• Enviro-Protect	Conservation
ii) International:	
• Heifer Project International	Livestock production
• UNEP	Provides funding and directives
• UNDP	Funding, information dissemination
• WWF	Conservation, studies, education on environment (flora, fauna)
• IUCN	Conservation (flora and fauna)
• WCS	Conservation /fauna
• GTZ	Conservation, funding, information exchange
• TROPENBOS	Conservation, studies
• CIRAD	Studies (Agricultural species)
• CARPE	Conservation, management, use

The private sector institutions include traditional (village) authorities (which have conserved and utilised biological resources over the years) and non-governmental organisations (many of them) concerned with particular aspects of biodiversity.

Table 1.1 Characteristics of Cameroon's Ecosystems

Priority Ecosystem	Major Composition	Location	Climate and Soils	Observation
Marine and Coastal Ecosystem	1. Continental shelf 2. Mangrove zone 3. Continental Coast	1. Geographical The coast is 402 km. long, beginning from the Akwayafe river on the south eastern end of Nigeria, latitude 4° 40' N. and descends to the border with Equatorial Guinea at the River Campo, Latitude 2° 20' N. The ecosystem is between Longitudes 8° 30' and 10° 20' E. 2. Administrative Ndian, Fako, Meme, Manyu, Moungo, Sanaga Maritime, Wouri, and Ocean Divisions.	Climate The climate is warm and humid with annual water surface and air temperatures averaging 24° C and 26.5°C, respectively. The area obeys a mono-modal rainfall pattern with an average of 5,000 mm per year. Soils The soils are volcanic, while the clays have a colour ranging from grey to yellow. The beaches are sandy. The northern and central parts of the ecosystem lie on sedimentary soils.	Continental Shelf The northern section of the continental shelf is wide: 25 nautical miles and 99 % trawlable while the southern part is narrow: 15 nautical miles and 70 % trawlable. Continental Coast The northern and central parts are dissected by rivers carrying large quantities of alluvial deposits and hence the prevalence of mangrove species. The coastal Mount Cameroon slopes and the

Table 1.1 Cont.

					extreme south of the ecosystem lie on hard rocks and hence little deposits and few mangroves.
Tropical Humid Dense Forest Ecosystem	1. 2. 3. 4.	Littoral or Atlantic Humid Forests Biafran forest Guinea-Congolian forest Swamp / flood forests	<u>Geographical</u> It is situated between latitudes 2° and 6° 30' N., and longitudes 10° 20' and 16° 20' E. <u>Administrative</u> South West (tendency), Littoral, Centre, South and East provinces.	The rainfall obeys 2 patterns: Cameroonian; mono-modal with more rain, and Guinean; bi-modal with less rain. ex Douala = 4,028mm, Yaounde = 1,597 mm. Mean annual temperatures are between 32° C and 23.5°C <u>Soils</u> Volcanic in the west, granitic and variously metamorphic in the rest of the ecosystem.	The Atlantic variant is made of 3 levels: tree, shrub and herbs, with a lot of *Lophira alata*. The Atlantic type gives way to the biafran and then to the mixed forests of *Gilbertiodendron dewevrei* which further give way to the *Sterculia subviolacea* marsh and raffia swamp forests.

Table 1.1 Cont.

Tropical Wooded Savannah Ecosystem	1. 2. 3.	Tree and woodland Savannah Shrub savannah Grassland Savannah	Geographical Latitudes 5° and 8° 20' N., and Longitudes 9° 30' and 15° 40'E Administrative N. West, West, and Adamawa Provinces.	The mean altitude is between 1,000 m and 1,600 m a.s.l. The average annual temperature is 19.4°C, and the mean annual rainfall is 2,000 mm. Soils Volcanic in the western half, granitic in the S/E Adamawa.	Tree and woodland savannah is found in the south and west of the ecosystem, progressing to shrub savannah of *Daniella oblonga* and *Lophira lanceolata* and then to grass savannah of *Imperata cylindricum* and *Pennisetum purpureum*.
Semi-arid	1. 2 3. 4.	Steppe, or large open lands Savannah and scrubland Prairie: pastures Yaérés and Bovés	Geographical Latitudes 8° 20' and 13° 10' N., and longitudes 12° 30' and 15° 40' E. Administrative North, and Far North provinces.	The climate is severe with clear differences between the daytime and night-time temperatures. Maximum temperatures vary between 40 and 42°C: end April and the minimum temperature is 17°C: Dec/Jan. Rainfall drops from South: 1,000mm to 900mm, to North: 900 to 400mm per yr.	Three major features include the Benoue plain in the South/East littered by small hills, the dry Mandara region, and the flood vegetation on the West, known as the Bovés and Yaérés. A special and unique vegetation of thorny scrubland occurs in the Mozogo Gogoko reserve of

Table 1.1 Cont.

Table 1.1 Cont.

Ecosystem		Yaérés and Bovés flooded lands.		Soils The eastern flood plains lie on sedimentary soils. The western soils are volcanic around the Mandara mountain and granitic north and south of the Mandara.	the Mayo-Tsanaga Division. Characteristic activities include fishing in the eastern flood plains; February - April, as the waters recede.
Montane Ecosystem	1. 2. 3.	Subalpine or Ericaceous belt (3,000 - 4,000 m. a.s.l.) Afromontane belt (1,600m - 3,000m. a.s.l.). Submontane (1200-1600 m)	Geographical The mountains are mainly located on the western half of the country's continental plate.	Mountains are cooler than their parent ecosystem because of their altitude eg. Mt. Cameroon 4,095m has a temperature of 4°C but at Limbe where it is 100m a.s.l, the temperature is 32°C. The soils are mainly volcanic. The micro-climate is more humid, with lower temperatures than the parent ecosystem (s). The annual thermal amplitude	The country's mountains are noted for volcanic activity. The most recent was in 1999 on Mt. Cameroon. Some flora: lichens and orchids strive on recent mountain larva.

Table 1.1 Cont.

				is lower than that of the parent ecosystem.	
Freshwater Ecosystems	1.	Limnological (continental lakes)	Geographical Rivers traverse one or more ecosystems but the lakes reside in a parent ecosystem. These features are different from their parent ecosystems due to the modification effect of water on micro-climate and vegetation		The lakes are classified in four categories namely: i. Craters or volcanic reservoirs ii. Subsistence or lowland Lakes iii. Basin lakes i.e., Lake Chad iv. Artificial Lakes i.e., Lagdo
	2	Lothological (Continental rivers)			

Source: Assembled from Amou'ou, *et al.* (1985); Sayer, et al. (1992); MINEF, (1996a); Okotiko, (1997); Satabie, (1997), CENADEFOR, (1985).

NB. The geographical locations of the various ecosystems are only indicative (see Fig. 7).