

**THE UNITED REPUBLIC OF TANZANIA  
VICE PRESIDENT'S OFFICE**



**NATIONAL BIODIVERSITY STRATEGY AND  
ACTION PLAN**

**AUGUST 2001**

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## ABBREVIATIONS AND ACRONYMS

ADB	-	African Development Bank
ADRI	-	Animal Diseases Research Institute
ARF	-	Agricultural Research Fund
CA	-	Catch Assessment
CBC	-	Community Based Conservation
CDM	-	Clean Development Mechanism
CBOs	-	Community Based Organisations
CBD	-	Convention on Biological Diversity
CEEST	-	Centre for Energy, Environment Science and Technology
CITES	-	Convention on International Trade on Endangered Species
COSTECH	-	Commission of Science and Technology
COMESA	-	Common Market for Eastern and Southern Africa
CRDB	-	Co-operative and Rural Development Bank
CSD	-	Civil Service Department
DoE	-	Division of Environment
DF	-	Driving Force
DRD	-	Directorate of Research and Development
EEZ	-	Exclusive Economic Zone
EIA	-	Environmental Impact Assessment
ERP	-	Economic Recovery Programme
ESAP	-	Economic and Social Action Programme
FDC	-	Focal Development Centre
FBD	-	Forest and Bee-keeping Division
FI	-	Fisheries Institute
FR	-	Forest Reserve
FT	-	Fisheries Training
GDP	-	Gross Domestic Product
GEF	-	Global Environmental Facility
GMOs	-	Genetically Modified Organisms
GMP	-	General Management Plans
GR	-	Grazing Reserves
IDA	-	International Development Association
IFAD	-	International Fund for Agricultural Development
IMS	-	Institute of Marine Sciences
IRA	-	Institute of Resource Assessment
IRRI	-	International Rice Research Institute
IPC	-	Investment Promotion Centre
IPM	-	Integrated Pest Management
ISNAR	-	International Services for National Agricultural Research
IUCN	-	International Union for Conservation of Nature
LFSA	-	Length Based Fish Stock Assessment
LG	-	Local Government
LITIs	-	Livestock Training Institutes
LPRI	-	Livestock Production Research Institute
LT	-	Long-Term
LVEMP	-	Lake Victoria Environmental Management Programme
LWRM	-	Land, Water Resource Management
MCM	-	Ministry of Cooperatives and Marketing
MAFS	-	Ministry of Agriculture and Food Security
MCT	-	Ministry of Communication and Transport
ML&YD	-	Ministry of Labour and Youth Development
MARPOL	-	Marine Pollution
MARTIs	-	Ministry of Agricultural Research and Training Institutes
MCDWA&C	-	Ministry of Community Development, Women Affairs and Children

MEM	-	Ministry of Energy and Minerals
ME&C	-	Ministry of Education and Culture
MF	-	Ministry of Finance
MFA&IC	-	Ministry of Foreign Affairs and International Co-operation
MJ&CA	-	Ministry of Justice and Constitutional Affairs
MLHUD	-	Ministry of Lands, Housing and Urban Development
MMC	-	Muhimbili Medical Centre
MNR&T	-	Ministry of Natural Resources and Tourism
MRLS	-	Maximum Residue Level Standards
MST&HE	-	Ministry of Science Technology and Higher Education
MT	-	Medium Term
MTI	-	Ministry of Trade and Industry
MUCHS	-	Muhimbili University College of Health and Allied Sciences
MWLD	-	Ministry of Water and Livestock Development
NALERP	-	National Agricultural & Livestock Research Project
NAMTraMP	-	National Agricultural Middle level Training Masterplan
NAP	-	National Action Programme
NARM	-	National Agriculture Research Masterplan
NBC	-	National Bank of Commerce
NBCS	-	National Biodiversity Country Study
NBSAP	-	National Biodiversity Strategy and Action Plan
NCA	-	Ngorongoro Conservation Area
NCDP	-	National Coconut Development Project
NEAP	-	National Environmental Action Plan
NEMC	-	National Environmental Management Council
NESP	-	National Economic Survival Program
NGOs	-	Non-Governmental Organisations
NIPC	-	National Investment Promotion Centre
NLUPC	-	National Land Use and Planning Committee
NORAD	-	Norwegian Agency for Development
NP	-	National Parks
NPGRG	-	National Plant Genetic Resources Centre
OGL	-	Open General Licensing
OPs	-	Operational Programme
PAs	-	Protected Areas
PMO	-	Prime Minister's Office
PO-PCP	-	President's Office – Planning Commission and Privatisation
PO- RALG	-	President's Office - Regional Administration and Local Government
PSRC	-	Parastatal Sector Reform Commission
RPFB	-	Rolling Plan and Forward Budget
RPGRG	-	Regional Plant Genetic Resources Centre
RAS	-	Regional Administrative Secretary
R & D	-	Research and Development
RS	-	Regulatory Services
RT	-	Research and Training
SADC	-	Southern Africa Development Community
SAP	-	Structural Adjustment Program
SC	-	Strategic Choices
SGR	-	Strategic Grain Reserve
ST	-	Short Term
SWRI	-	Serengeti Wildlife Training Institute
TCCIA	-	Tanzania Chamber of Commerce, Industry and Agriculture
TARO	-	Tanzania Agricultural Research Organisation
TALIRO	-	Tanzania Livestock Research Organisation
TANRIC	-	Tanzania Natural Resources Information Centre
TCMP	-	Tanzania Coastal Management Partnership
TFAP	-	Tanzania Forestry Action Plan
TAFIRI	-	Tanzania Fisheries Research Institute
TAFORI	-	Tanzania Forestry Research Institute

TANAPA	-	Tanzania National Parks
TECOBLAX	-	Temeke Combined Black-quarter and Anthrax
TISCO	-	Tanzania Industries Studies and Consulting Organisation
TLS	-	Tanzania Library Services
TTB	-	Tanzania Tourist Board
TPRI	-	Tropical Pesticides Research Institute
UNCCD	-	United Nations Convention to Combat Desertification
UDSM	-	University of Dar-Es-Salaam
UNDP	-	United Nations Development Programme
UNEP	-	United Nations Environment Programme
UNFCCC	-	United Nations Framework Convention on Climate Change
VPO	-	Vice President's Office
VWO	-	Village Ward Officer
WD	-	Wildlife Division
WMAs	-	Wildlife Management Areas

## **PREFACE**

Current and future economic, social and ecological contributions of genes, species, and ecosystems make the conservation and sustainable use of biodiversity not just technical concerns but political imperative as well. Biodiversity is the source of economic and ecological security of present and future generations. Diversity and variety enable humanity to adapt to local, regional and global changes. The need to put in place a national biodiversity strategy and action plan has been necessitated by this understanding.

Tanzania began developing a National Biodiversity Strategy and Action Plan (NBSAP) in March 1998. This document is the product of a long consultative process, which has included consultations at various levels with the intent of providing a national driven and implementable strategy and action plan. The NBSAP has been formulated taking into consideration the country's dependency on biodiversity for socio-economic development in terms of rendered ecological services, provision of food and medicines, building materials and energy. Micro-organisms form part of the biodiversity which act as decomposers of wastes for enrichment of soils and aquatic environment for perpetuation of nature taking into account the provisions of the Convention on Biological Diversity (CBD) to which Tanzania is a party.

The Vice President's Office through the Division of Environment (DoE) managed a consultative process involving all the stakeholders to formulate a comprehensive NBSAP. These include public institutions, NGOs, CBOs, community leaders, industry and the private sector as partners in the conservation and sustainable utilisation of the country's biological wealth. The National Steering Committee (NSC) and the Technical Committee (TC) were established by the Vice President's Office (VPO) in order to co-ordinate the development of NBSAP. Three national consultants were engaged to work on Terrestrial, Agro and Aquatic biodiversity respectively. An international consultant was commissioned to provide technical backstopping throughout the NBSAP formulation process.

Acquisition of basic data for NBSAP was made possible through sectoral consultations (covering over twenty government sectors, several public institutions and NGOs) and five Zonal Workshops (covering coastal and marine, arid and semi-arid lands, wetlands, mountainous and agricultural lands). The Workshops were conducted with a focus on identification and analysis of threats, constraints, challenges, opportunities and strategic choices for conservation and sustainable use of biodiversity.

The NBSAP document will be valuable to all public institutions, NGOs, community leaders, industry and any other stakeholders who are concerned with the conservation and sustainable utilisation of aquatic, agro and terrestrial biodiversity resources for the present and future generations.



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We wish to offer special gratitude to all government ministries, particularly to the Ministries of Lands and Human Settlements; Ministry of Trade and Industries; Foreign Affairs and International Co-operation; Agriculture and Food Security; Water and Livestock Development; Community Development, Women Affairs and Children; Works; Finance; Natural Resources and Tourism; Energy and Minerals; and the Planning and Privatisation. Special thanks also go to key Research and Development Institutions: Commission for Science and Technology (COSTECH); Tropical Pesticides Research Institute (TPRI); Agricultural Research Institute of Lyamungu Tengeru and Training Institute; Livestock Research Centre in West Kilimanjaro; Serengeti Wildlife Research Institute, Arusha (WRIA); Sokoine University of Agriculture and the University of Dar Es Salaam.

Several Non-Governmental Organisations (NGOs): Ox-Farm, Agenda, and WWF who along with Government Projects and institutions such as Tanzania National Parks (TANAPA) and Tanzania Wildlife Co-operation (TAWICO) made invaluable contribution in translating the consultations into this valuable strategy.

We acknowledge the tireless efforts of the Technical Committee Members and the experts (Mr. B. Bayona; M. Lugenja and J. Kayera) who, not only carried out the consultations but also participated in formulating this Strategy and Action Plan. The three experts, under the coordination of Mr. R. S. Muyungi, Assistant Director of Environment, Vice President's Office, carried out consultations in their respective areas of competence - aquatic biodiversity, agro biodiversity and terrestrial biodiversity.

The government is also indebted to the Royal Norwegian Government for providing critical funds for supporting the whole process and also for availing and supporting an International consultant, Dr. Peter Schei who was instrumental from the early stages of the formulation of this document.

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National Biodiversity Strategy and Action Plan Project  
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## EXECUTIVE SUMMARY

### THE IMPORTANCE OF BIODIVERSITY

1. 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 species, between species and of ecosystems. Thus, biodiversity is the whole variety of living organisms on which society depends. Because of the society's dependency on biodiversity for socio-economic development, to a greater extent, biodiversity connotes legal, social and economical equity issues at various levels, including national and international levels.

The society's dependency on biodiversity for socio-economic development is underscored by the rendered ecological services, source of food and medicines, source of building materials and energy as well as perpetuation of nature as decomposers of organic wastes and enrichment of soils and aquatic environment. Thus the conservation of the earth's biological diversity is vital to humanity's economic and social development. Biodiversity is an asset of tremendous value because our survival and that of our future generations depend on the harmonious relationship with the natural elements and ecosystems. The value of biodiversity may be summarised as; utilitarian (direct social and economic benefits), aesthetic (**the value biodiversity place on seeing**, hearing or touching nature), moral (the moral right of species to exist) and ecological (the importance of diversity to the persistence of ecological systems).

2. The need to care about the biological diversity and the environment in general, is a prime necessity because of the Tanzania's heavy dependency on her capital of natural resources. Tanzania is one of the twelve-megadiverse countries of the world, and the nation's biological diversity has important economic, technological and social implications. Agriculture, Livestock, Forestry, and Fisheries together contribute over 65% of GDP and account for over 80% of total employment and over 60% of the total export earnings. The sector has direct relationship with biodiversity.

3. The dependency is even truer in the context of alleviating poverty because environmental degradation primarily affects the poor, particularly in the rural areas. Reversing the downward trend of environmental degradation is a key element of this strategy. The overriding priority is to reduce poverty, which in turn will reduce environmental degradation including reduction in biodiversity loss. That is why in formulating this strategy and action plan we are guided by the attributes of vision 2025 for the United Republic of Tanzania, a blue print for Tanzania's development to the year 2005.

Tanzania's natural resources base is the sum total of forest ecosystems, savannah, pastures and rangelands, wetlands, rivers, lakes and the ocean. All these are affected in various combinations by increasing population growth, which in turn increases the demand on the natural capital. The conservation of Tanzania's biological wealth is also affected by urbanization and migration compounded by extreme poverty in both rural and urban centres. The evolution of market economies and globalization has also brought its own problems to the domestic scene, where the use of natural wealth by the present generation seems to compromise that of the future. Thus the sustainable use of biotic wealth for the present and future generations needs concerted action with immediate effect, even in the absence of any international treaty.

### THE COMMITMENT TO THE CONVENTION ON BIOLOGICAL DIVERSITY

4. Tanzania signed the Convention on Biological Biodiversity (CBD) in 1992 and ratified the same in March, 1996; thereby committing herself to join other global partners aspiring to conserve biological diversity and enhance development opportunities, banking on more sustainable use of biological resources and promoting more equitable measures of sharing accrued benefits across local, regional, national and global stakeholders.

The objectives of the Convention on Biological Diversity are the conservation of biological diversity, the sustainable use of components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.

5. As a Contracting Party, Tanzania is obliged to:

- (a) Develop appropriate national strategies, action plans and programmes for the conservation and sustainable utilisation of its biological resources; and integration of these into relevant sectoral or cross-sectoral plans, programmes and policies- (article 6 of the Convention);
- (b) Build capacities for research, assessment, identification, evaluation and monitoring of biodiversity at the national level with full support and participation of local communities- (articles 7,12,13 and 14 of the Convention);
- (c) Collaborate internationally in transfer of technology, handling of biotechnology and other scientific linkages; (articles 15,16,18 and 19 of the Convention);
- (d) Exchange information relevant to conservation and sustainable use of biological diversity as provided under Article 17 and present national reports to the conference of parties- (articles 23 & 26 of the Convention); and
- (e) Provide financial support and incentives for national bio-diversity programmes whereby developed countries shall provide or meet incremental costs as financial topping-up of budgets for biodiversity programmes in developing countries, - (articles 20 & 21 of the Convention).

Tanzania embarked on the implementation of the CBD since 1995, and produced her first comprehensive National Biodiversity Country Study (NBCS) Report in 1997. The development of a National Biodiversity Strategy and Action Plan (NBSAP) started in March 1998, and has been formulated taking into consideration the country's dependency on the biodiversity wealth for socio-economic development and the uniqueness of Tanzania's biological wealth worldwide. Annex 5 outlines the process that was undertaken to prepare the NBSAP.

## **THE BIOTIC WEALTH AND THREATS**

### **Aquatic Biodiversity**

The biotic wealth of Tanzania and the threats with regard to its conservation and sustainable utilisation are examined in three broader thematic areas, namely; Aquatic biodiversity, Agro-biodiversity and Terrestrial biodiversity.

6. Over 10% of the total surface area of Tanzania (945,000km<sup>2</sup>) (both mainland and Zanzibar) in general, constitute wetlands, which support aquatic biodiversity. The NBCS report of 1997 identified marine and coastal wetlands, inland wetlands, (lakes, rivers, inland flood plains) and artificial wetlands as major ecological systems in which biological resources thrive. Seagrass beds, seaweeds, coral reefs, salt and mudflats, mangrove swamps, estuarine and deltaic ecosystems are examples of marine and coastal wetlands with diversified habitats to support biological diversity.

7. Diversity of flora has been reported to include 12 species of seagrass, 287 species of seaweeds, 250 species of phytoplankton in the marine environment compared to 243 species of macrophytes (238 species of angiosperms and five species of ferns) and 1,119 species of phytoplankton in freshwaters.

8. Diversity of fauna in the marine environment was assessed to include over 976 species of invertebrates (Molluscs - 73.6%, echinoderms - 10.9%, arthropods - 6.5%, corals - 5% and sponges - 4%). Vertebrates include 532 species of fish, five species of sea turtle, one species of snake and four species of marine mammals. Diversity of freshwater invertebrates, however, is somewhat smaller than in marine waters - with about 785 species, (37% of them endemic). Vertebrate diversity - especially fishes constitute 729 species (95% being endemic).

9. Whilst attempts to ensure aquatic biodiversity have been made through initiatives such as the integrated coastal zone management programmes, there is evidence that threats to wetlands are still not adequately covered by current conservation measures. This is particularly true with designated sites for in-situ conservation (Marine Parks and Reserves), temporal and spatial zones whose legislation remains weak. The current most evident threats of wetlands and aquatic biological resources are indicative of inadequacy inherent to the current conservation measures or their implementation modalities.

10. Human intervention is seriously threatening sustainable utilisation of aquatic biodiversity. Relevant direct threats include:

- (i) Pollution from industrial, domestic and agricultural effluents,
- (ii) Destructive fishing by use of dynamite, beach-seining and poisoning,
- (iii) Trophy collection - coral and shell collection,
- (iv) Unregulated coastal tourism,
- (v) Over-exploitation of aquatic resources,
- (vi) Introduction of exotic species,
- (vii) Erosion and silting due to over-grazing and deforestation and
- (viii) Loss of habitat due to developmental activities, e.g. habitat clearing, construction of dams, mineral and aggregate mining, irrigation, etc.

11. Direct threats to aquatic biodiversity are made worse when antagonistic socio-economic, legal and policy issues come into play. Thus in working out a sound NBSAP, it is necessary to reconcile all these hindrances, gaps and driving forces; whose negative impact on biological diversity could be profound if not reconciled in time. Examples of landraces gaps and driving forces for aquatic, biodiversity, conservation includes the following hindrances:

- (i) Absence of a national strategy on wetlands to clearly define nation-wide issues like property rights/tenure and their strategies to arrest encroachment and misuse,
- (ii) Gaps in research and information for conservation and management decisions,
- (iii) Small area being protected despite extended jurisdiction of over 200 miles limit (EEZ),
- (iv) Inadequate capacity for research and extension services,
- (v) Poor infrastructure and high post harvest losses,
- (vi) Poor handling and processing technologies,
- (vii) Under-developed cultural fisheries and recreational sports,
- (viii) Lack of awareness, inadequate participation and empowerment of local communities,
- (ix) Unfavourable credit conditions from lending financial institutions,
- (x) Lack of proper plans to internalise externalities spill over like accidents and disasters, and
- (xi) High population growth-rate accompanied with increasing poverty.

### **Agro-Biodiversity**

12. Arable land cover 44.0 million hectares while 24.0 million hectares is under livestock production. Of the arable land available 10.1 million hectares are used for crop cultivation. Agriculture employs over 80% of the population's work force and accounts for about 50% of Tanzania's GDP. Of this, 18% is derived from livestock, which is about 30% of agriculture GDP.

13. The arable land is also the main source of food supply and raw materials for the industrial sector.

14. The available rangeland has a potential carrying capacity of 12 ha to 3.25 ha/beast for Tabora, Singida, Shinyanga, Mtwara, Lindi, Morogoro, Coast, Dodoma, Rukwa and Kagera regions. However almost 50% of this is infested with tsetse flies, mostly in the Miombo Woodlands. Therefore only 50% of the rangeland is available for grazing carrying about 52% of the estimated livestock population. Thus, there is a serious overgrazing problem and land degradation, consequently leading to great loss in forage species diversity.

15. In total there are 47 cultivated plant species in Tanzania. These include; 9 cereals, 11 legumes, 10 oil crops, 6 roots and tuber crops, 4 fibre crops and 3 beverage crops. There are 79

indigenous horticultural plant species (including 48 introduced fruit trees, 37 introduced vegetable crops and 40 indigenous vegetable crops). There are 109 ornamentals and 34 species of spices or herbs.

16. Principal traditional export crops consist of sisal, cotton, coffee, tea, cashew nuts, tobacco, pyrethrum, whereas the non traditional crops include, sugar, oilseeds, vegetables, cardamoms, cocoa beans, cinchona barks, and nuts, cloves and other types of spices, soybeans, groundnuts, castor and sesame, fresh fruits, sunflower and flowers.

17. Domestic animal species in Tanzania, comprise of 16 million cattle, 3.5 million sheep, 11 million goats, 0.5 million pigs, 0.25 million rabbits, 2,048 horses, and 419,000 donkeys. Also there are 28 million chicken, 214,330 ducks and geese, 91,136 turkeys, 43,195 guinea fowls and 7,911 water buffaloes.

18. Animal husbandry, for both commercial and subsistence purposes occurs in approximately one-third of the country, which is free of tsetse flies. About 50% of the herd is on agro-pastoral systems in dry sub-humid uplands (Mwanza, Mara, and Mbeya), 40% are on pastoral systems in semi-arid to sub-humid areas (Arusha, Dodoma, Shinyanga and Singida). The remaining 10% include 200,000 exotics and crossbred dairy cattle found in very humid Northern and Southern Highlands and the humid lowlands around Tanga and Dar es Salaam.

19. Sheep and goats are found in large concentration in Arusha, Shinyanga, Mwanza, Singida, Dodoma and Kilimanjaro regions and account for two-thirds of the total. They produce about 12% of the national meat supply. On the other hand, over 70% and over 90% of the production of poultry and piggery respectively, are in the traditional free ranging systems.

20. There are over 1600 species of bacteria, several species of cyanobacteria and fungi that have been reported in Tanzania. On the other hand, though viruses are important to all forms of living organisms, their information is very scanty. Mycorrhiza fungi exist in association with shrubs in Miombo woodlands whereas ectomycorrhizae is common in pine nurseries in Iringa, Arusha and Morogoro. There are over 30 species of edible mushrooms that have been reported in Tanzania.

21. Conservation of agro-biodiversity is through in-situ and ex-situ methods. For in-situ conservation, genetic materials such as sisal, forage crops and tree crops, are conserved in the field as gene banks. There are several hectares of land in different research institutions and farms used for this purpose. In case of ex-situ conservation, genetic materials are conserved as dry seeds and frozen tissues (plants), and frozen semen (livestock). There are about 107 different plant species, making about 1700 accessions in the gene bank at the National Plant Genetic Resources Centre (NPGRC) at the Tanzania Pesticides Research Institute (TPRI), Arusha. Ex-situ conservation strategies, particularly for plants have been limited by inadequate sampling during field collection and lack of representation in gene banks of the whole range of diversity of a given crop and its close genetic relatives.

22. The diversity of cultivated plants are threatened by many factors, including the following:

- Deforestation,
- Overgrazing,
- Introduction of exotic species,
- Lack of comprehensive research plans,
- Extensive use of agro-chemicals,
- Environmental pollution/climate change,
- Lack of systematic transmission of knowledge from one generation to another and
- Changes in food habits,
- Introduction of genetically modified organisms.

23. Domesticated animals diversity is threatened by many factors including:

- Migratory pastoralism and agro-pastoralism,
- Overgrazing,
- Encroachment of grazing areas,
- Importation of exotic livestock,
- Intensification of animal agriculture,
- Increasing animal diseases, and
- Introduction of genetically modified organisms

### **Terrestrial Biodiversity**

24. Attempt to conserve terrestrial biodiversity has been made through programmes and initiatives like wildlife and forests protected area networks, establishment of different levels of legal status, administration and protection, and imposition of restrictions with regard to hunting, grazing and tree felling. Access and activities are by special permission only [ e.g. Game reserves]. Restrictions apply specifically to hunting animals in the area [Game controlled areas] and management under multiple land use as in the Ngorongoro Conservation Area. The threats of terrestrial ecosystems and biological resources are indicative of inadequacy inherent to the current conservation measures or their implementation modality.

25. Tanzania's network of protected areas consists of National Parks (12) where all consumptive exploitation such as hunting, grazing and tree felling are prohibited; Game Reserves (31) such as Selous where access and activities are by special permission only; Conservation Area (1) managed for both wildlife conservation and legally agreed resident Masai herders; Forest Nature Reserves (543); Biosphere Reserves (1); World Heritage sites (3) and Game Controlled Areas (43) where restrictions apply specifically to hunting animals in the area.

26. It is estimated that the flora of Tanzania consists of about 10,000 plant species of which about 11 percent are endemic. There are also 31 endemic species of amphibians, 18 endemic species of lizards, 9 endemic species of snakes, 10 endemic species of birds and about 80 species of the famous violet flower plant species.

27. Tanzania's terrestrial biodiversity (wildlife resources and habitats) are threatened by:

- Fragmentation and loss of critical ecosystems linkages,
- Over exploitation of some species [e.g. elephant and rhino],
- Agricultural expansion,
- Rapid human population growth,
- Land degradation, pollution, and causal threats (human activities).
- Loss of wildlife habitats,
- Exploitation of resources to meet market demands
- Increased influx of refugees, and
- External market forces as a result of the process of globalization.

### **NATIONAL VISION, GOALS AND GAPS**

28. Consistent with vision 2025, the overall vision which guides this NBSAP is to build a society that values all the Biodiversity richness, using it sustainably and equitably, while taking the responsibility for actions that meet both the competing requirements of the present and the legitimate claims of the future generations.

29. In order to pursue the above mentioned NBSAP vision the following guiding principles will apply:

- (i) The protection of the biological diversity is the responsibility of each and every Tanzanian,
- (ii) All life forms have intrinsic value and their use should be sustainable,

- (iii) Each and every Tanzanian has the right to understand and appreciate Biodiversity and participate in resource use decisions that affect the Biodiversity particularly in the ecosystems within which they live and depend upon,
- (iv) Empowerment of women is a critical factor in the eradication of poverty and hence in the sustainable use of the biological diversity,
- (v) It is vital to anticipate, prevent and attack the cause of significant reduction or loss of biological diversity,
- (vi) Biological diversity is best-conserved in-situ, capacity for ex-situ conservation is important,
- (vii) It is only when people can satisfy their needs, have control of their resource base, and have secure tenure to land that long-term objectives of biological diversity conservation and sustainable use can be satisfied,
- (viii) Science and technology have a central role in the exploitation, processing and utilisation of the biological diversity,
- (ix) The knowledge, innovations and practices of indigenous and local communities should be respected, preserved, maintained, and used with the approval and involvement of those who possess the knowledge,
- (x) The conservation of Tanzania's Biodiversity is influenced by international activities, therefore to be able to conserve it a global co-operative action and benefits are required,

30. Integrating the provisions of the CBD within the current policy goals and objectives for relevant sectors in Tanzania will develop goals and objectives for biodiversity conservation and sustainable utilisation.

## **CROSS-SECTORAL GOALS**

### **The cross-sectoral goals for the NBSAP**

31. Ensure sustainability, security and equitable use of biological diversity for meeting the basic needs of the present and future generations by developing and implementing a holistic NBSAP for the conservation of biological diversity and sustainable use of its components,

32. Co-ordinate the planning and implementation of a biodiversity conservation program by ensuring that relevant activities harmonise with those of other government and non-governmental organisations, private sector, religious groups, local communities and other civic organizations,

33. Institutionalise the practice of biological conservation and the sustainable use of resources through legislative, administrative, fiscal and other regulatory measures,

34. Promote public education, understanding and awareness of the values and benefits of biodiversity conservation and of the merits of sustainable development,

35. Enhance capacity building through formal and informal education, training, research and institutional facilitation as well as financing and,

36. Enhance and facilitate collaboration between national and international community for the sustainable utilisation and conservation of biological resources,

In order to realise the above cross-sectoral goals, the following broad category objectives have been formulated.

## **CROSS-SECTORAL OBJECTIVES**

### **37. Policy, regulatory issues and international co-operation**

- (a) Strengthen and facilitate regional and international collaboration in sustainable exploitation, management and conservation of biodiversity,
- (b) Provide support services including the institutional and legal framework to ensure sustainable utilisation and conservation of biodiversity resources,

- (c) Develop mechanism for technological and financial co-operation,
  - (d) Develop and strengthen sectoral and cross-sectoral linkages for harmonisation of management and regulatory decisions, affecting biodiversity, and
  - (e) Facilitate economic growth through formulation and enforcement of appropriate policies and regulatory services including important assessments for the management of biodiversity resources
- 38. Planning and Co-ordination**
- (a) Develop and strengthen sectoral and cross-sectoral institutional co-ordination for harmonisation and mainstreaming of biodiversity concerns in planning and management.
  - (b) Ensure national welfare by sustainably increasing output, quality and availability of biodiversity resources,
  - (c) Improve community standard of living through equitable sharing of income generated from the sustainable utilisation of biodiversity resources at national and international levels and,
  - (d) Promote national biodiversity resources at both national and international markets.
- 39. Education and Information**
- (a) Establish and promote appropriate, education and awareness programmes to facilitate proper community participation in conservation and sustainable utilisation of biodiversity resources,
  - (b) Improve availability, accessibility and exchange of information pertaining to sustainable utilisation of biodiversity resources, and
  - (c) Establish and maintain information centres for biodiversity
- 40. Research and Development**
- (a) Establish and promote research and development programmes with a view to building the capacity to efficiently conserve and sustainably use the biodiversity resources,
  - (b) Develop and introduce new technologies that increase the productivity of biological resources in various ecosystems including rangelands and agricultural ecosystems,
  - (d) Ensure fragile ecosystems such as drylands, mountainous and wetland ecosystems have specific and well-tailored development programmes and
  - (e) Undertake thorough research before oxotic genetic materials including genetically modified organisms.
- 41. Ecosystems and Species Conservation and Sustainable Utilisation**
- (a) Increase production and yield of biological resources for nutritional and socio-economic development,
  - (b) Protect, regulate and manage biodiversity resources productivity through prevention of habitat destruction, pollution and over-exploitation,
  - (c) Adopt community participation approaches at all levels of planning, development and management of biological diversity and,
  - (d) Promote sound utilisation of biotechnology.
- 42. Biodiversity Monitoring and Evaluation**
- (a) Develop a reliable and sustainable monitoring and evaluation system for sustainable use and conservation of biodiversity resources.
- 43. Capacity Building (personnel, institutional, facilities, and financial capacities)**
- (a) Establish and promote appropriate training programs to build capacity and technological innovations for identification, conservation and sustainable use of biological diversity of the various ecosystems,
  - (b) Promote specifically the access of women, youth and marginalized communities to land, credit, education and information to facilitate their effective participation in development, conservation and sustainable utilisation of biological resources.
  - (c) Establish and/or strengthen research and training institutions for encouraging ex-situ conservation of biological resources within the country.



## **GAPS, HINDRANCES AND DRIVING FORCES**

44. Gaps [G], Hindrances [H] and Driving Forces [DF] have been identified through a consultative process, which involved all sectors and stakeholders including the international partners.

### **General**

45. The following general threats have been identified:

- (i). The highest percentage of terrestrial biodiversity in Tanzania occurs in protected areas (National Parks, Game Reserves and Forest Reserves) as such conflicts over biodiversity value may occur for example between the mineral sector and the natural resources sector when mineral also occur in these protected areas - Hindrances
- (ii) Unplanned human and livestock migrations - Hindrances
- (iii) Rapid growth of rural and urban populations which lead to loss of habitats due to settlement, agriculture, grazing, mining and logging - Driving forces
- (iv) Some biodiversity hot spots like Rufiji Delta, Coastal forests and Eastern Arc Same Mountains and catchment area remain unprotected - Gap
- (v) Inadequate or lack of inventories of bio-diversity resources in protected areas hence, little knowledge of their bio-diversity potential - Gap
- (vi) Inadequate experts in the field of physiology, pathology, anatomy and taxonomy particularly in high learning institutions - Gap/Hindrances
- (vii) Not many studies have been done on ecosystems, such as wetlands and coastal forests (especially mangrove) and use of non-traditional exports such as mushrooms and medicinal plants - Gap
- (viii) Lack of catalogue and field guides for some plant and animal families - Gap
- (ix) Inadequate execution of the established planning process and regulations- Gap/Hindrances
- (x) Lack of umbrella environmental legislation - Gap

## **STRATEGIC CHOICES**

46. Several strategic choices intended to fulfill the stated objectives and are developed under the broader thematic areas, of Aquatic, Agro and Terrestrial biodiversity components and, for each strategy, suitable action plans/programmes are proposed Annex 7.

47. Proposed strategic choices include the following:

- (i) Policy, regulatory issues and international co-operation,
- (ii) Planning and Co-ordination,
- (iii) Education and Information,
- (iv) Research and Development,
- (v) Ecosystems and Species Conservation and Sustainable Utilization,
- (vi) Biodiversity Monitoring and Evaluation and
- (vii) Capacity Building.

### **Strategic Choices for aquatic biodiversity**

#### **48. Policy, Regulatory issues and International Co-operation**

- Establishing mechanisms and legal instruments for exploitation, research management, assessing the national harvesting capacity, and ensuring compliance with international conventions for management, conservation and utilisation of biological resources.
- Reviewing, updating and harmonising all policies and supporting legislation relevant to aquatic biodiversity.
- Setting standards for inputs, outputs, and quality of services and ensuring sustainable funding at both national and international level to aquatic biodiversity conservation and sustainable utilisation programs.

- Collaborating with regional and other bodies including multilateral organisations in getting access to and transfer of relevant technologies and genetic resources.
- Formulating legislative and administrative procedure for facilitating access, transfer of technology in order to enhance sustainable biodiversity and the aquatic environment as a whole.
- Enacting legislation regarding patents, trademarks and other relevant intellectual property rights legislation relevant to aquatic biodiversity.
- Encouraging the involvement of donors and conservation agencies to support conservation and management of aquatic biodiversity resources for national, regional and international benefits and
- Co-operating with other parties in the conservation and management of trans-boundary aquatic ecosystems.

#### 49. **Planning and Co-ordination**

- Promoting vertical and horizontal co-ordination and harmonisation,
- Establishing appropriate quality control systems,
- Monitoring the impacts of the aquatic-biodiversity development strategies on the community.
- Generating, preserving and disseminating appropriate information
- Developing incentives such as credit schemes to promote artisan exploitation,
- Participating in identifying and promoting appropriate infra-structural development to permit easy harvesting and distribution,
- Developing both aquaculture and recreational sports potentials and promoting consumption of alternative aquatic biodiversity resources.
- Integrating technical and political advice in the sustainable management of aquatic biodiversity,
- Facilitating access to credit for riparian communities,
- Encouraging the formation of marketing and processing associations to take advantage of economies of scale in processing and marketing of aquatic biodiversity,
- Establishing and implementing quality control standards,
- Developing and introducing appropriate technologies for harvesting, processing and handling to reduce post-harvest losses and promote marketability.

#### 50. **Education and Information**

- Establishing priority areas for aquatic biodiversity training,
- Developing national training curricula to promote aquatic biodiversity conservation and sustainable utilisation,
- Enhancing co-operation and linkages with national, regional, and international bodies/institutions in promoting research and transfer of technology,
- Developing a mechanism for sustainable financing of aquatic biodiversity research and training,
- Establishing interactive biodiversity information centres at institutional, national and regional levels,
- Involving local communities and other stakeholders in aquatic biodiversity planning, conservation, management and decision making,
- Introducing a system of benefit sharing,
- Creating awareness,
- Streamlining land resource tenure to facilitate community responsibility, establishing and/or strengthening community based organisations (CBOs), co-operatives, women and youth groups and Non-Governmental Organisations (NGOs) and establishing and updating legal instruments
- Continue undertaking provisions of international conventions and the relevant agreements for sustainable utilisation and management of aquatic biological resources,
- Establishing mechanisms and legal instruments for exchange of information of aquatic biodiversity,
- Establishing biodiversity data base centres at various institutional levels and
- Promoting the training of taxonomists and other scientists that are in scarce locally.

#### 51. **Research and development**

- Involving local communities and other stakeholders in the identification of priority areas of aquatic biodiversity

- Focusing research and development on the establishment of baseline data and development of methodologies for systematic sampling and evaluation of the aquatic biodiversity resources,
- Encouraging the private sector and the NGOs to participate in the aquatic research and development programs, developing a mechanism to co-ordinate and regulate aquatic biodiversity research programmes within the country, at regional and international levels,
- Developing a mechanism to facilitate sustained financing and facilitating regular inventories and mapping of existing aquatic biodiversity resources and habitats.
- Promoting, co-ordinating and regulating biotechnology and indigenous species,
- Encouraging revival and preservation of indigenous knowledge on sustainable utilisation and management of aquatic resources.
- Promoting collaboration and co-operation between aquatic research institutions at both national and international levels,
- Developing close linkages between research and development institutions and users  
Strengthening the liaison between producers, the extension services and support services
- Collaborating with national, regional, and international research and development institutions with a view to minimising unnecessary duplication of efforts, taking advantage of research results from elsewhere.
- Encouraging public sector, private sector and the international community to co-operate in undertaking long term aquatic biodiversity research
- Encourage research on integrated pest management (IPM) for management of aquatic pests (particularly invasive pests)
- Operationalizing an effective quality control and management system to develop and maintain aquatic biodiversity resources customer confidence at local and international levels and
- Undertaking specific research on the impacts of biotechnology on aquatic ecosystems.

## 52. **Ecosystems and species conservation and sustainable utilisation**

- Assessing economic opportunities and constraints facing communities, taking full advantage of research results and relevant biodiversity technologies developed through national, regional and international research for adoption at local production systems
- Improving the capacity of researchers and research institutions
- Disseminating appropriate aquatic biodiversity packages and integrating appropriate economic, social and other measures in applied aquatic resources production systems to encourage speedy optimisation of their productivity
- Reinforcing in-situ conservation in and outside marine/aquatic reserves, parks and protected areas,
- Rehabilitating and restoring degraded ecosystems and ensuring recovery of the threatened species
- Preventing and controlling introductions of exotic species with potential to become aquatic pests,
- Developing and establishing mechanisms for identifying rare, endangered and vulnerable species and critical habitats for protection
- Putting to an end unsustainable aquatic resources utilisation and harvesting,
- Establishing mechanism to regulate importation, use, and safe disposal of industrial wastes agro-chemicals, and domestic waste
- Developing and operationalizing mechanisms and national strategies for integrated management of coastal zone and wetlands.
- Introducing water quality monitoring program
- Involving local communities and other stakeholders in biodiversity planning, conservation and management and decision making programmes,
- Introducing a system of benefit sharing among local communities and all other stakeholders involved in the utilisation and management of aquatic biodiversity resources.
- Developing institutional capacity to monitor and regulate importation, production and introduction of biotechnologically developed organisms (e.g. GMO's) in the environment and
- Safeguarding indigenous intellectual property rights to ensure their continued access locally

**53. Biodiversity Monitoring and Evaluation**

- Introducing monitoring and evaluation systems in all public and private institutions responsible for the management and use of aquatic biodiversity resources,
- Revising and updating sectoral budget to introduce performance budgeting as a tool to evaluate appropriate utilisation of resources allocated for biodiversity resources management,
- Designing and instituting aquatic biodiversity resources management information system and
- Designating co-ordination of the same to relevant national institutions.

**54. Capacity Building (personnel, institutional, facilities, and financial capacities)**

- Establishing aquatic biodiversity resources management institutions with adequate facilities and technical capacity,
- Allowing progressive capacity building (skilled manpower, technological facilitation and financing) for aquatic biodiversity research and training,
- Streamlining and consolidating national financing mechanisms of biodiversity research and training and
- Establishing and promoting appropriate training programs to build capacity and technological innovations for identification, conservation and sustainable use of biological diversity.

**Strategic choices for Agro-biodiversity**

**55. Policy, Regulatory, Issues and International Co-operation**

- Strengthening and/or reviewing all regulations and legislation that enforce established standards of seeds, plant protection services, animal health services, agricultural information and marketing of inputs and outputs, co-operative development services and technical services and strengthening the link between research and extension.
- Facilitating the formation and growth of producer and marketing organisations, proper registration and development of a curriculum for a co-operative education programme for youths.
- Encouraging the private sector to participate in extension services and funding,
- Co-operating with developed countries in accessing and transferring of relevant environmentally sound technologies, formulating legislative and administrative policy measures regarding access to and transfer of technology and establishing financial requirements for assistance to enhance conservation and sustainable utilisation of biodiversity resources.
- Enacting national legislation regarding patents and other intellectual property rights and development of policies governing the conservation and sustainable use of agro-biodiversity.
- Focusing research and extension services on increasing appropriate traditional and non-traditional agro-biodiversity resources productivity and concentrating staff and their skills at field level.
- Establishing good quality control system on the quality of agro-biodiversity resource products, promoting private sector participation in the production, supply of inputs and marketing
- Developing and/or expanding, improving, maintaining and extending effective rural infrastructure (roads, railway systems and harbour facilities in potential areas where target agro-biodiversity resources are produced
- Creating appropriate environment for the banking system to set up adequate financing mechanism for input and purchase of outputs and
- Regularly reviewing the impact of various government policies on agro-biodiversity resource conservation and sustainable utilisation.

**56. Planning and Co-ordination**

- Ensuring local communities are involved in decision-making regarding land use, management and development.
- Incorporating environmental education into agricultural training institutions of ministry of Agriculture and Food Security.
- Continuing with sectoral land use planning and strengthening co-ordination capacity of National Land Use Planning Commission (NLUPC) to enhance linkage and reconciling the sectoral plans into cross-sectoral sustainable land use plans.

- Collaborate with MLHUD to ensure efficient implementation of the National Land Policy
- Respecting, recording, protecting and promoting the wider application of knowledge for agro-biodiversity resources management including indigenous knowledge
- Promoting the cost recovery mechanisms for the maintenance and construction of irrigation schemes.
- Introducing livestock and large-scale agro biodiversity related activities related in new areas after environmental impact assessment has been undertaken
- Preventing the introduction of, and controlling eradicating, alien species that threaten ecosystems, habitats and species.
- Protecting customary rights of different groups with respect to agro-biodiversity, encouraging co-operation between MAFS and private sector in developing methods for sustainable use of biological resources,
- Legislating, respecting, preserving and maintaining knowledge, innovations and practices of indigenous and local communities,
- Regulating or managing the relevant process and categories of activities where a significant adverse effect on agro-biodiversity has been determined pursuant to Article 7 of CBD,
- Establishing and maintaining facilities and capacities for ex-situ conservation and research,
- Regulating and managing or controlling the risks associated with the use and release of living modified organisms and regulating and managing collections of biological resources from natural habitats for ex-situ conservation purposes.
- Encouraging farmers to use improved seed varieties and productive livestock herds, formation of marketing and processing associations ensuring that women have access to land.
- Fulfilling the basic needs of the community in the grassland and farming ecosystems,
- Increasing the efficiency and effectiveness of the research and extension systems and
- Promoting cross-border trade with neighbouring countries.
- Encouraging the establishment and growth of ox-drawn equipment and other simple technologies necessary for the development and productivity of the agro-biodiversity resources.
- Encouraging banks and other financial institutions to provide both long and short term credit to individuals, groups of people, production, marketing and processing associations and
- Facilitating the private sector and co-operatives to invest in agro-biodiversity resource processing.

#### 57. **Education and Information**

- Promote dissemination of new scientific knowledge and information to farmers,
- Encouraging farmers to adopt improved agricultural and livestock production technologies, strengthening the link between research and extension and encouraging the private sector to participate in agro-biodiversity extension services both in terms of funding and delivering the services,
- Implementing the Tanzania Agricultural Research Programme (TARP), the National Agricultural Extension Programme (NAEP) and the NAMTraMP to meet the national and international obligations,
- Promoting progressive capacity for research and training institutions and enhancing co-operation and linkages with national, regional, and international bodies/institutions in promoting research and transfer of technology in agro-biodiversity.
- Involving local communities and other stakeholders in planning, implementation, conservation and management and in decision making,
- Creating awareness, re-enforce land tenure system to facilitate community responsibility,
- Establishing/enhancing community based organisations to support agro-biodiversity development activities,
- Establishing mechanisms and legal instruments for exchange of information generated from research, management, and conservation of agro-biodiversity resources.

#### 58. **Research and development**

- Making full advantage of relevant research results and desired agro-biodiversity technologies developed from identified international collaborating institutions for adoption in the production systems in Tanzania,

- Improving the performance of research personnel, motivating them and enhancing the retention of competent staff
- Improving extension to disseminate suitable packages on integrated agro-biodiversity resources production.
- Solving immediate production, processing and storage problems facing the producers and ensuring that the private sector and the international community co-operate to undertake long-term research and complement scarce public resources.
- Promoting biotechnological research without compromising the economic value of indigenous genetic resources,
- Co-ordinating and regulating biotechnology on indigenous species, encouraging, reviving and preserving indigenous knowledge on sustainable utilisation and management and
- Developing close linkages between research and development institutions and users of agro-biodiversity resources.

#### 59. **Ecosystems and species conservation and sustainable utilisation**

- Reinforcing in-situ and ex-situ methods of conservation, rehabilitating and restoring degraded agricultural ecosystems, preventing and controlling introductions of exotic species and minimising adverse impacts of pollution in agricultural ecosystems,
- Establishing mechanism to regulate importation, use, and safe disposal of industrial, consumer and agro-chemicals.
- Developing and operationalizing mechanisms for combating desertification including famine and drought management,
- Identifying and protecting vulnerable species, updating and maintaining agro-biodiversity database, and reviewing and
- Updating all legislation governing the introduction, and use of biotechnology in the agricultural ecosystems.
- Enhancing *institutional* capacity to monitor and regulate importation, production, and introduction of biotechnologically developed organisms such as GMO's in the country, safeguarding indigenous intellectual property rights (IPR) to ensure their continued access to *locally* developed biodiversity resources and
- Facilitating research and development institutions access to biotechnology resources and *technology* from within, regional and international levels for ensuring sustainable utilisation and management of Agro-biodiversity resources.

#### 60. **Biodiversity Monitoring and Evaluation**

- Introducing monitoring and evaluation systems in all public and private institutions responsible for the use and management of Agro-biodiversity,
- Introducing and enforcing performance budgeting in sectoral budgets to evaluate appropriate utilisation of resources allocated for development, management and utilisation of agro-biodiversity resources and
- Enforcing, strengthening and co-ordinating research information system and monitoring the impacts of development strategies on communities' incomes, and their capacity to sustainably manage their production environment.

#### 61. **Capacity Building (personnel, institutional, facilities, and financial capacities)**

- Strengthening (facilities and manpower) the existing training institutions, developing their capacity to monitor changes in biodiversity,
- Operationalization of a national training curricula, allowing progressive capacity building and enhancing co-operation and linkages, to promote research, training, transfer of technology conservation, sustainable utilisation of agro-biodiversity resources.
- Implementing the three-year General Agricultural Diploma Course to produce graduates who would be able to perform in the field of new agricultural extension paradigm, agricultural research, and training and in general agricultural production enterprises,

- Incorporating into MATIs and LITIs curricula extension programme which is based on clients-oriented communication methods and techniques and a systems approach for improved linkages with research, participating organisations and others.
- Enhancing farmers' participation in the generation and dissemination of technologies,
- Strengthening collaboration and communication with international research institutions, to minimise the risk of duplication of work
- Developing an education curriculum for youths for conservation and sustainable use of agro-biodiversity resources and
- Providing training for monitoring and evaluation and for management of environmental data.

### **Strategic choices for Terrestrial biodiversity**

#### **62. Policy, Regulatory issues and International Co-operation**

- Encouraging the involvement of development partners and conservation agencies to support Tanzania to conserve her biological resources both for national, regional and international benefits,
- Cooperating with any party including neighbouring countries in the conservation of trans-boundary ecosystems, and migratory species,
- Participating in relevant international treaties and conventions such as Ramsar Convention, United Nations Framework Convention on Climate Change and the Convention to Combat Desertification,
- Updating and developing policies within the framework of such treaties and conventions as they are consistent with Tanzania's position on conservation of terrestrial biodiversity,
- Developing sound management policies and enabling legal, regulatory, and institutional environment for rural communities and private sector to participate in biological resources utilisation, and combating illegal use of biological resources,
- Encouraging private sector to invest in the utilisation of biological resources e.g. hunting and photographic safaris, ranching and farming, developing tourism infrastructure, residue hunting, and wood industries,
- Managing specific types of PAs and specific components of biodiversity through relevant institutions,
- Ensuring that permits issued for activities related to biodiversity use take into account the need to benefit the local communities,
- Encouraging legal and sustainable trade in biodiversity and its components,
- Enforcing EIA process for proposed development in PAs and other areas in order to minimise potential damage to the environment,
- Developing mechanisms for technological and financial co-operation to enhance the capacity and sustainable utilisation and management of terrestrial biodiversity,
- Reviewing the existing conservation legislation under Forestry and Bee-keeping and Fisheries Divisions in order to include management and development of important and fragile ecosystems such as wetland, coastal weeds, mountainous ecosystems, arid and semi-arid ecosystems,
- Encouraging community participation in biodiversity conservation through establishment of joint agreements with local communities.

#### **63. Planning and Co-ordination**

- Providing cross-sectoral co-ordination between sectors responsible for terrestrial biodiversity management and administrations at all levels.
- Strengthening the capacity of local governments to administer and manage biodiversity resources.
- Establishing/promoting co-ordination mechanisms between the local and central governments.
- Enhancing rural development through ensuring community participation and access in sustainable utilisation of terrestrial biodiversity resources.
- Cushioning the pressure on biodiversity resources through ensuring that biodiversity products and services are valued at market prices,
- Adopting an efficient and flexible approach to collecting revenue and
- Mainstreaming biodiversity concerns in planning process.

**64. Education and Information**

- Creating the understanding and support for terrestrial biodiversity conservation by preparing and distributing posters, magazines and pamphlets and use of other news media,
- Co-operating with the sectors responsible for education and high learning institutions to promote the integration of biodiversity issues into school syllabi and educational programmes.
- Enhancing extension services and supporting them with adequate levels of manpower, funds and equipment in order to strengthen their capability,
- Promoting communication and collaboration with other sectoral rural extension services and co-ordinating and harmonising cross-sectoral extension services through integrated extension research, planning and in-service training of the extension staff,
- Designing the extension messages in a gender sensitive manner, developing public awareness programmes with respect to conservation and sustainable use of biological diversity.
- Providing opportunities for the general public and decision makers to appreciate nature (through guided tours, visits) and making sure that the public and decision makers have access to information on biodiversity, especially on development that will influence it locally, and
- Establish and enhance environmental/biodiversity information centres.

**65. Research and development**

- Putting special effort to train experts in taxonomy, physiology, pathology and anatomy that are at present very few in higher learning institutions,
- Regulating and monitoring biodiversity, providing sufficient financial resources through cost sharing mechanisms and research funds,
- Reviewing biodiversity research and development priorities based on the specific demand driven research principles,
- Focusing research and monitoring on levels of economics of biological resources use, human-wildlife interaction, sociology of rural communities, basic knowledge of ecosystems process and biology of indigenous threatened/endemic species,
- Promoting biotechnology research that evaluates the economic value of local genetic resources,
- Co-ordinating research in genetic engineering related to native species and reviving traditional knowledge of the uses, such as medicinal plants, ensuring the maintenance and application of indigenous knowledge and practice and promoting and encouraging research which contribute to the conservation and sustainable use of biological diversity and its components,
- Promoting collaboration and cooperation between the research institutions at both national and international levels,
- Developing close linkages between research institutions and users through information exchange, symposiums, and seminars and joint development of research plans, understanding the complex links between modified and natural systems through research and encouraging and motivating Tanzania researchers to undertake research and development and
- Introduce new strategies for increasing productivity of Terrestrial biodiversity resources.

**66. Ecosystems and species conservation and sustainable utilisation**

- Adopting measures that bring equitable share of revenue and other benefits to the rural communities on whose lands conservation of biodiversity is practised,
- Continuing to maintain PA networks to ensure that the biodiversity within them is not eroded and is adequately represented within any categories and its use is sustainably manage. continued to identify, create and upgrade series of protected area networks and important wetland in order to safeguard the biological diversity of Tanzania sustainable utilization,
- Developing criteria for selecting areas for protection and giving special conservation status to rare, threatened or endangered species of fauna and flora.
- Identifying components of terrestrial biological diversity resources important for conservation and sustainable use of protected areas of scenic beauty and of special or cultural interest, providing for rehabilitation of particular habitats, introduction and reintroduction of particular fauna or flora species,



- Preparing management plans with other stakeholders for some species or taxonomic groups of particular concern in order to ensure their survival,
- Promoting establishment of ex-situ measures and giving special conservation status to rare, threatened or endangered species of fauna or flora,
- Maintaining biological diversity at the ecosystem, species and genetic levels by conserving core areas of high biodiversity value and species habitats in-situ,
- Retaining the ownership of and overall responsibility for management of core biodiversity PAs by the state, to ensure that national priorities are addressed and abuses are controlled,
- Developing management plans that include biodiversity conservation, management guidelines and zoning prescribing levels and types of use in each zone, to ensure attainment of management objective of each PA,
- Managing wildlife resources based on the ecosystems rather than administrative boundaries,
- Promoting the involvement of local communities and other stakeholders in conservation and management planning initiatives through joint management agreements, ensuring effective partnership with rural communities and private sector outside PAs and providing them with direct and indirect benefit from biodiversity utilization,
- Adding, up-grading and extending PA network on the basis of a system plan, prepared in co-ordination with different sectors and stakeholders,
- Enforcing EIA process for proposed development in PAs and requesting for environmental planning for development to be carried out in wildlife areas outside PAs in order to minimise negative impacts and ensuring that local communities benefit from living adjacent to PAs.
- Seeking to bring under control and minimise the damage caused by repeated wild fires, restoring degraded habitats and population of endangered species and promoting alternative source of domestic and industrial energy in order to alleviate the current pressure on PAs.

#### **67. Biodiversity Monitoring and Evaluation**

- Facilitating regular inventories and mapping of existing Biodiversity, status coverage of catchment, habitats, mountainous ecosystems, arid and semi arid ecosystems, coastal forests and wetlands and emphasising monitoring in management planning of PAs according to national research and development plans, and
- Documenting the components, distribution, structure and function of biodiversity through inventory, data management and research activities.

#### **68. Capacity Building (personnel, institutional, facilities, and financial capacities)**

- Strengthening the capacity of terrestrial biodiversity resources regulatory institutions, encouraging and facilitating training in ecology management and other necessary skills,
- Monitoring training standards in training institutions, providing sufficient resources in order to strengthen the capabilities of training institutions,
- Developing programmes and criteria for staff development based on manpower needs assessment.
- Encouraging, motivating and facilitating stakeholders to train in areas related to biodiversity conservation and management,
- Motivating natural resources sector personnel by improving working conditions, remuneration, providing adequate working equipment and other incentives,
- Putting special effort to train experts in anatomy, physiology, pathology and taxonomy who are currently very few in national research institutions and universities and promoting programmes for scientific and technical training in measures for identification, conservation and sustainable use of biological diversity and its components.
- Setting aside a budget line which will cater for biological diversity conservation through a retention scheme or other wise,
- Facilitating responsible sectors/divisions to budget for activities falling within their area of implementation,
- Motivating donor and other cooperating partners to indicate areas that can be funded by their organisations.

*The Proposed Action Programmes are shown in Annex 7.*

## **IMPLEMENTING THE STRATEGY AND ACTION PLAN**

In any successful conservation and management of the biodiversity it is implicit that regular or continued monitoring be conducted especially to collect information on status of biodiversity, activities and processes which are likely to have adverse impacts. It is recommended therefore that lead and collaborative institutions have to perform the role of biodiversity monitoring and impact assessments and will liaise with the National Biodiversity Technical Committee on specific tasks or actions. It is, however, the responsibility of the Vice President's Office to foresee the implementation of the strategies and report to the Government and stakeholders.

It is recommended also that biodiversity information centres at institutional, national and regional levels be established to promote acquisition, storage and dissemination of biodiversity information.

The approved NBSAP shall be revised every five years following appropriate review and evaluation every three years. Reporting and exchange of information among contracting parties (international level) shall remain as provided under Articles 16, 17 and 26 of the Convention on Biological Diversity.

## **PART 1: BIODIVERSITY STRATEGY**

### **1.0 INTRODUCTION**

Biodiversity simply denotes the totality of variety among living organisms and their ecosystems. It is the whole variety of living matter on which the society is inevitably dependent; it is critical to life for the whole communities. Usually this variability occurs at ecosystem level (ecosystem diversity), species level (species diversity) and gene level (genetic diversity). The society's dependency on biodiversity for socio-economic development is underscored by the rendered ecological services, source of food and medicines, source of building materials and energy as well as perpetuation of nature as decomposers of organic wastes and enrichment of soils and aquatic environment. Thus the conservation of the earth's biological diversity is vital to humanity's economic and social development. Biodiversity is an asset of tremendous value because our survival and that of our future generations depend on the harmonious relationship with the natural elements and ecosystems. The value of biodiversity may as well be summarised as utilitarian (direct social and economic benefits), aesthetic (the value biodiversity places on seeing, hearing or touching nature), moral (the moral right of species to exist) and ecological (the importance of diversity to the persistence of ecological systems).

The need to care for the biological diversity and generally, the environment (and of human beings to benefit from biodiversity in their local environment) in Tanzania, is a prime necessity because of the country's heavy dependency on her capital of natural resources. The dependency is even truer in the context of alleviating poverty because environmental degradation primarily affects the poor, particularly in the rural areas of Tanzania. Reversing the downward spiral of environmental degradation trend is a key element of a strategy, to reduce poverty, which in turn will reduce environmental degradation.

In order to provide goods and services from the natural resources, we depend on the variety and variability of genes, species, population and ecosystems found in country. The natural ecosystems of forests, savannah vegetation, pastures and rangelands, rivers, lakes and seas with which Tanzania is endowed, form the basis of our resource wealth. In the event of increasing population growth which necessitates heavy reliance on natural capital, urbanisation and migration, evolution to market economies, and extreme poverty due to both international and domestic factors, the conservation of these biological wealth and their sustainable use for the present and future generations certainly need concerted action with immediate effect, even in the absence of any international treaty.

### **1.1 TANZANIA: A BROAD PERSPECTIVE**

The United Republic of Tanzania consists of the islands of Unguja and Pemba (2,400 km<sup>2</sup>) and Tanzania Mainland (942,600 km<sup>2</sup>). Together they encompass (945,800 km<sup>2</sup>) of land and water. Tanzania currently is the home to over 32 million people. Over 80% of Tanzanians live in rural areas, in more than 8,000 villages. The urban population is about five million, growing rapidly at seven to eight percent a year against the natural average of about 2.8 percent a year. Tanzania had a per capita GNP of US\$210 in 1997 which was low compared with the average of US\$ 503 for African countries. The rural GDP per capita in real terms showed a growth of about 4-5 over the period 1987 – 1998.

Tanzania has also been hosting over 300,000 refugees annually over the recent years arriving mainly from Rwanda, Burundi and the Democratic Republic of Congo, adding to the 120,000 refugees who arrived in the 1960s and are now settled in the country. The implication of their presence particularly in the bordering regions in terms of biodiversity conservation is great.

About 70 percent of the population live in rural areas, and 59 percent of them are virtually depending on the natural resources use. Human development indicators are low and have been falling since the 1980s. Net primary schools enrolment is 48 percent. Using 1988 census data, infant mortality rate is 8.6 percent and only 22 percent of the population have access to clean and safe water.

Agriculture dominates the economy, accounting for about 50 percent of GDP and 56.2 percent of export earnings, as well as employment and income for most Tanzanians. Actual land under cultivation is currently 6 percent of which 5 percent is used by smallholders and 1 percent is under large-scale farming. It is estimated, however, that more than 55 percent of the total land area is potential agricultural land. However poor farming practices and land tenure systems have resulted in unsustainable agriculture in some areas manifesting itself through soil erosion, loss of vegetative cover, ground water pollution, loss of fertility and desertification.

Livestock keeping is an important component of the farming systems. The livestock sub-sector contributes 18 percent of the National GDP. According to the 1994/95 national sample census, Tanzania has 15.6 million cattle, 10.7m goats, 3.5m sheep, 201,800 pigs and 27.0m chicken. Ninety (90%) percent of the cattle herd are of the indigenous breed - zebu, characterised by low productivity but relatively high resistance to endemic diseases. Almost 60 percent of livestock are found in 10 percent of the land area in the north and central parts of Tanzania.

Tanzania has the biggest lake and river systems in Africa. These include Lake Victoria, Lake Tanganyika, Lake Nyasa and a number of other smaller lakes, swamps and floodplains forming a major wetland resource. The Tanzania coastal line stretches for about 800 km from north to south. Marine resources include fish stocks, coral reefs, sandy beaches, mangroves, seaweeds, seagrasses and salt resources. A small percentage of rural families depend on fishing as the main means of livelihood either from the coastal waters or from inland fresh water lakes and reservoirs.

Forest resources include forests, woodland and grasslands. About 50 percent of the total land area is forest and woodland, 40 percent is grassland and shrub. Only 3 percent of the country is covered by dense closed forest.

Today most of Tanzania forests and rangelands are highly fragmented, in many cases separated from each other by densely populated agricultural lands. It has been estimated that the country's forest area has declined from 44,300,000 hectares or 50 percent of total land area in 1938 to 33,096 hectares or 43 percent of total area in 1987.

The urban dwellers especially the poor, who make up 30 percent of the urban dwellers, tend to rely on the informal sector for income. They mostly depend on fuel wood and charcoal for energy and are directly affected by environmental problems related to urban pollution.

Energy and mineral resources are important components of the resource base in Tanzania. The major energy sources are fuel wood and hydropower. Coal mining is also growing in importance. Important minerals include gold, diamond, coal, gemstones and gas. The Government of Tanzania is committed to trade liberalisation through its membership to the World Trade Organization, East African Community, Southern African Development Community (SADC) and through its economic reform programmes.

Tourism has potential but still lacks significant investment. Tanzania is naturally endowed with some of the best tourist attractions, which include wildlife-protected areas, coastal beaches and mount Kilimanjaro. The industry, however, is facing a number of challenges including lack of marketing strategies and poor publicity. Investment in the mining sector is increasing, causing concern on its implication on the environment and biodiversity.

## **1.2 THE CONVENTION AND GENERAL BACKGROUND**

### **1.2.1 The Convention on Biological Diversity**

The United Republic of Tanzania is among 157 countries that signed and adopted the CBD at the Earth Summit in Rio de Janeiro in 1992. Tanzania ratified the CBD in March 1996. The CBD provides for a global consensus for the contracting parties to conserve biological diversity, enhance development

opportunities - banking on more sustainable uses of biological resources and promoting more equitable measures of sharing accrued benefits across local, regional, national and global stakeholders.

Obligations of the contracting parties are articulated by the CBD for successful implementation of this global consensus. The provisions, *inter alia*, focus on:

- Development of National strategies, plans or programmes for the conservation and sustainable utilization of biological resources, and the integration as far as possible and as appropriate, the conservation and sustainable utilization of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies;( Article 6 of the Convention).
- Building capacities for research, assessment, evaluation and monitoring of biodiversity at the national level with full support and participation of local communities; ( Articles 7,12,13 and 14 of the Convention).
- International collaboration in transfer of technology, handling of biotechnology and other scientific linkages; (Articles 15,16,18 and 19 of the Convention).
- Exchange of information relevant to conservation and sustainable use of biological diversity as provided under Article 17 and presentation of national reports to the conference of parties; (Articles 23 & 26 of the Convention).
- Provide financial support and incentives in respect of national biodiversity programmes whereby developed countries shall provide or meet incremental costs as financial topping-up of budgets for biodiversity programmes in developing countries; articles 20 & 21 of the Convention.

While the above provide some of the basic elements for the implementation of this international treaty, states have, in accordance with the contracting parties have on charter and principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies. The responsibility to ensure that their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction; (Article 3 of the Convention).

By ratifying the Convention, Tanzania is committed to joining other parties in a global partnership to address the provisions of the Convention. Ratification signifies her commitment to safeguard and comprehend the profusion of species, genetic materials, habitats, and ecosystems that make up the natural world. Tanzania agrees to foster development that uses biological resources sustainably, and that recognises each nation's sovereignty over the biodiversity found in its territory. By ratification, also Tanzania agrees to correct the imbalance between who benefits from biodiversity protection and who pays. The country is committed also to find equitable ways to share biodiversity's monetary and non-monetary values, across the communities at local, regional, national and international levels, and also to spur co-operation and to establish mechanisms to finance investment in maintaining the diversity of life on earth.

The preparation of conservation and development strategies and their related action plan is not new in Tanzania. Sectoral biodiversity related programmes are numerous. The NBCS report has enumerated some of these and the leading sectors in the conservation of biodiversity related programmes. These include forestry, wildlife, fisheries, agriculture (including livestock) and water.

The overall aim of many of these conservation programmes is to meet one or more of the following objectives:

- Strengthening and improving the capacity to manage and conserve biodiversity through research and training,
- Restoring or rehabilitating terrestrial and/or aquatic habitats.
- Creating and promoting general awareness about Tanzania ecosystems, the species they contain and the benefits they bring.
- Enhance participation of local people, especially those living near the ecosystems in the conservation programmes, and

- Promote sustainable utilization of natural resources.

Most of these conservation related programmes and plans already contain assessment of Tanzania's natural resources (although there are a lot of inconsistencies in available data) and have proposed strategic measures to strengthen administrative capability and improve conservation and use.

Experience in the planning and implementing these biodiversity-related measures, has always been limited in scope and complexity. Most of these plans have not been undertaken in a comprehensive and integrated manner thus lacking integrity, continuity and sustainability.

The CBD seeks to conserve and sustainably use the biological wealth of the country in a comprehensive and integrated manner, bringing together biodiversity users, biodiversity planners, biodiversity implementers and policy makers in a concerted effort, relying on the role, authority, responsibility, and jurisdiction of each of them.

The National biodiversity strategies and action plans as stipulated under Article 6 of CBD, are therefore key vehicles in implementing the Convention and they are intended to help a country to articulate her own priorities for domestic actions and for international co-operation. The NBSAP intends to address all this, clearly defining key issues and identifying strategies, actions, priorities and main actors in a comprehensive manner.

### **1.2.2 NATIONAL DEVELOPMENT OBJECTIVES AND THE BIODIVERSITY CONVENTION**

Since independence, Tanzania has implemented various development plans. First, the three five year development plans up to 1981; the first one from 1964/65 to 1968/69, the second one from 1969/70 to 1973/74 and the third one from 1976/77 to 1980/81. These three successive five-year plans were part of the first long-term perspective plan (1964/65-1980/81). The second long-term perspective plan was launched in 1981, covering the years 1981 to 2000. This long-term plan spelt out the major objectives as follows:

- Consolidate and expand the national economy at an average GDP growth rate of 6% annually.
- Increase the mining sectors contribution to GDP from 0.5% in 1980 to 2.4% by the year 2000.
- Increase the contribution of the industry sector to GDP to 16% by year 2000 from 9.3% observed in 1980.
- Increase the contribution of the water and energy sectors to 1.7% of the GDP by the year 2000, rising from 0.8% in 1980 and
- Increase the shares of construction, commerce, finance and services (administration, education, health, etc.) to 6%, 9%, 9% and 10% respectively by the year 2000.

The second long-term perspective plan assumed that 51.4% of the resources for implementation of the plan would be imported from foreign sources. Failure of this assumption, however, called for the introduction of two programs to replace the long-term perspective plan. These include the SAP and the NESP, whose overall objective has been to revamp the national economy and facilitate whole sale growth. The Government has since then embarked on three yearly RPFBS.

The National Development plan formulated for 1996/97 - 1998/99 focuses on the following socio-economic objectives and policies:

- Combat poverty and deprivation in order to improve people's welfare.
- Ensure macro-economic stability.
- Maintain an environmentally sustainable development path.
- Create an enabling environment for a strong private sector.
- Reduce Government involvement in directly productive activities and,
- Improve efficiency in the use of public resources.

Implementation of the macro-economic reforms, *inter alia*:

- Financial sector reform, including restructuring of state-owned banks,
- Establishment of a PSRC for privatisation or liquidation of public parastatal organisations so as to optimise the use of resources,
- Reduction in civil service employees to allow a more realistic remuneration for the remaining employees,
- Adopt the National Investment Promotion Policy, and
- Revise sectoral policies, including Fisheries, Forestry, Minerals, Lands, Industries, Agriculture, etc.

Within this National Development Framework and Vision, a National Environmental Action Plan (NEAP) was formulated in 1994 and a National Environmental Policy was adopted in 1997.

In the same context, six major environmental concerns have been addressed in both documents: Land degradation; lack of accessible water supply and poor water quality (both rural and urban); environmental pollution; deterioration of aquatic systems (marine and fresh water); loss of wildlife habitat and biodiversity; and deforestation.

The overall objectives of the national environmental policy are to:-

- Ensure sustainable and equitable use of resources for meeting the basic needs of the present and future generations without degrading the environment or risking health or safety,
- Prevent and control degradation of land, water, vegetation and air which constitute our life support systems,
- Conserve and enhance our natural and man made heritage, including the biological diversity of the unique ecosystems of Tanzania,
- Improve conditions and productivity of degraded areas including rural and urban settlements so that all Tanzanians may live in safe, healthful, productive and aesthetically pleasing surroundings,
- Raise public awareness and understanding of the essential linkages between environment and development, and promote individual and community participation in environmental protection and management, and
- Promote international co-operation on the environment agenda, and expand our participation and contribution to relevant bilateral, sub-regional, regional, global organisations and programmes, including implementation of Conventions.

While the legal and institutional framework for the implementation of the provisions of the National Environmental Policy are being formulated by the Vice President's Office which has the overall mandate over environmental issues, it is thus considered that the National Environmental Policy provides both the legal and policy framework for the preparation of this NBSAP.

The National Biodiversity Strategy and Action Plan seeks to complement the national development objectives as defined in vision 2025 also gended by the provisions of Agenda 21.

The strategy and action plan is an integral part of the NEAP which to ensure that environmental initiatives as a whole enhance preventive measures and address the problems from a more holistic and target oriented point of view. Further, the NEAP is meant to strengthen the interaction between environmental policy and sectoral plans. Integration of environmental concerns is an essential ingredient in the preparation of sectoral plans, especially agriculture (including livestock), forestry, wildlife, water, and fisheries. In additional NEAP is an important tool for setting priorities in the formulation of specific future political initiatives in the environmental field.

## 2.0 BIODIVERSITY ASSESSMENT

A NBCS was concluded in 1997. Findings and conclusions are hereunder analysed on the basis of three broad categories of biodiversity, namely aquatic biodiversity, terrestrial biodiversity and agro- biodiversity.

### 2.1 AQUATIC BIODIVERSITY

#### 2.1.1 Status and Trends:

Ten percent of Tanzania's total surface area of 945,000 km<sup>2</sup> constitutes wetlands. Wetlands are ecologically laden with fresh, brackish or saline water, which may be static or flowing. The area is particularly important for ground water recharge and discharge, flood control, shoreline stabilisation, sediment/toxicant retention, nutrient retention/cycling, biomass export, microclimate stabilisation, navigation, water supply and support of fisheries, forestry and agricultural activities apart from support of biological diversity. The NBCS classifies wetlands under four major areas, namely (i) Marine and coastal wetlands, (ii) Inland wetlands, (iii) Rivers and inland floodplains and (iv) artificial wetlands. Whilst slightly different from the classification proposed for East African Wetlands by International Union for Conservation of Nature [IUCN] all types of wetlands are fully covered by the classifications.

Marine and coastal wetlands include seagrass beds, seaweeds, coral reefs, salt and mud flats, mangrove swamps, estuarine and deltaic environments. Inland wetlands include rift and non-rift lakes as well as surrounding swamps. They include Lake Tanganyika (32,900 km<sup>2</sup>) draining into the Atlantic Ocean through river Lakuga, Lake Nyasa (30,800 km<sup>2</sup>) draining into the Indian Ocean through Shire and Zambezi rivers. Other rift lakes which are characterised by interior drainage include Lake Rukwa (2,300 km<sup>2</sup>), Natron (850 km<sup>2</sup>), Eyasi (1,125 km<sup>2</sup>), Kitangiri (115 km<sup>2</sup>), Bahi (1,25 km<sup>2</sup>), Singida (17.5 km<sup>2</sup>), Balangida-Lelu (67.5 km<sup>2</sup>), Balangida (46.5 km<sup>2</sup>), Manyara (470 km<sup>2</sup>), Babati (21 km<sup>2</sup>), Basuto (2.6 km<sup>2</sup>), Magadi (8.4 km<sup>2</sup>), Ngusero, Ikimba, Mommela and Lagaria. Lake Victoria (68,800 km<sup>2</sup>) is an inter-rift lake, draining into the Mediterranean Sea through the Victoria Nile river.

Rivers and inland floodplains include Kilombero, Lower Rufiji, Usangu, Ruvuma, Malagarasi, Moyovusi, Wami and Pangani flood plains as the prominent ones. Artificial wetlands include man-made lakes and fishponds. The largest man made reservoirs include Mtera (610 km<sup>2</sup>) and Nyumba ya Mungu (180 km<sup>2</sup>). There are also small ones like Pangani (42 km<sup>2</sup>).

Other sensitive areas include coastal forests, catchment forests, coral reefs, semi arid areas and mountainous areas. The large diversity of fauna and flora in wetlands as well as the critical ecological functions rendered by the areas suffice to group wetlands under ecologically sensitive areas. The study has identified diversity of flora to include 12 species of seagrass, 287 species of seaweeds 250 species of phytoplakton in the marine environment compared to 243 species of rophytes (238 species of angiosperms and 5 species of ferns) as well as 1119 species of phytoplankton in the fresh water wetlands.

The diversity of fauna in the marine waters is represented by 976 invertebrate species which are actually identified apart from the estimated 8,270 species. Of the invertebrates, molluscs, echinoderms, arthropods, corals and sponges respectively accounted for 73.6%, 10.9%, 6.5%, 5% and 4%. Vertebrates include 532 species, which were actually identified compared to 1,000 species estimated to exist in the maritime waters. Actual observations show 532 species of fishes, 5 species of sea turtle, 1 species of snake and 4 species of marine mammals. Whilst over 27 species of marine mammals were recorded in the Western Indian Ocean and reported by the Division of Environment (1995) only 8 species, including *Stenella attenuata*, *Stenella longirostris*, *Steno brendanesis*, *Tursiops truncatus*, *Dugong dugon*, *Delphinus delphis*, *Pseudorca crassidens* and *Balaenoptera acutorostratus* were sighted in Tanzania. *Dugong dugon* and sea turtles are recognised as endangered species.



Fresh water invertebrate diversity is composed of 785 species for which 37% are endemic. Vertebrates, especially fish, are composed of over 729 species and 95% of the species are endemic.

### **2.1.2 Anthropogenic Threats**

Wetlands and wetland biodiversity are threatened by several anthropogenic activities. These include:

- (i) pollution from industrial, domestic and agricultural effluents
- (ii) destructive fishing by use of dynamite, beach-seining and fish poisoning,
- (iii) trophy collection-coral and shell collection,
- (iv) unregulated tourism, for example around some coastal areas of Tanzania,
- (v) over-exploitation of aquatic resources,
- (vi) introduction of exotic species,
- (vii) erosion and siltation due to over-grazing and deforestation and
- (viii) loss of habitats due to development activities, like construction of dams, mineral and aggregate mining, irrigation, etc.

### **2.1.3 Conservation Initiatives:**

Conservation of Aquatic Biodiversity in Tanzania is mainly based on the following approaches:

- **Integrated Coastal Zone Management:**

Tanga Coastal Zone Conservation and Development Programme. (established in 1993), Kinondoni Integrated Coastal Area Management Project and Rural Integrated Project Support in Mtwara and Lindi are established to address problems of resource over-exploitation, illegal fishing by dynamite and pollution of the environment.

- **Designated Sites for Conservation:**

The Fisheries Inland Waters Regulations of 1981 established closed periods in specific designated sites. The areas were surveyed and are earmarked for joint protection/management by local communities and the Government. They are very special as spawning and nursery grounds for protection.

In 1975, Fisheries Marine Reserves Legislation established five marine reserves, namely: Fungu Yasin, Mbudya Island, Bongoyo Island, Pangavini Island and Maziwi Island in Tanga which has eventually disappeared due to erosion. The biodiversity in the reserves, however, remained under severe encroachment until recently when the Marine Parks and Reserves Act of 1994 became operational. Mafia Island was declared a Marine Park in 1995 followed recently by Mnazi Bay has been gazetted as a second marine park.

Aquatic biodiversity conservation especially for wetlands falling within areas gazetted as Game Reserves, Controlled/Conservation Areas and National Parks is automatically achieved. Wetlands protected under the Wildlife Act No.12 of 1974 and National Park Ordinance of 1959 include: fish spawning areas and inshore fish fauna within a limited shoreline area of Lake Tanganyika around Mahale Mountain National Park and Gombe Stream National Park. In Lake Victoria areas including Rubondo, Sanane and Serengeti National Park-bound waters are protected. Other specific wetlands, which are protected as Game Controlled Areas, include Usangu, Kilombero, Lower Rufiji and Ruvu floodplains. The Pangani flood plain is fully protected as Game controlled area. The rest of the riverine systems and floodplains are unprotected.

Conservation of fauna includes coastal mangroves, which are gazetted as forest reserves. In Rufiji, about 1,160 km<sup>2</sup> of mangroves are being managed under a special integrated programme of conservation and resource use.

## Temporal and Spatial Zones

Shrimp fishery is being managed and protected by the establishment of three fishing zones in which fishing is regulated seasonally with a closed season between December and February.

### Protected Sites

Some species, which are either threatened or endangered, are protected by special legislation. Some marine mammals (*Dugong dugon* and Dolphins - *Delphinus delphis* and *Stenella* species) are protected by the Marine Parks and Reserves Act of 1994. *Dugong dugon* are also protected by CITES whereas Sea turtles are protected by the Fisheries Act No.6 of 1970 - Fisheries Principal Regulations of 1989.

#### 2.1.4 Conservation Capacity and Gaps

Major gaps especially in the areas of aquatic biodiversity conservation and sustainable utilization of biotic resource components. Such issues include:

(i) **Protected Areas:** Many important areas including fauna and flora which call for conservation action are yet to be identified especially marine based areas/biodiversity components within the extended jurisdictional area of Tanzania, the EEZ.

(ii) **Wetlands Development Strategy:** Many wetlands are suffering from non-sustainable uses due to encroachment, irrigation, sitting, invasion by noxious weeds and plants as well as the lack of clearly defined property rights/tenure. In order to effectively conserve and manage these aquatic wetlands there is a need for adoption of a common national strategy on wetlands.

(iii) **Research and Information:** There is an indisputable lack of applied scientific information to assist in conservation and management decisions, more specifically concerning the following:

- Information on abundance and distribution of fish species for marine and inland systems is scanty or very much out-dated for current applications.
- Abundance and distribution of invertebrates and flora inhabiting freshwater bodies is lacking and chances of inferring to some species as bioindicators are marginalized
- Biodiversity information for ephemeral water bodies especially swamps; bogs, pools, temporary lakes and rivers are one of the major gaps.
- Ecology of sodic lakes in the country as well as benthic ecology as it relates to pelagic community (for example coelenterates, epiphytic algae, echinoderms, sponges, small arthropods and angiosperms are lightly covered) have to be accorded special attention.
- Taxonomic studies which provide species information and field guides (yet to be prepared include fishes of little or no economic importance, zooplankton, phytoplankton, echinoderms and sponges) as well as the biology of fish species to determine species status (threatened, rare, extinct or vulnerable) are very limited and that their undertaking is highly recommended for effective conservation.
- Generation, preservation and dissemination of scientific information especially in the preceding areas call for necessary capacity building in aquatic research.

## 2.2 AGRO BIODIVERSITY

### 2.2.1 Status and Trends:

Tanzania total land area is estimated to be 94.5 million hectares. Of this, 39.5 million hectares is arable land while 54 million hectares is under livestock production. On the arable land available 6.2 million

hectares are used for crop cultivation. Agricultural production is the basic economic activity in Tanzania. It employs about 84% of the population's work force and contributes over 50% of GDP at factor costs and 75% of the foreign exchange earnings. Agriculture also is the chief source of food supply and raw materials for industrial sector and also major market for industrial goods. Livestock contributes 18% to GDP or 30% of agriculture GDP is derived from livestock.

Principal staple subsistence food crops, parts of which are also marketed commercially, consist of cereals: - maize, sorghum, millets and wheat; root crops: - cassava and potatoes (sweet and round; and others: bananas, yams, taro, beans, and other pulses. This forms the bulk of the farm output. The major commercial and export crops, grown by small holder farmers as well as plantations, include sisal, cotton, coffee, tea, sugarcane, cashewnuts, tobacco, pyrethrum, oilseeds, cloves, soybeans, groundnuts, castor, sesame and sunflower.

The non traditional export crops include oilseeds (groundnuts, sesame, oil-palm, copra, soya-beans, castor and sunflower), pulses (cow-peas, pigeon peas, soya-beans, green grams, yellow grams and common beans, lentils and velvets), horticultural items, spices [cardamon, black, sweet and hot pepper, chillies, ginger, coriander, onions, garlic onions, turmeric and cinnamon], fruits (citrus, pineapples, bananas, mangoes, avocados, pears, quinces, and tomatoes), fresh vegetables (onions), processed fruits and vegetables (jam, jellies puree, passion/tomato/pineapples juices, canned pineapples, dried fruits, and flowers). Others are: sugar, cocoa beans, maize, rice, wheat, dates, kapok, cinchona bark, betel nuts and various medicinal plants.

Overall exports of non-traditional exports bring in between \$40 to 50 million a year. Another new entry in the export of non-traditional crops is fresh cut flowers. Current producers have concentrated on *Ammi majus*, *Euphobia marginata*, *Molucella* species, *Amaranthus* species, and roses. To date some 87 hectares of field and plastic greenhouses are under flower and foliage production in Arusha whose export is mainly detuned for the Netherlands. Initial growth was rapid, it bring from US\$200,000 in 1987 to US\$444,000 in 1991.

Fruit and vegetables such as French beans, chillies, avocados, mangoes, okra, pineapples, passion fruits etc are produced mainly for domestic use but production conditions are conducive and are comparable to those of Kenya, suggesting that Tanzania could soon be exporting fruit industry as well.

Oilseeds, such as cottonseed, sesame seed, groundnuts, copra, soy beans, castor seed are available for export for oil extraction.

Animal husbandry, both commercial and for subsistence purposes occurs in the approximately one-third of the country which is free of tsetse flies. Herding is the primary economic base of the pastoralists, who range over the wide-open, relatively dry lands of the central and northern Tanzania. Cattle are also raised in large numbers by the agro-pastoralists and in the north-western regions under mixed farming systems.

Cattle are the most important exports as live animals to neighbouring countries or as hides and skins, contributing 25% of the agricultural GDP. About 100,000-200,000 live animals (cattle) are exported to neighbouring countries, usually illegally. The domestic supply of beef in 1991 was estimated at 190,000 tons, while estimated milk production for the same year was 525 million litres.

Sheep and goats are found in large concentration in Arusha, Shinyanga, Mwanza, Singida, and Dodoma and Kilimanjaro regions, accounting for two-thirds of the total. The population almost entirely consists of local breeds, which produce about 12% of the national meat supply.

Over 70% of the poultry consist mainly of the traditional scavenging flocks. There are a number of hatcheries providing day old chicks at competitive prices. Meanwhile pigs are not of great significance in meat supplies. Over 90% of the production come from the traditional free ranging village system, which

rely on scavenging and household residues. The largest concentration is in Iringa, Mbeya, Arusha and Kilimanjaro regions.

Research in agriculture is still underdeveloped. There is close relationship between a strong research base and high productivity, growth and progress. Actually the prosperity of a nation largely depends on research. Realising the importance of research, Tanzania with the assistance of the World Bank launched NARM in 1991. NARM reviewed the research programmes and station status once under TARO and TALIRO and developed prioritised research programmes. A total of 33 research programmes were generated. The research programme comprises 22 crop, five livestock, and six specialised research areas. These areas or programmes are conducted in 20 main research institutions and centres in seven research and training zones.

### Priority Research Programmes

#### First priority

Crop research: Coffee, cotton, tea and rice.

Livestock research: Animal health and livestock diseases, and ruminant meat and milk production.

Specialised research: Soil and water management and Agro-forestry

The systems approach: Farming systems and agricultural research.

#### Second priority

Crop research: Maize, root and tuber crops, *Phaseolus* beans, grain legumes, vegetable, oil-seeds, sunflower and cashewnuts.

#### Third priority

Crop research: Twelve crop research programmes, including; sorghum and millets, viticulture, sisal, tobacco, sugarcane, coconut, pyrethrum, banana and crop protection.

Livestock research: Three livestock research programmes; non-ruminant meat production (Poultry and Piggery).

Specialised research: Two specialised programs. Agricultural Engineering, Post harvest technology.

## **Prioritisation of Institutions**

### **First priority**

Ifakara for rice, Kifyulilo for tea, Mlingano for soil and water management, Mpwapwa for ruminant meat and milk production, Animal Diseases Research Institute (ADRI), Temeke for animal health and animal diseases, Tumbi for agro-forestry and Ukiriguru for cotton research programmes.

### **Second priority**

Ilonga for maize, grain legumes and cotton, Kibaha for sugarcane and root and tuber crops, Selian for *Phaseolus* beans, wheat and barley, Maruku for coffee and bananas, Naliendele and Nachingwea for oil seeds and cashewnuts, The Tsetse and Trypanosomiasis Research Institute (TTRI), Tanga for Tsetse, Tengeru for vegetables and Uyole, Nkundi, Ismani, and Ndengo for maize, vegetables, pyrethrum and animal nutrition. The Tanzania Agricultural Research Programme (TARP II) is implementing the plan.

Following the Ministries re-organisation in August 2000, the new ministry of Agriculture and food security was formed. The ministry has three line divisions namely, Crop Development, Research and Development and Food Security; two staff divisions (Administration and personnel and Training Institutes), three units (Policy and Planning, Internal Audit, Finance and accounts) and a Strategic Grain Reserve (SGR). The government has opted to maintain the SGR for food security purposes. Livestock development issues are dealt by the Ministry of Water and Livestock Development (WLD).

The Government has been funding research, training and extension services for many years. However, the budget has for some time been declining resulting in poor services to the farmers. As a result the performance of the agricultural sector has also been declining over time. Recently, the Government has decided to fund research and extension services at about 1.5% of the agricultural GDP. However, for sustainable kept of reach activities, funding of agriculture research is now shared between central government, local government authorities, commodity boards and private sector. The zonal research funds have been established in which all pastory put in thier shares. The bulk extension services will continue to be finances by the central and local government. Other sources of funds come from bilateral and multi-lateral donors (over 50% of the funding over the past 10 - 15 years).

### **Agro-biotic wealth**

The agro-biotic wealth in general includes 47 recorded plant species that are cultivated in Tanzania, which include; 9 cereals [maize, rice, wheat, triticale, sorghum, millets, barley, oats, rye), 11 legumes (groundnuts, soybean, common bean, cow-peas, pigeon peas, green grams, chick peas, bambara nuts, hyacinth bean, lima bean etc), 10 oil crops (groundnuts, sunflower, sesame, soybean, castor, coconut, oil palm, etc), 6 roots and tuber crops (cassava, sweet potatoes, round potatoes, yams/cocoyams), 4 fibre crops (sisal, kenaf, cotton and kapok), 3 beverage crops (coffee, tea, and cocoa) and 4 other crops (sugar cane, tobacco, pyrethrum and cashewnut).

There are 79 indigenous plant species that produce edible fruits; forty-eight (48) introduced fruit trees, thirty-seven introduced vegetable crops and forty indigenous vegetable crops. There are also 109 ornamentals and 34 plant species of spices or herbs.

Domesticated animal species in Tanzania, comprise of 16 million cattle, 3.5 million sheep, 11 million goats, 0.5 million pigs, 0.25 million rabbits, 2,048 horses, and 419,000 donkeys. Also there are 28 million chicken, 214,330 ducks and geese, 91,136 turkeys and 43,195 guinea fowls. There are 7,911 water buffaloes and 8 camels recently introduced.

Micro-organisms recorded in Tanzania include 1600 species of bacteria, several species of Cyanobacteria (Blue green algae), several species of fungi, and over 30 species of edible mushrooms. On the other hand, though viruses are important to all forms of living organisms, their information is very scanty.

Mycorrhiza fungi exist in association with shrubs in Miombo woodlands whereas ectomycorrhizae is common in pine nurseries in Iringa, Arusha and Morogoro. Some of these micro-organisms are sometimes known to undergo genetic changes and therefore population changes within a short time and these changes may occur even in gene banks. Therefore, this makes it difficult to determine their diversity at any given specific time.

### **2.2.2 Anthropogenic Threats**

The extent to which field gene-banks have been used in crop improvement programmes is not clear; also unknown are the rate at which local cultivars are being replaced by introduced improved cultivars. The influence of monoculture and extensive use of agro-chemicals on genetic erosion are also unknown. Not much information had been documented on potential crops like oil palms, traditional food crops and the role of indigenous agriculture is not well established in the field.

- The cultivated plants are threatened by high consumer preferences, introductions of improved varieties, biological use of industrial fertilizers, extensive use of agro-chemicals, deforestation, overgrazing, lack of comprehensive research plans, environmental and health concerns and competition with synthetics.
- Land expansion has reduced the diversity of these crops, intensive use of agro-chemicals has affected non-target organisms through environmental pollution and massive land movements to meet some agricultural practices, have also affected soil micro-organisms.
- Horticultural plants biodiversity is threatened by lack of systematic transmission of knowledge from one generation to another, changes in food habits, localized consumption of traditional vegetables and fruits, external market for flowers and changes in the ecology of many areas. Others are, lack of germplasm collection and preservation of indigenous fruits and vegetables, increased prices for inputs, poor regulation on imported horticultural planting materials, lack of co-ordinated efforts on research and development on horticultural crops and lack of organised markets.
- Under the current situation of dividing land resources, trans humans is no longer terrible, where it views affected both livestock diversity and agro-pastoralism, resulting in conflict over resources, overgrazing, reduced carrying capacity, reduced nutrition and animal fertility. Through these practices, rangeland plants diversity has also been affected. Also, cultivation in grazing areas has affected livestock fertility and range plant biodiversity. Importation of exotic livestock has undermined the diversity of indigenous species.
- The diversity of domesticated animals is currently threatened by intensive adoption of animal agriculture in which few but producing animals are kept at the expenses and sometimes extinction of what species that are less productive, but otherwise genetically important. The indiscriminate use of artificial insemination and cross-breeding to up-grade local breeds is often affected by poor management and diseases (trypanosomiasis, tick and vector borne diseases, infectious diseases and internal parasites) that result in high mortality rates.
- There are apparent Gaps in knowledge in relation to genetic characteristics, population dynamics and behaviour of both domesticated and wild animals. The impact of ruminant animal populations on environment, the optimal plant-animal interaction and contribution of domesticated animals to the national economy also remain unknown.

- There is a limited reference collections of micro-organisms in the medical, veterinary sciences, plant and soil sciences at Muhimbili Medical Centre, ADRI-Temeke and SUA, respectively. These reference collections are maintained *ex-situ*. On the other hand, several species of fungi (*Penicillium* spp., *Saccharomyces* spp.) and bacteria (*Rhizobium* spp.) have been isolated in the country. Considerable research has been carried out by the Department of Forest Biology at SUA and Botany at UDSM to identify mycorrhizae fungi.
- However, no *ex-situ* conservation efforts have been made for these micro organisms. Generally microorganisms are threatened by climatic and economic conditions.

### 2.2.3 Conservation Initiatives:

Conservation of Agro-biodiversity in Tanzania has adopted the following approaches:

#### Genetic Resources Conservation

**Ex-Situ Conservation:** Under Norwegian Government Assistance, SADC countries have established a Regional Plant Genetic Resources Centre (RPGRC) and this is housed in Zambia. Under this project each member country has in turn established a National Plant Genetic Resources Centre (NPGRC), Tanzania the centre is at the TPRI, Arusha. The genetic materials are kept as seeds and duplicate samples are stored in member countries and relevant international institutions such as the IRRI. For domesticated animals and in particular cattle, conservation is carried out in the form of frozen semen from elite bulls.

**In-Situ Conservation:** Researchers in cultivated plants such as coffee, tea, sisal, forages, and horticultural plants maintain genetic materials in their research institutions. To ensure that these genetic materials survive and continue to be sources of new genetic recombinants, the materials are usually replicated in different fields /locations. Some attempts have been made by MAFS to conserve some domesticated animals of economic importance at the Livestock Research Centre, West Kilimanjaro.

### 2.2.4 Conservation Capacity and Gaps

The Biodiversity Country Study report has identified major gaps in agro-biodiversity conservation and sustainable utilization in both cultivated and horticultural plants such gaps include of biotic resource components:

The degree of use of wild relatives in gene banks; replacement rate of reputable local cultivars by introduced improved ones and the impact of improved agricultural technologies on genetic erosion, and localised potential plants such as oil-palms and local traditional food crops such as the yam bean *Pachyrhizus* spp.

The gaps identified under the diversity of horticultural plants include the role of indigenous agricultural practices-traditional conservation methods; nutritive value, methods of production, preservation and utilisation of indigenous vegetables and fruits; semi-wild or wild ornamental with big market potential; agronomic practices for traditional crops for increased production and independent market and price information system.

#### Domesticated Animals

Major gaps identified under the diversity of domesticated animals include the characterisation of various genotypes, population dynamics and behaviour; impact of animal population on environment; optimal plant-animal interaction; mechanism of transmission and control of vector borne diseases within and between animal species and contribution to the national economy in terms of manure, draft power and other social and economic aspects.

## 2.3 TERRESTRIAL BIODIVERSITY

### 2.3.1 Status and Trends

Terrestrial biodiversity is the whole variety of living organisms (plants, animals' fungi and microbes) that exist on land and wetlands. Tanzania is divided into three categories of ecosystems namely Phytogeographical regions (Afromontane Archipelago-like Regional Centre of Endemism, Somali-Maasai Regional Centre of Endemism, Zambesian Regional Centre of Endemism, Zanzibar Inhambane Regional Mosaic and Lake Victoria Regional Mosaic), Ecological zones (Moist forests mosaic, Coast forests and thicket, Afromontane forest zone, Acacia-grassland, and Brachystegia-Julbernadia savannah woodlands), ecologically sensitive areas (coastal forests, PAs, wetlands, catchment forests, and arid and semi-arid areas). Since there is much overlap between biogeographical regions and ecological zones, emphasis is put on the latter classification because it is based on plants.

#### Ecological zones

The moist forest mosaic represents Lake Victoria's phytochorion and includes the Lake Victoria Basin, covering an area of about 43,551 km<sup>2</sup> or 4.6% of Tanzania's land surface. These are evergreen and tropical lowland forests exemplified by remains of forests near Musoma and Bukoba. The moist forests are among the richest in bird diversity. The zone is also rich in butterflies, but 270 species are yr to be recorded in Tanzania. Despite a few endemic species (e.g., Mangabey monkey and tree hyrax in Minziro forest), the zone is generally poor in endemic species.

The presence of over 500,000 refugees since 1994 has threatened the existence of biodiversity in Ngara and Karagwe districts. Typically the Busenyi forest has undergone extensive woodcutting. Agricultural production, livestock, indiscriminate fishing and infrastructure in the eastern side of the lake pose a number of threats to biodiversity. With such pressure, only about 12% of the area is protected wildlife, covering 9.24% while forest reserves account for only 2.75%.

The moist forest mosaic is threatened primarily by the activities of a high population density. The forest ecosystem covers more than two third of the total forested land. The zone has probably the zone has Africa's richest and most diverse flora, with the widest range of vegetation types.

The coastal forest and thicket includes the Zanzibar-Inhambane regional mosaic and lies less than 700m above sea level. It extends to Kenya and southern Somalia in the north and to the Limpopo River in Mozambique. The coastal forests and thickets are remnants of once extensive lowland forests of East Africa, covering about 59,000 km<sup>2</sup>. To date they occur as small isolated patches, in some cases as small as 2 km<sup>2</sup>, limited to hilltops and perhaps covering 350 km<sup>2</sup> or 1% of the original area. The mangrove forests are said to cover 1,150 km<sup>2</sup>.

About 75% of the coastal forests are reserves. The Udzungwa National Park covers rich forests of the Eastern Arc in which the Selous Game Reserve, constituting about 8% of the zone. Botanically the zone is very rich, with an estimated 3,000 species, of which 40% are endemic. These forests have been disappearing at an alarming rate due to various human activities and are at risk of extinction unless they are protected.

The Afromontane regions include the Usambaras, Udzungwas and Uluguru Mountains, collectively known as the "Eastern Arc" mountains. The montane forest zone comprises high altitude areas over 2,000 m, covering about 50,000 km<sup>2</sup> and receive rainfall exceeding 1,000 mm a year. Primarily, the Eastern Arc extends from the South Pare mountains to the edge of the Southern Highlands. Also included within the zone are Mahenge and Matengo hills, Mt. Mahale, Ufipa plateau, Mts Kilimanjaro and Meru, Ngorongoro, Rungwe and Hanang.



Rich in plant and animal species, the Eastern Arc mountains are often referred to as the “hot spots” (areas of high endemism) of Tanzania. Threats to biodiversity include agricultural activities and deforestation and there are only three wildlife PAs covering 10,956 km<sup>2</sup> and forest reserves or catchment forests that cover more than 1,650 km<sup>2</sup>.

Acacia-savanna and grassland some cover 175,160 km<sup>2</sup> falling mostly within the Somali-Maasai phytocoenosis. This is mainly a flatland found at an altitude of around 1000m, although, sometimes undulating hills of up to 1,800 m dissect it. The zone is poor in agricultural potential except in the highlands. The vegetation ranges from grassland to thorn/shrubland to wood/bushland. This variety of habitat types constitutes the most famous conservation areas in the country and includes what is probably the greatest concentration of large mammals. It encompasses the whole or parts of the Ngorongoro Conservation Area (NCA), five Game Reserves, five Game Parks and two Game Controlled Areas (GCA) amounting to 41% of the total protected land. However, biodiversity is affected by poaching and conflicting interests between wildlife, subsistence agriculture and, in some cases, pastoralism.

The acacia-commiphora thornbush zone is characterized by the *Acacia* and *Commiphora* species and covers about 73,000 km<sup>2</sup>, falling within the Somali-Maasai phytocoenosis. The zone is adequately protected (37% of the zone) but faces encroachment by pastoralists and poaching.

Miombo woodlands are a major characteristic of the Brachystegia – Julbernadia Savanna Woodland, with about 554,600 km<sup>2</sup> in the Zambezian Regional Centre of Endemism. The Miombo woodlands have Africa’s biggest and most diverse flora, with the widest range of vegetation types.

Tsetse flies scare habitation but tobacco cultivation and deforestation are major threats. Moreover, overgrazing leading to loss of total biomass, palatable species and soil erosion are other important factors.

The area under wildlife PAs occupy 96,000 km<sup>2</sup> or 47% of the zone, but is under serious threat from poaching. The Forest Reserves cover 22% (121,000 km<sup>2</sup>) of the zone. Because it is unprotected, Itigi thicket with many strict endemic thicket species is being cleared rapidly. The zone has low carrying capacity of one animal unit per 15 ha, and requires massive destocking.

Of a total of 250 families of terrestrial flora, there are 10,645 species, 927 sub-species and 1,102 varieties. The 250 families are distributed among four major groups: Dicotyledons (165), Monocotyledons (48), Ferns (31) and Gymnosperms (6). The Angiosperm largest family is Leguminosae with a total of 1,654 taxa, followed by *Rubiaceae* (1156), *Compositae* (817), *Graminae* (794), *Orchidaceae* (587) and *Euphorbeaceae* (534).

The Somali-Maasai Regional Centre of Endemism, covering the dry lands of north and central Tanzania to the south of the Great Ruaha River valley, has a substantial number of species. The region has 2,500 species of flowering plants of which about 50% are endemic. The Zambezian Regional Centre of Endemism covers the biggest part of Tanzania. The flora is estimated at 8,500 species, making it Africa’s richest phytocoenosis with the most diverse flora, but with lower proportion and absolute number of endemism (54%). The area represents three main vegetation communities: Zambezian woodlands (Miombo) as the largest part; Zambezian thicket with Itigi thicket covering 620 km<sup>2</sup>; and Zambezian grassland (floodplain grassland) in seasonally water logged soils.

In Tanzania there are 67 species of terrestrial isopods; of these 49 (73%) are endemic, especially in Mt Kilimanjaro and the Uluguru mountains. There are 600 to 1,000 species of Millipedes (Diplopods), of which 215 have been described and 85 (39.5%) are endemic in the Eastern Arc mountains and Coastal forests. Terrestrial Annelids are poorly studied and no information has been obtained for Molluscs. The Arthropoda are a very large phylum containing a big number of species, many of which have not been identified. Butterflies alone number about 1,235 species. The phylum Platyhelminthes (flatworms) has 45 genera and 81 known species (mainly of medical and veterinary importance). Parasitic Nematodes

are well studied (44 species), but the undescribed species outnumber the described ones. Four Acanthocephala species are reported, being endoparasitic in nature and requiring two hosts to complete a cycle.

Tanzania's terrestrial vertebrates are grouped into amphibians, reptiles, birds and mammals. Though poorly studied, the amphibians show high diversity and wide distributions with high endemism in the Eastern Arc Mountains and coastal forests. There are 133 amphibian species under 36 genera and 10 families. There are 55 species of conservation concern of which 40 are endemic. The 293 reptile species fall under 104 genera and 21 families. Birds are the best known taxonomically, with 1,065 species of which 25 (2%) are endemic. All but three of these endemics are limited to forests. Of all the species, 93 are migrants from the Palaearctic region, four from Madagascar and 27 intra-African migrants. So far there is no well-articulated guideline for conservation of birds and four species (Uluguru bush shrike, Sokoke pipit, Sokoke scops owl and Long-billed apalis) are critically endangered. At the national level, 10 species are endangered, 60 species are vulnerable. It should be noted that Tanzania exports more birds than any other African country except Senegal. Exploitation is done through live birds for the pet trade. The implication of this trade is extinction of targeted species.

There are 302 mammal species while keystone species of critical importance include Chimpanzee, Colobus and Mangabey monkeys, African elephant and Black rhinoceros. Apart from large mammals, there are 97 species of bats of which four fruit bat species are of conservation concern. Shrews comprise 32 species and Rodents 100 species of which nine are of conservation concern. Of the 302 mammal species, 13 species (4%) and five subspecies are endemic to Tanzania and Kenya, one subspecies to Tanzania and Uganda. The survival of primates will basically depend on conservation of their habitats and, in some cases, restriction on hunting. Out of the 34 antelope species, only 29 are in a satisfactory situation as regards conservation.

An ethnomedical study of plants used by traditional healers in five regions of Tanzania indicates that there are 405 known plant species belonging to 257 genera in 87 families of pteridophytes. These plants have been associated with treatment of many animal and human conditions. The highest percentage of plant remedies belongs to those employed in treating problems of the digestive system, with 32.3%.

### **Ecologically sensitive Areas**

Based on UNEP guidelines, Tanzania has five ecologically sensitive areas that include coastal forests, PAs, semi-arid areas, catchment forests and wetlands. Species endemism, vulnerability, fragility, economic and social importance as well as their roles characterize these areas in the natural systems.

The numerous coastal forests (excluding thickets and areas as small as 1 km<sup>2</sup>) support many rare and endemic taxa as well as species and subspecies not known anywhere else in the world. The African violet (*Saintpaulia ionantha*) is abundant in the Kierengoma forest (Matumbi hills). Also 200 species of woody plants have been collected from Pande and Zaraninge forests to be tested for cancer. The African elephant (*Loxodonta africana*) and Black rhinoceros still exist in the southern coastal forests.

Tanzania's wetlands cover about 10% of the total surface area and could be categorised as marine and coastal wetlands, inland wetland system; rivers and inland flood plains; and artificial wetlands.

Information on marine and coastal wetlands is scanty. Due to their considerable large sizes they support over 50,000 artisanal fishermen, whose potential catch is estimated at 100,000 tonnes. Threats to these ecosystems include pollution, poor fishing methods, collection of molluscs and corals and over-exploitation of mangroves, prawns, sea cucumbers, lobster and octopus.

Arid and semi-arid areas cover considerable land from the northern to the central parts and in the south-east of the country. Though traditionally suitable for transhumance pastoralist and wildlife conservation, they are sensitive to further degradation and vulnerable to soil degradation, leading to desertification,

becoming pronounced in most of these areas. Extensive cultivation of wheat, beans and maize; deforestation, overgrazing and mineral prospecting are major threats.

Catchment forests are important for water quality and quantity in watershed areas and amount to about 1,016,000 ha of non-Miombo forests. Morogoro, Arusha, Kilimanjaro and Tanga have more than 60% of total catchment forests. Logging, cultivation and charcoal making are most deleterious on the forests. Vivid examples are around Mt. Kilimanjaro, the Uluguru and West Usambaras. Fortunately, most catchment forests are protected as forest reserves but experience considerable exploitation and manipulation because of their status, lack of clear boundaries and inadequate law enforcement.

Tanzania has successfully designated large network of protected areas made up of: 12 National Parks (NPs), 31 Game Reserves (GRs), the Ngorongoro Conservation Area (NCA ), Forest Nature Reserves (543), Biosphere Reserves (1) and World Heritage sites (3).

### **2.3.2 Anthropogenic Threats:**

The Tanzania national census of 1921 enumerated a human population of 4,107,000. Since then the human numbers have risen consistently to 7,480,429 in 1948, 23,174,000 in 1988, and current population of over 30 million in 1998 (estimates). The population growth rate between 1978 and 1988 is 2.8 percent. The figure for 1988 represents 210 percent increase over the population of 1948, indicating the expanding pressures that have been exerted on the Tanzania natural resources over a period of 40 years. In 1996 for example, Tanzania already lost 47 percent of her original wildlife habitats. Based on this trend, it is obvious that Tanzania terrestrial biodiversity (Wildlife resources and habitats) is under threat. Main threats include, fragmentation and loss of critical ecosystem linkages, over exploitation of some species such as elephant and rhino and considerable local pressure to extend agriculture at the expense of forests often for very short-term gain. The most critical threat is the issue of benefit sharing. The government must establish programmes, which encourage the sharing of benefits accrued from utilization of biodiversity resources with the communities. This will act as incentive for communities to protect and conserve the forest and wildlife resources and lastly the lack of community participation in resource management and decision making of natural resources under their jurisdiction.

### **Other anthropogenic threats**

#### **(a) Rapid growth of human population**

The rapid population growth in some areas the surpassing existing capacity of resource base.

#### **(b) Land degradation**

Land degradation through poor agricultural practices, soil mismanagement, and deforestation, overstocking of livestock and lack of security to land. Land degradation is reducing the productivity of soils in many parts of Tanzania. Natural constraints of the soil and environment such as the arid and semi-arid areas also contribute to degradation of soils.

#### **(c) Pollution**

A wide range of agro-vet chemical products of inferior or questionable efficacy has flooded the market threatening the survival of biodiversity and lowering the productivity of the environment.

#### **(d) Causal threats**

Unplanned and uncontrolled economic activities such as agriculture, livestock keeping, fuelwood gathering, commercial logging and poaching and infrastructural development which directly cause biodiversity loss. These causal threats are usually driven by economic, social (poverty) and political forces, including urbanization.

#### **(e) Loss of wildlife habitats**

This is by deforestation through clearance for agriculture, for woodfuel and for other demands.

#### **(f) External threats**

These are rooted in the inequitable international trade systems, huge debt servicing and the demand of foreign countries for local resources and products. These threats ultimately influence economic and political considerations in biodiversity utilization.

### **3.0 NATIONAL VISION ON BIODIVERSITY CONSERVATION**

Tanzania has an outstanding biodiversity resource resulting from existing diverse ecosystems, topography and climate. It is one of the 14 biodiversity hot spots in the world. The need to exploit this rich biodiversity is recognised. The vision is thus to build a society that values all this biodiversity richness, using it sustainably and equitably, while taking the responsibility for actions that meet both the competing requirements of the present and the legitimate claims of the future generations.

#### **3.1 GUIDING PRINCIPLES**

In pursuing the above vision, the following guiding principles will apply:-

- The protection of the biological diversity is the responsibility of each and every Tanzanian:
- All life forms have intrinsic value and their use should be sustainable.
- Each and every Tanzanian has the right to understand and appreciate biodiversity and participate in resource use decisions that affect the biodiversity particularly within the ecosystems within which they live and depend upon.

- Empowerment of women is a critical factor in the eradication of poverty and hence in the sustainable use of the biological diversity. Action Plans should then take on board the role of women in the conservation of Biodiversity.
- It is vital to anticipate, prevent and attack at source the cause of significant reduction or loss of biological diversity.
- Biological diversity is best conserved in the wild (in-situ).
- It is only when people can satisfy their needs, have control of their resource base, and have secure tenure to land that long-term objectives of biological diversity conservation and sustainable use can be satisfied.
- Science and technology have a central role in the exploitation, processing and utilization of the biological diversity.
- The knowledge, innovations and practices of indigenous and local communities should be respected, preserved, maintained, and used with the approval and involvement of those who possess the knowledge.
- The conservation of Tanzania's biodiversity is affected by international activities, which require a global cooperative action and benefits.

### **3.2 GOALS**

The goals and objectives for the NBSAP are discussed below.

#### **3.2.1 CROSS-SECTORAL GOALS**

The following are the overall cross-sectoral goals for the NBSAP

- Ensure sustainability, security and equitable use of biological diversity for meeting the basic needs of the present and future generations by developing and implementing a holistic NBSAP for the conservation of biological diversity and sustainable use of its components
- Co-ordinate the planning and implementation of a biodiversity conservation program by ensuring that relevant activities harmonise with those of other government and non-governmental organisations, private sector, religious groups communities and other civic organisations
- Institutionalise the practice of biological conservation and the sustainable use of resources through legislative, administrative, fiscal and other regulatory measures
- Promote public education and understanding of the values and benefits of biodiversity conservation and of the merits of sustainable development
- Enhance capacity building through formal and informal education, training, research and institutional facilitation and financing.
- Enhance and facilitate collaboration between national and international community for the sustainable utilization and conservation of biological resources.

#### **3.2.2 SECTORAL GOALS**

##### **3.2.2.1 AQUATIC BIODIVERSITY**

Improve nutritional, social and economic well being of present and future generations through conservation and sustainable utilization of aquatic biodiversity.

##### **3.2.2.2 AGRO BIODIVERSITY**

To improve and maintain the well being of Tanzanians through integrated and sustainable use and management of natural resources such as land, soil, water and vegetation in order to conserve the environment.

### **3.2.2.3 TERRESTRIAL BIODIVERSITY**

To achieve sustainable development that maximises the long terms and short terms welfare of both present and future generations through sustainable utilization and conservation of terrestrial biodiversity resources.

## **3.3 OBJECTIVES**

In order to realise the above cross-sectoral and sectoral goals, the following broad category objectives have been identified.

### **3.3.1 CROSS- SECTORAL OBJECTIVES**

#### **3.3.1.1 Policy, Regulatory issues and International Co-operation**

- Strengthen and facilitate regional and international collaboration in sustainable exploitation, management and conservation of biodiversity
- Provide support services to ensure sustainable utilization and conservation of biodiversity resources
- Develop mechanism for technological and financial co-operation.
- Develop and strengthen sectoral and cross-sectoral linkages for harmonisation of management and regulatory decisions, affecting biodiversity
- Facilitate economic growth through formulation and enforcement of appropriate policies and regulatory services for the management of biodiversity resources

#### **3.3.1.2 Planning and Co-ordination**

- Develop and strengthen sectoral and cross-sectoral institutional co-ordination for harmonisation of planning and management of biodiversity.
- Ensure national welfare by sustainably increasing output, quality and availability of biodiversity resources.
- Improve community standard of living through equitable sharing of income generated from the sustainable utilization of biodiversity resources at national and international levels.
- Promote national biodiversity resources at both national and international markets.

#### **3.3.1.3 Education and Information**

- Establish and promote appropriate, education and awareness programmes to facilitate proper community participation in conservation and sustainable utilization of biodiversity resources.
- Improve availability, accessibility and exchange of information pertaining to sustainable utilization of biodiversity resources.

#### **3.3.1.4 Research and Development**

- Establish and promote research and development programmes with a view to building the capacity to efficiently conserve and sustainably use the biodiversity resources.
- To develop and introduce new technologies that increases the productivity of biological resources in rangelands and agricultural ecosystems

#### **3.3.1.5 Ecosystems and Species Conservation and Sustainable Utilization**

- Increase production and yield of biological resources for nutritional and socio-economic development

- Protect, regulate and manage biodiversity resources productivity through prevention of habitat destruction, pollution and over-exploitation
- Adopt community participation MAFShinery at all levels of planning, development and management of biological diversity.
- Promote sound utilization of biotechnology

#### **3.3.1.6 Biodiversity Monitoring and Evaluation**

- Put in place a reliable and sustainable monitoring and evaluation system for sustainable use and conservation of biodiversity resources

#### **3.3.1.7 Capacity Building (personnel, institutional, facilities, and financial capacities)**

- Establish and promote appropriate training programs to build capacity and technological innovations for identification, conservation and sustainable use of biological diversity.
- Promote specifically the access of women, youth and marginalized communities to land, credit, education and information to facilitate their effective participation in development, conservation and sustainable utilization of biological resources.

### **3.3.2 SECTORAL OBJECTIVES**

#### **3.3.2.1 AQUATIC BIODIVERSITY**

##### **3.3.2.1.1 Policy, Regulatory issues and International Co-operation**

- Strengthen and facilitate regional and international collaboration in sustainable exploitation, management and conservation of aquatic biodiversity
- Provide support services to ensure sustainable utilization and conservation of aquatic biodiversity resources
- Develop mechanism for technological and financial co-operation to enhance the capacity for sustainable utilization and management of aquatic bio diversity
- Develop and strengthen sectoral and cross-sectoral linkages for harmonisation of management and regulatory decisions, relevant for sustainable utilization and management of aquatic biodiversity resources
- Facilitate economic growth through formulation and enforcement of appropriate policies and regulatory services for the management of aquatic biodiversity resources

##### **3.3.2.1.2 Planning and Co-ordination**

- Develop and strengthen sectoral and cross-sectoral institutional co-ordination for harmonisation of planning and management of aquatic biodiversity
- Ensure increased welfare of riparian communities and associate areas by sustainably increasing output, quality and availability of aquatic biodiversity resources
- Improve community standard of living through equitable sharing of income generated from the sustainable utilization of aquatic biodiversity resources at national and international levels
- Promote national aquatic biodiversity resources at both national and international markets

##### **3.3.2.1.3 Education and Information**

- Establish and promote appropriate, education and awareness programmes to facilitate proper community participation in conservation and sustainable utilization of biodiversity resources
- Improve availability, accessibility and exchange of information pertaining to sustainable utilization of aquatic biodiversity resources

##### **3.3.2.1.4 Research and Development**

- Establish and promote research and development programmes with a view to building the capacity to efficiently conserve and sustainably use the biodiversity resources.
- Develop and introduce new technologies that increase the productivity of biological resources in aquatic ecosystems

#### **3.3.2.1.5 Ecosystems and Species Conservation and Sustainable Utilization**

- Increase production and yield of biological resources for nutritional and socio-economic development
- Protect, regulate and manage biodiversity resources productivity through prevention of habitat destruction, pollution and over-exploitation
- Adopt community participation MAFShinery at all levels of planning, development and management of biological diversity
- Promote sound utilization of biotechnology.

#### **3.3.2.1.6 Biodiversity Monitoring and Evaluation**

- Put in place a reliable and sustainable monitoring and evaluation system for sustainable use and conservation of biodiversity resources

#### **3.3.2.1.7 Capacity Building (personnel, institutional, facilities, and financial capacities)**

- Establish and promote appropriate training programs to build capacity and technological innovations for identification, conservation and sustainable use of biological diversity.

### **3.3.2.2 AGRO BIODIVERSITY**

#### **3.3.2.2.1. Policy, Regulatory Issues and International Co-operation**

- Provide support services to ensure sustainable utilization and conservation of agro-biodiversity resources.
- Develop mechanism for technological co-operation to enhance the capacity for sustainable utilization and management of agro-biodiversity resources.
- Strengthen and facilitate regional and international collaboration in sustainable exploitation, management and conservation of agro-biodiversity resources.

#### **3.3.2.2.2 Planning and Co-ordination**

- Promote agro-biodiversity resources at national and international markets.
- Ensure sustainable national food security and general welfare of local communities by sustainably increasing output, quality and availability of agro-biodiversity resources.
- Improve community standard of living through equitable sharing of income generated from sustainable utilization of agro-biodiversity resources at national and international levels.

#### **3.3.2.2.3. Education and Information**

- Establish and promote appropriate, research education and training programmes to build capacity for conservation and sustainable utilization of agro-biodiversity resources.
- Establish and promote appropriate, education and awareness programmes to facilitate community participation in conservation and sustainable utilization of agro-biodiversity resources
- Improve availability and exchange of information pertaining sustainable use of agro-biodiversity resources.
- Promote the use of traditional knowledge for biodiversity construction



#### **3.3.2.2.4. Research and Development**

- Develop and introduce new technologies that increase the productivity of biological resources in agricultural ecosystems
- Establish and promote research and development programmes with a view to building the capacity to efficiently conserve and sustainably use the agro-biodiversity resources
- Enhance the use of soil biodiversity including soil micro organisms

#### **3.3.2.2.5 Ecosystems and Species Conservation and Sustainable Utilisation**

- Protect, regulate and manage agro-biodiversity resources productivity through prevention of ecosystem degradation, pollution, and over-exploitation.

#### **3.3.2.2.6. Biodiversity Monitoring and Evaluation**

- Establish a reliable and sustainable monitoring and evaluation system for sustainable use and conservation of agro-biodiversity resources.

#### **3.3.2.2.7 Capacity Building (personnel, institutional, facilities, and financial capacities)**

- Establish and promote appropriate training programs to build capacity and technological innovations for identification, conservation and sustainable use of agro-biodiversity.
- Develop human resources within the sector in order to build the capacity to undertake development, research, and training and support services.

### **3.3.2.3 TERRESTRIAL BIODIVERSITY**

#### **3.3.2.3.1 Policy, Regulatory issues and International Co-operation**

- Strengthen and facilitate regional and international collaboration in sustainable exploitation, management and conservation of terrestrial biodiversity
- Provide support services to ensure sustainable utilization and conservation of terrestrial biodiversity resources
- Develop mechanism for technological and financial co-operation to enhance the capacity for sustainable utilization and management of terrestrial bio-diversity,
- Develop and strengthen sectoral and cross-sectoral linkages for harmonisation of management and regulatory decisions, relevant for sustainable utilization and management of terrestrial biodiversity resources
- Facilitate economic growth through formulation and enforcement of appropriate policies and regulatory services for the management of terrestrial biodiversity resources

#### **3.3.2.3..2 Planning and Co-ordination**

- Develop and strengthen sectoral and cross-sectoral institutional co-ordination for harmonisation of planning and management of terrestrial biodiversity.
- Ensure increased welfare of riparian communities and associate areas by sustainably increasing output, quality and availability of terrestrial biodiversity resources.
- Improve community standard of living through equitable sharing of income generated from the sustainable utilization of terrestrial biodiversity resources at national and international levels.
- Promote national terrestrial biodiversity resources at both national and international markets.

#### **3.3.2.3.3 Education and Information**

- Establish and promote appropriate, education and awareness programmes to facilitate proper community participation in conservation and sustainable utilization of biodiversity resources.
- Improve availability, accessibility and exchange of information pertaining sustainable utilization of terrestrial biodiversity resources.

#### **3.3.2.3.4 Research and Development**

- Establish and promote research and development programmes with a view to build the capacity to efficiently conserve and sustainably use the terrestrial biodiversity resources.
- Develop and introduce new technologies that increase the productivity of biological resources in terrestrial ecosystems.

#### **3.3.2.3.5 Ecosystems and Species Conservation and Sustainable Utilization**

- Increase production and yield of terrestrial biological resources for nutritional and socio-economic development,
- Protect, regulate and manage terrestrial biodiversity resources productivity through prevention of habitat destruction, pollution and over-exploitation.
- Adopt community participation MAFShinery at all levels of planning, development and management of terrestrial biological diversity.
- Promote sound utilization of biotechnology in terrestrial ecosystems

#### **3.3.2.3.6 Biodiversity Monitoring and Evaluation**

- Put in place a reliable and sustainable monitoring and evaluation system for sustainable use and conservation of terrestrial biodiversity resources.

#### **3.3.2.3.7 Capacity Building (personnel, institutional, facilities, and financial capacities)**

- Establish and promote appropriate training programmes to build capacity and technological innovations for identification, conservation and sustainable use of terrestrial biological diversity.

### **4.0 GENERAL HINDRANCES, GAPS AND DRIVING FORCES (OBSTACLES)**

#### **4.1 DEFINITIONS AND ANALYSIS**

Generally hindrances, gaps and driving forces are defined as obstacles. For the purpose of this report, "hindrances" mean obstacles, obstructions, stop or keeping back, "Gap" means break in continuity, unfilled space or divergence, "Driving-force" means energy, capacity to achieve things, inner urge to attain a good or satisfy a need. In this context it means energy, capacity or causes to achieve things. Through ministerial, parastatal organisations, government departments, institutions of higher learning, NGOs and Consultative zonal workshops, hindrances, gaps and driving forces relevant to biological diversity component were identified.

Specifically these issues were derived from:

The Planning Commission, Ministries of Lands and Human Settlements Development, Trade and Industry, Education and Culture, Agriculture and Co-operatives, Water, Finance, Works, Community Development, Women and Children and Energy and Minerals, Sokoine University of Agriculture (Department of Animal Science and Production, Morogoro), University of Dar es Salaam (Botany Department), Institute of Resource Assessment and Commission of Science and Technology, Institute of Marine Sciences-Zanzibar, Mbegani Fisheries Development Centre. Consultative zonal workshops were conducted in Dodoma, Iringa, Mwanza, Tanga and Morogoro.

The issues have been classified as hindrances (H), gaps (G) and driving forces (DF) as follows:-

## **4.2. GENERAL OBSTACLES**

### **Hindrances**

- The highest concentration of biodiversity in Tanzania occurs in protected areas (National Parks, Game Reserves and Forest Reserves). Conflicts over biodiversity value may occur between the mineral sector and the natural resources sector when mineral also occur in these protected areas.
- Unplanned human and livestock migrations.
- Improper execution of the planned process.

### **Gaps**

- Most biodiversity hot spots like Rufiji Delta, coastal forests and Eastern mountains are on catchment arc that remains unprotected.
- Inadequate or lack of inventory knowledge of biodiversity resources in protected areas.
- Lack of experts in the field of physiology, pathology and anatomy and taxonomy particularly in Higher Learning Institutions.
- Inadequate ecosystem studies on alternative utilisation of available non-traditional biodiversity resources on wetlands, coastal forests (especially mangrove).
- Lack of catalogue and field guides for some plant and animal families in Tanzania.
- Lack of umbrella environmental legislation.
- Insufficient or poor knowledge and technologies necessary for sustainable management of biodiversity resources.

### **Driving forces:**

- Rapid growth of rural and urban populations which lead to loss of habitats due to settlement, agriculture, grazing, mining and logging.
- Poor leadership.

## **4.3 SECTORAL OBSTACLES**

### **4.3.1 AQUATIC BIODIVERSITY**

#### **Hindrances**

- Introduction of exotic species often with adverse effects on the ecology and indigenous species diversity.
- Bio-invasion of our natural resource systems by noxious plants and animals.
- Poor agricultural practice including irrigation and encroachment to wetlands
- Inadequately planned and underdeveloped tourism and recreational activities.
- Inadequate access to credit from established financial institutions.

#### **Gaps**

- Insufficient knowledge of aquatic biodiversity resource base (abundance and distribution), marine species lists and field guides (zooplankton, phytoplankton, echinoderms, sponges and fishes) of limited economic importance and biodiversity of ephemeral water bodies (sodic lakes, swamps, bogs, pools and rivers).
- Inadequate capacities to conduct aquatic research, promote dissemination of research findings as well as extension services.
- Inadequate community involvement and empowerment.
- Inadequate capacity to sustainably exploit and conserve biodiversity resources essentially in the EEZ.
- Inadequate or poor infrastructure leading to high aquatic resources post-harvest losses.

- Inadequate contingency measures to internalise externalities or spill over like coastal accidents and environmental hazards.
- Lack of Wetland Policy Guidelines to clearly define property rights/tenure and arrest problems of encroachment, irrigation, silting, and infestation by noxious plants, exotic introductions and pollution.
- Paucity of the aquatic conservation areas. A lot more areas, which call for conservation, are yet to be identified.
- Lack of harmonised and co-ordinated activities/decisions among sectors, Local Governments and NGOs.
- Inadequate public awareness on environmental issues to alleviate problems of over exploitation, illegal fishing and pollution of aquatic systems.
- Inadequate institutional collaboration.
- Inadequate mainstreaming of biodiversity in planning process.

#### **Driving forces:**

- Uncontrolled urban and coastal development activities such as property development and infrastructural development and disposal of wastes.
- Non-sustainable resource exploitation leading to habitat degradation due to pollution and over-exploitation.
- Increasing poverty.
- Increasing pressures for local and underwrest marcluets.

### **4.3.2 AGRO-BIODIVERSITY**

#### **Hindrances**

- Inadequate community awareness on its role in sustainable utilization and conservation of agro-biodiversity.
- Inappropriate land tenure system leading to uncertain security, delays in providing land for investors natural resources and limited information with regards to land ownership, value and use.
- Weak institutions and legislation on environmental issues.
- Political interference on sustainable utilization and management of biodiversity conservation technical issues.

#### **Gaps**

- Inadequate community involvement in resource allocation for agro-biodiversity conservation and management.
- Uncoordinated sectoral policies and legislation and their enforcement mechanism leading to duplication of mandate and institutional conflicts. This creates a difficult situation for managers to efficiently and judiciously execute their mandates and responsibilities.
- Inadequate sectoral policies in environmental management protection issues.
- Inadequate involvement of major stakeholders (local communities, NGOs and private sectors) in the management of biological resources.
- Insufficient capacity (institutional, working facilities, manpower and financial resources) necessary for sustainable management of biodiversity resources.
- Inadequate co-ordination among various stakeholders.
- Inadequate and conflicting messages from extension staff to farmers, and vice-versa.
- Insufficient or poor adoption of developed or improved technologies.
- Lack of research and development (R&D) for indigenous non-traditional commercial crops; e.g. cereals, fruits, vegetables, spices, flowers etc.
- Inadequate in-situ conservation of domestic animals of economic importance.
- Inadequate exploitation of potential alternative natural resources areas leading to over exploitation of current resources.
- Inadequate mandate by some institutions to enforce legislation.
- Inadequate capacity to monitor and evaluate agro-biodiversity resources.

- Inadequate manustreng of biodiversity in the plany process.

#### **Driving forces**

- Increasing dependence and indiscriminate use of off-farm inputs (e.g. agrochemical) leading to human and environmental contamination.
- Indiscriminate and inappropriate exploitation of mineral resources often leading to habitats and species contamination and poisoning respectively (e.g. artisanal gold mining in Great Lakes region).
- Unfavourable policies (certain policies and practices especially economic and fiscal inhibit the conservation and management of biodiversity by supporting wasteful and destructive exploitation of biodiversity).
- Poverty.
- Inadequate markets and marketing strategies.
- Markets.

### **4.3.3 TERRESTRIAL BIODIVERSITY**

#### **Hindrances**

- Inadequate resource allocation for sustainable biodiversity conservation and management. Current resources allocations do not allow for capacity building and investment in quality staff.
- Inadequate integration of conservation principles and socio-economic development policies e.g. food security, health and education.
- Inadequate allocation of resources for biodiversity research and development as well as monitoring and other enforcement and regulatory activities.
- Past distortinary policies in some sectors such as Lands and Mineral sectors. For example wetlands were regarded as wastelands, Ujamaa villagelization policy.
- Lack of adequate incentive for sustainable utilisation of biological resources and effective management of the environment.
- Lack of instutionalized and operationalized EIA guidelines. Consequently, existing drafts cannot confidently be incorporated in the development planning process.
- Lack of institutionalised and operationalized national long term planning vision.
- Marginalization of women, youth and minority communities in the utilization of biodiversity resources.
- Insufficient collaboration between institutions/facilities which manage database.
- Need for Government to invest more in education and research. At present only 0.05% of the revenue accrued from livestock industry is used for research and training.

#### **Gaps**

- Inadequate capacity for sustainable utilization and management of terrestrial biodiversity.
- Inadequate, uncoordinated, or absence of sectoral policies relevant to conservation of biodiversity.
- Lack of umbrella environmental/biodiversity legislation. There are several pieces of legislation pertaining to conservation and utilisation of biodiversity. Existing sectoral legislation in place are either weak, uncoordinated, fragmented or outdated. Also existing regulatory institutions have inadequate enforcement capacity (e.g. lack joint enforcement between local communities and central levels).
- Inadequate economic valuation of biodiversity resources.
- Inadequate or lack of relevant information on biodiversity leading to inappropriate decisions and under utilization or overexploitation of biodiversity resources.
- Inadequate institutionalised knowledge and intellectual property rights mechanism capable of safeguarding indigenous biodiversity knowledge and resources.
- Inadequate international and regional collaboration in management of trans-boundary resources e.g the Great Lakes, the Serengeti and Mkomazi/Tsavo ecosystems.
- Law does not protect natural forest and exotic forests.
- Inadequate acknowledgement of the contribution of technology and science in sustainable utilization and management of biodiversity resources.

- Animal quota for hunting and live animal trade is not based on scientific information.
- Lack equitable utilisation of terrestrial biodiversity resources among stakeholders especially the rural communities on whose land the industry is practised.
- Many areas containing high biodiversity values like the great lakes, the eastern arc mountains and the rampant patches of coastal forests are not included in the National Parks network,
- Inadequate or lack of appropriate communities' access to equitable utilization and sharing of benefits of biodiversity resources as an incentive for them to respect protected areas (NPs) boundaries,
- National Parks network covers areas of large mammals' value and inadequately address ecosystems such as closed forests, marine communities and wetlands.
- Lack of involvement of end-users of research findings,
- Inadequate collaboration/co-ordination between institutions/sectors involved in biodiversity conservation, sustainable utilisation, and research and extension services in the country.
- Lack of equitable recruitment of experts creates a gap in development and transfer of technology with time.
- Inadequate awareness amongst planners and other decision makers on sustainable utilization and management of biodiversity resources leading to allocating low priorities on biodiversity issues.

### **Driving forces**

- Unfavourable and inequitable terms of trade, low commodity prices leads to overexploitation of biodiversity resources.
- Need for promotion and establishment of joint research programmes and ventures for the development of skill, transfer of technology and institutional building.
- Need to prevent or control introduction of dangerous plant/animal specimens, which threaten ecosystems, habitats or species at designated quarantine centres.
- Need to strengthen co-operation between institutions involved in conservation of biodiversity through in-situ and ex-situ conservation

## **5.0 STRATEGIC CHOICES**

The strategic choices arrived at are intended to meet the goals of the various objectives, meet the basic needs of the people and fill the gaps identified during the institutional, sectoral consultations, and during the consultative workshops. The strategic choices have been presented on the basis of whether they cut across the sectors (overall choices), or on the basis of their specificity to the three-biodiversity components, namely; aquatic, agro and terrestrial biodiversity. While formulating sectoral strategic choices attention has also been paid to the general objectives and obstacles (hindrances, gaps and driving forces) as identified in the fore going sections.

### **5.1 AQUATIC BIODIVERSITY STRATEGIC CHOICES**

#### **5.1.1 Policy, Regulatory issues and International Co-operation**

*(a) Strengthen and facilitate regional and international collaboration in sustainable exploitation, management and conservation of aquatic biodiversity.*

#### **Strategic choices**

- Establishing mechanisms and legal instruments for regional exploitation, research management and conservation of biodiversity in shared water bodies, including EEZ,
- Assessing the national harvesting capacity so that the surplus is allocated to land locked states, which are ready for joint-venture programs with Tanzania,
- Ensuring compliance with international conventions for management, conservation and utilisation of biological resources in marine, freshwater and sodic ecosystems.

*(b) Provide support services to ensure sustainable utilisation and conservation of aquatic biodiversity resources*

#### **Strategic choices**

- Reviewing, updating and harmonising all policies relevant to aquatic biodiversity and supporting legislation in accordance with the provisions of the National Environmental Policy. The reviewed legislation among other things should set standards for inputs, outputs, and quality of services for sustainable utilisation and management of aquatic bio-diversity resources
- Strengthening the link between research and other service institutions with regard to empowering the communities on sustainable aquatic biodiversity conservation and management.
- Ensuring sustainable funding to aquatic biodiversity conservation and sustainable utilisation programs through involvement of CBOs, NGOs, the private sector and the international community.

*(c) Develop mechanism for technological and financial co-operation to enhance the capacity for sustainable utilisation and management of aquatic biodiversity*

#### **Strategic choices**

- Collaborating with regional and international countries in facilitating biodiversity management including access to and transfer of relevant technologies and genetic resources, while ensuring minimum adverse effects to existing biodiversity and the aquatic environment as a whole,
- Formulating legislative and administrative procedure for facilitating access, transfer of technology and to enhance sustainable utilisation of existing aquatic genetic resources,
- Enacting legislation regarding patents, trademarks and other relevant intellectual property rights legislation relevant to aquatic biodiversity,
- Establishing sustainable financial mechanism at both national and international levels for sustainable management of aquatic biodiversity resources
- Encouraging the involvement of donors and conservation agencies to support conservation and management of aquatic biodiversity resources for national, regional and international benefits.
- Co-operating with other parties in the conservation and management of trans-boundary aquatic ecosystems.

### **5.1.2 Planning and Co-ordination**

*(a) Develop and strengthen sectoral and cross-sectoral institutional co-ordination for harmonisation of planning and management of aquatic biodiversity.*

#### **Strategic choices**

- Promoting vertical and horizontal co-ordination and harmonisation of aquatic biodiversity resources management.
- Establishing appropriate quality control systems on the quality of aquatic biodiversity resource products geared at promoting investment in the production, supply and marketing aquatic biodiversity resources,
- Monitoring the impacts of the aquatic biodiversity development strategies on communities incomes, and their capacity to sustainably manage their production environment.

*(b) Ensure increased welfare of riparian communities and associated areas by sustainably increasing output, quality and availability of aquatic biodiversity resources.*

#### **Strategic choices**

- Generating, preserving and disseminating appropriate information on the aquatic biological resource base potential and allowable yield to govern exploitation.

- Developing incentive and credit schemes to promote artisanal exploitation of aquatic biodiversity resources.
- Participate in identifying and promotion of the appropriate infra-structural development to permit easy harvesting and distribution of aquatic biodiversity resources
- Making deliberate efforts of developing both aquaculture and recreational sports fisheries potentials.
- Promote consumption of alternative aquatic biodiversity resources.

*(c) Improve community standard of living through equitable sharing of income generated from the sustainable utilisation of aquatic biodiversity resources at national and international levels.*

#### **Strategic choices**

- Integrating technical and political advice in the sustainable management of aquatic biodiversity,
- Providing appropriate infrastructure to facilitate aquatic biodiversity development,
- Facilitating riparian communities access to credit through encouraging financial institutions investment in the aquatic resources sector.
- Encouraging the formation of marketing and processing associations among producers and formation of joint ventures between such associations and entrepreneurs, to take advantage of economies of scale in processing and marketing of aquatic biodiversity production.
- Achieving a balanced aquatic resource utilisation amongst stakeholders including the international community,

*(d) Promote aquatic biodiversity resources at both national and international markets.*

#### **Strategic choices**

- Establishing and implementing quality control standards of aquatic biological resources in compliance with national and international market requirements,
- Developing and introducing appropriate technologies for harvesting, processing and handling of aquatic biological resources to reduce post-harvest losses and promote marketability of the aquatic biodiversity,
- Controlling and regulating importation and export of aquatic biodiversity resources in accordance with the national and international legislation, agreements and/or conventions.

### **5.1.3 Education and Information**

*(a) Establish and promote appropriate research, education, and training programmes to build capacity for conservation and sustainable use of aquatic biodiversity resources.*

#### **Strategic choices**

- Establishing priority areas for aquatic biodiversity training
- Developing national training curricula to promote aquatic biodiversity conservation and sustainable utilisation,
- Enhancing co-operation and linkages with national, regional, and international bodies/institutions in promoting research and transfer of technology.
- Establishing interactive biodiversity information centres at institutional, national and regional levels.
- Developing a mechanism for sustainable financing of aquatic biodiversity research and training involving all stakeholders at national, regional and international levels.

*(b) Establish and promote appropriate, education and awareness programs to facilitate proper community participation in conservation and sustainable utilisation of biodiversity resources.*

#### **Strategic choices**



- Involving local communities and other stakeholders in aquatic biodiversity planning, conservation and management and decision making
- Introducing a system of benefit sharing among local communities and all other stakeholders involved in management/conservation and utilisation of aquatic biodiversity resources.
- Creating awareness through extension services on the need and importance of aquatic biodiversity resources sustainable utilisation and conservation and sustainable utilisation.
- Streamlining land resource tenure to facilitate community responsibility in the sustainable management of aquatic biodiversity resources.
- Establishing community based organisations (CBOs), co-operatives, women and youth groups and Non-Governmental Organisations (NGOs) to support activities related to sustainable aquatic biodiversity management.
- Establishing and updating legal instruments and enforcement institutions at different levels of community administration (national district and village), to promote sustainable utilisation and conservation of aquatic biodiversity resources.

*(c) Improve availability, accessibility and exchange of information pertaining sustainable utilisation of aquatic biodiversity resources.*

#### **Strategic choices**

- Establish mechanisms and legal instruments for exchange of information of aquatic biodiversity.
- Need to international conventions for sustainable utilisation and management of aquatic biological resources in marine, freshwater and sodic ecosystems.

#### **5.1.4 Research and Development**

*(a) Establish and promote research and development programs with a view to building the capacity to efficiently conserve and sustainably utilise the biodiversity resources.*

#### **Strategic choices**

- Involving local communities and other stakeholders in the identification of aquatic biodiversity research areas,
- Focusing research and development on the establishment of baseline data and development of methodologies for systematic sampling and evaluation of the aquatic biodiversity resources,
- Encouraging the private sector and the NGO's to participate in the aquatic research and development programs,
- Developing a mechanism to co-ordinate and regulating aquatic biodiversity research programmes within the country, at regional and international levels.
- Developing a mechanism to facilitate sustained financing of aquatic biodiversity research and developing programmes,
- Facilitating regular inventories and mapping of existing aquatic biodiversity resources and habitats
- Promoting, co-ordinating and regulating biotechnology on indigenous species,
- Encouraging, revive and preservation of indigenous knowledge on sustainable utilization and management of aquatic resources,
- Promoting collaboration and co-operation between aquatic research institutions of both national and international levels.
- Developing close linkages between research and development institutions and users through information exchange, symposiums, and seminars and joint development of research plans.

#### **5.1.5 Ecosystems and Species Conservation and Sustainable Utilisation**

*(a) Increase production and yield of aquatic bio diversity resources for nutritional and socio-economic development.*

### **Strategic choices**

- Assessing economic opportunities and constraints facing communities,
- involving communities in the planning, management of research and decision making, enhance data collection, analysis, synthesis and dissemination of the appropriate technology to enhance the productivity of aquatic biodiversity resources,
- Taking full advantage of research results and relevant biodiversity technologies developed through national, regional and international research for adoption at local production systems
- Improving the capacity and retention of researchers through creating better working conditions and facilities
- Improving dissemination of appropriate aquatic biodiversity packages for sustainable utilization and conservation of aquatic biodiversity,
- Integrating appropriate economic, social and other measures in applied aquatic biodiversity resources production systems to encourage speedy optimisation of their productivity,
- Strengthening the liaison between producers, the extension services and support services, to facilitate identification of production constraints and formulation of appropriate correction measures
- Collaborating with national, regional, and international research and development institutions and minimise unnecessary duplication of efforts and take advantage of research results from elsewhere.
- Encouraging public, private sector and the international community to co-operate in undertaking long term aquatic biodiversity research and complement local resources,
- Encourage research on environmentally sound pest management techniques such as integrated pest management (IPM) for management of aquatic pests (particularly invasive pests),
- Operationalizing an effective quality control and management system to develop and maintain our aquatic biodiversity resources customer confidence at local and international levels,

*(b) Protect, regulate and manage biodiversity resources productivity through prevention of habitat destruction, pollution and over-exploitation.*

### **Strategic choices**

- Reinforcing in-situ conservation in and outside marine/aquatic reserves, parks and protected areas so as to protect essential habitats and species,
- Rehabilitating and restoring degraded ecosystems and ensure recovery of the threatened species,
- Preventing and controlling introductions of exotic species with potential to become aquatic pests,
- Developing and establishing mechanisms for identifying rare, endangered and vulnerable species as well as critical habitats for protection.
- Putting to an end unsustainable aquatic resources utilisation and harvesting techniques such as poisonous and dynamite fishing and restricted gear, preventing, controlling and minimising adverse impacts of pollution in aquatic wetlands and marine environment.
- Establishing mechanism to regulate importation, use, and safe disposal of industrial, consumer and agro-chemicals,
- Establishing sustainable land use plans and promoting clean production and environmentally friendly technologies/practice in, agriculture, industrial production, mining, fisheries, irrigation and energy production and supply.
- Working towards compliance to relevant regional and international conventions, agreements, treaties and protocols on the conservation and sustainable utilisation of aquatic biodiversity resources,
- Improving management of biodiversity components as well as by reviewing and updating relevant policies and legislation governing utilisation and conservation of aquatic biodiversity,
- Developing and operationalizing mechanisms for environmental disaster management.

- Identifying and protecting vulnerable species, habitats and areas of special ecological, scientific or recreational significance (Marine Parks, Reserves and Protected Areas).
- Instituting and operationalizing Environmental Impact Assessment (EIA) as mandatory activity in all development projects/activities
- Introducing water quality monitoring program.
- Developing and operationalization of national policies for integrated management of coastal zone and wetlands.
- Adopting multi-use management strategy by zonation of coastal zone and regulating coastal activities by catch/size limits, activity permits and impact limitation,
- Updating and maintaining aquatic biodiversity database as a management and decision support system,
- Promoting a cross-sectoral approach to discourage habitat destruction resulting into loss of habitats.

*(c) Adopt community participation approaches at all levels of planning, development and management of biological diversity.*

### **Strategic choices**

- Involving local communities and other stakeholders in biodiversity planning, conservation and management and decision making programmes
- Introducing a system of benefit sharing among local communities and all other stakeholders involved in the utilisation and management of aquatic biodiversity resources.
- Creating awareness through extension services on the need and importance of aquatic biodiversity resources conservation and sustainable utilisation.
- Streamlining land resource tenure to facilitate community responsibility in the sustainable management of aquatic biodiversity resources.
- Establishing community based organisations (CBOs), co-operatives, women and youth groups and Non-Governmental Organisations (NGOs) to support activities related to sustainable aquatic biodiversity management.
- Establishing and updating legal instruments and enforcement institutions at different levels of community administration (national, district and village), to promote sustainable utilisation and conservation of aquatic biodiversity resources.
- Encouraging gender equity and facilitating participation of marginalized communities in the planning, implementing and utilisation of aquatic resources

*(d) Promote sound utilisation of biotechnology.*

### **Strategic choices**

- Putting in place institutional capacity to monitor and regulate importation, production, and introduction of biotechnologically developed organisms (e.g. GMO's) in the environment,
- Safeguarding indigenous intellectual property rights (IPR) to ensure their continued access to locally developed biodiversity resources.

## **5.1.6 Biodiversity Monitoring and Evaluation**

*(a) Put in place reliable monitoring and evaluation system for sustainable use and conservation of biodiversity resources.*

### **Strategic choices**

- Introducing monitoring and evaluation systems in all public and private institutions responsible for the management of aquatic biodiversity resources,
- Revising and updating sectoral budgeting to introduce performance budgeting as a tool to evaluate appropriate utilisation of resources allocated for biodiversity resources management,
- Designing and instituting aquatic biodiversity resources management information system, and designating co-ordination to relevant national institutions,
- Develop monitoring framework and guidelines.

### **5.1.7 Capacity Building (personnel, institutional, facilities, and financial capacities)**

*(a) Establish and promote appropriate training programs to build capacity and technological innovations for identification, conservation and sustainable use of biological diversity,*

#### **Strategic choices**

- Establishing aquatic biodiversity resources management and training institutions with adequate facilities and technical capacity,
- Allowing progressive capacity building (skilled manpower, facilitation and financing) for aquatic biodiversity research and training,
- Streamlining and consolidating national financing mechanisms of biodiversity researches and training.

## **5.2 AGRO BIODIVERSITY STRATEGIC CHOICES**

### **5.2.1. Policy, Regulation issues and International Co-operation**

*(a) Provide support services to ensure sustainable utilisation and conservation of agro-biodiversity resources.*

#### **Strategic Choices**

- Strengthening and/or review legislation that enforce established standards of seeds, plant protection services, animal health services, agricultural information and marketing of inputs and outputs, co-operative development services and technical services.
- Develop policies for conservation and sustainable use of biological resources and regularly review the impact of various government policies on agro-biodiversity.
- Harmonising policies and legislation of MAFS with those of Ministry of Natural Resources and Tourism (MNRT), Ministry of Water and Livestock Development (MWLD), Ministry of Energy and Minerals (MEM) etc. and enhance sectoral Ministries to address biodiversity issues.
- Facilitate the use of alternative sources of energies, such as biogas, solar and wind.

*(b) Develop mechanism for technological Cooperation to enhance the capacity for sustainable utilisation and management of agro-biodiversity resources.*

- Institute technological transfer mechanism with developed countries to have access and transfer of relevant technologies for conservation and sustainable utilisation of biodiversity resources.
- Enacting national legislation regarding patents and other intellectual property rights.
- Establishing financial requirements for assistance to enhance conservation and sustainable utilisation of biodiversity resources and
- Developing legislation governing the introduction, and use of biotechnology in conservation and sustainable utilisation of agro-biodiversity resources at national, regional and district levels.

*(c) Strengthen and facilitate regional and international collaboration in sustainable exploitation, management and conservation of agro-biodiversity resources.*

## **Strategic Choices**

- Focusing regional and international collaboration in research and extension services on increasing appropriate traditional and non-traditional agro-biodiversity resources productivity.
- Ensuring compliance with regional (ASARECA) and international (SPAAR, CIAT, CIP, ILRI etc) bodies in exploitation, management and conservation of agro-biodiversity resources.
- Establishing and collaborating with different agro-biodiversity net works (AFRENA, A-AARNET etc).

### **5.2.2 Planning and Co-ordination**

*(a) Promote agro-biodiversity resources at national and international markets.*

- Ensuring local communities are involved in decision making regarding land use, management and development and/or create land resource partnership arrangements in land resource management
- Continuing with sectoral land use planning and strengthening the co-ordination capacity of National Land Use Plan Commission (NLUPC) to enhance linkage and reconciling the sectoral plans into cross-sectoral sustainable land use plans.
- Enhancing a coherent land use planning system such that MAFS leads micro land use planning at district level consistent with MAFS professional knowledge whereas the NLUPC concentrates on the MAFSro land use physical plans.
- Collaborated with MLHUD to ensure efficient implementation of the National Land Policy (1999).
- Respecting, recording, protecting and promoting the wider application of knowledge for natural resources management concerning agro-biodiversity resources.
- Introducing and promoting appropriate environmental impact assessment procedures regarding biological diversity resources in Tanzania.
- Promoting the cost recovery mechanisms for the maintenance and construction of irrigation schemes to increase the productivity of agro-biodiversity resources.
- Promoting the development of open and transparent land markets, improved land use practices for the production and conservation of resources on private and communal holding.
- Protecting customary rights of different groups to essential agro-biodiversity resources, rangelands and access routes
- Encouraging co-operation between MAFS and private sector in developing methods for sustainable use of agro-biodiversity, terrestrial, marine, wildlife and mining resources.
- Establishing or maintaining means to regulate, manage or control the risks associated with the use and release of living modified organisms resulting from biotechnology
- Preventing the introduction of, control or eradicate those alien species that threaten ecosystems, habitats and species.
- Respecting, preserving and maintaining knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation of agro-biodiversity.
- Developing or maintaining necessary legislation and /or other regulatory provisions for the protection of threatened species or populations.
- Establishing and maintaining memorandum of understanding for communities to participate in planning and management and
- Introducing and promoting livestock and human migration guidelines

*(b) Ensure sustainable national food security and general welfare of local communities by sustainably increasing output, quality and availability of agro-biodiversity resources.*

## **Strategic Choices**

- Enforcing laws and by-laws regarding sustainable use of agro-biodiversity resources.
- Improving and integrating current traditional conservation practices /technologies in the production systems.

- Introducing and promoting domesticated animals' diversity in particular livestock in new areas.
- Encouraging the formation of marketing and processing associations among producers, and the formation of joint venture between these associations and entrepreneurs.
- Ensuring that women who constitute the majority of the land users have access to land and that deliberate efforts are made to ensure that they are enlightened on the best ways to develop and utilise agro-biodiversity resource sustainably.
- Promoting cross-border trade with neighbouring countries and promoting export to other countries of agro-biodiversity products.
- Improving extension to disseminate suitable packages on integrated agro-biodiversity resources production.
- Establishing and maintaining facilities for ex-situ conservation and research on plants, animals and micro-organisms, preferably in the country of origin of genetic resources.

*(c) Improve community standard of living through equitable sharing of income generated from sustainable utilisation of agro-biodiversity resources at national and international levels.*

### **Strategic Choices**

- Facilitating the formation and growth of democratic producer and marketing organisations, proper registration and development of a curriculum for a co-operative education programme for youths.
- Encouraging banks such as NBC, LTD, CRDB and other financial institutions to establish and strengthen their rural branches to provide both long and short term credit to individuals, groups of people, and production, marketing and processing associations.
- Instigating the banking system to set up adequate financing mechanism for inputs and purchase of output from the biological resources.
- Monitoring the impacts of the agro-biodiversity development strategies on incomes, income distribution and on access to productive assets.
- Controlling economically harmful diseases to biological resources.
- Achieving a balance in agro-biodiversity species and forage resource through appropriate land policy, deliberate planning of new water resources for pastoral cattle herds, producer education and resource monitoring.
- Encouraging the establishment and growth of ox-drawn equipment necessary for the development and productivity of the agro-biodiversity resources.
- Disseminating information and appropriate technologies.
- Rehabilitating and facilitating centres to monitor pests and diseases.
- Encouraging farmers to invest in different agro-biodiversity production activities so as to earn sustainable income to avoid risks associated with mono-activities.
- Establishing appropriate irrigation systems under wetlands to increase the quantity of food and income of the farmers.

*(d) Develop and strengthen sectoral and cross sectoral institutional co-ordination for harmonisation of planning and management of agro-biodiversity.*

### **Strategic choices**

- Promoting vertical and horizontal co-ordination and harmonisation of agro-biodiversity resources management.
- Establishing appropriate quality control systems on the quality of agro-biodiversity resource products geared at promoting investment in the production, supply and marketing agro-biodiversity resources.

### **5.2.3. Education and Information**

*(a) Establish and promote appropriate research, education and training programmes to build capacity for conservation and sustainable utilisation of agro-biodiversity resources*

## **Strategic choices**

- Encouraging farmers to adopt improved agricultural and livestock production technologies.
- Strengthening the link between research and extension with regard to agro-biodiversity.
- Encouraging the private sector to participate in agro-biodiversity extension services both in terms of funding and delivering the service itself.
- Implementing TARP II, and NAEP to meet the national and international obligations, to promote agro-biodiversity conservation and sustainable utilisation,
- Implementing NAMTraMP to promote progressive capacity building (skilled manpower, facilitation and financing) for agro-biodiversity research and training institutions.
- Disseminating of environmental information through both traditional and modern technologies as well as capacity building at community level.
- Enforcing, strengthen and co-ordinate agro-biodiversity research information system.
- Increase the efficiency and effectiveness of the research and extension systems on agro-biodiversity existing in Tanzania
- Improving and strengthen the farmers training programmes at the farmers training centres. Gender balance will be ensured in each training programme
- Facilitating the private sector to be involved in agro-biodiversity industrial commodity research.
- Updating and maintaining agro-biodiversity database as a management and decision tool.

*(b) Establish and promote appropriate, education and awareness programmes to facilitate community participation in conservation and sustainable utilisation of agro-biodiversity resources.*

## **Strategic Choices**

- Involving local communities and other stakeholders in agro-biodiversity planning, implementation, conservation and management and decision making.
- Promote and encourage exchange of agro-biodiversity conservation and utilisation experiences between Districts
- Creating awareness through extension services on the need and importance of agro-biodiversity resources conservation and sustainable utilisation.
- Reinforcing land tenure system to facilitate community responsibility in the sustainable management of agro-biodiversity resources.
- Mobilising communities into economic groups so that they qualify for bank loans or grants from non-government organisations to enable them steadily improve their skills to address biodiversity conservation needs.
- Establishing community based organisations (CBOs), co-operatives, women and youth groups, Non-Governmental Organisations (NGOs) and multi-sectoral committees to support and co-ordinate activities related to sustainable agro-biodiversity resource management at national and district levels.
- Supporting participation of women in planning and management of development programmes about agro-biodiversity conservation and sustainable use.
- Incorporating various aspects of environmental education including environmental awareness, agro-biodiversity concerns, etc into primary, secondary schools and agricultural training institutions of MAFS.
- Disregarding the technical advice by both politicians and councillors.
- Improving and strengthening the farmers training programmes at the MAFS training institutes and deliberate arrangements made to ensure that women (who constitute 56% of the active workforce involved in crop production and 44% in mixed farming) are represented in a favourable ratio among participants.

*(c) Improve availability and exchange of information pertaining to sustainable use of agro-biodiversity resources.*

### **Strategic Choices**

- Establishing mechanisms and legal instruments for exchange of information generated from research, management, and conservation of agro-biodiversity resources.
- Establishing agro-biodiversity information centres at district level.

### **5.2.4 Research and Development**

*(a) Develop and introduce new technologies that increase the productivity of biological resources in agricultural ecosystems.*

### **Strategic Choices**

- Regulating and managing collections of biological resources from natural habitats for ex-situ conservation purposes so as not to threaten ecosystem and in-situ population of species.
- Enhancing co-operation and linkages with national, regional, and international bodies/institutions in promoting research in conservation and sustainable utilisation of agro-biodiversity resources.
- Taking full advantage of research results and relevant and desired agro-biodiversity technologies developed from identified regional and international collaborating institutions/bodies for adoption in the production systems in Tanzania
- Improving the performance of research personnel and motivating them through continued efforts to creating better working conditions and facilities and enhance the retention of competent staff through attractive remuneration.
- Taking effective economic, social and other appropriate incentive measures to encourage the conservation of biological diversity and priority given to applied research on agro-biodiversity resources to solve immediate problems facing the producers.
- Emphasising sound research in agro-biodiversity resources so as to cater for export markets and local markets for food.
- Strengthening the liaison with the extension and support services, to ensure that production problems on agro-biodiversity are correctly identified and the solutions are appropriate and efficiently utilised.
- Intensifying the collaboration and communication with international research institutions, to minimise the risk of duplication of work on agro-biodiversity resources and to take full advantage of research results from elsewhere.
- Ensuring that the private sector and the international community co-operate to undertake long term research and complement scarce public resources with regard to agro-biodiversity research.
- Encouraging research on natural and biological methods of pest control that can be applied by farmers engaged in agro-biodiversity resources development.
- Setting up of a good quality control system in order to maintain or develop a good reputation of Tanzanian products and to earn special reputation about agro-biodiversity resources productions.
- Focusing research and extension on increasing productivity are enhancing input use and introduction of new technologies
- Undertaking long-term research programmes and increases the efficiency and effectiveness of the research and extension systems related to agro-biodiversity existing in Tanzania.

*(b) Establish and promote research and development programmes with a view to building the capacity at effectively conserve and sustainably use the agro-biodiversity resources.*



### **Strategic choices**

- Focusing research and development on the establishment of baseline data and development of methodologies for systematic sampling and evaluation of the aquatic biodiversity resources,
- Encouraging the private sector and the NGO's to participate in the agro-biodiversity research and development programs,
- Involving local communities and other stakeholders in the identification of Agro-biodiversity research areas,
- Developing a mechanism to facilitate sustained financing of agro-biodiversity research and developing programmes,
- Promoting biotechnological research that evaluates the economic value of indigenous genetic resources.
- Co-ordinating and regulating biotechnology on indigenous species,
- Promoting collaboration and co-operation between agriculture research institutions of both national and international levels.
- Developing close linkages between research and development institutions and users through information exchange, symposiums, seminars and joint development of research plans.
- Undertaking long-term research programmes and increases the efficiency and effectiveness of the research and extension systems related to agro-biodiversity existing in Tanzania.

### **5.2.5 Ecosystems and Species Conservation and Sustainable Utilisation**

*(a) Protect, regulate and manage agro-biodiversity resources productivity through prevention of ecosystem degradation, pollution and over exploitation.*

#### **Strategic choices**

- Identifying, protecting vulnerable species and reinforcing in-situ and ex-situ methods in conservation of agro-biodiversity resources,
- Rehabilitating and restoring degraded agricultural ecosystems to ensure recovery of the threatened flora and fauna species,
- Preventing and controlling introductions of exotic species with potential to become agro-biodiversity pests,
- Preventing, controlling, minimising adverse impacts of pollution in agricultural ecosystems and establishing mechanism to regulate importation, use, and safe disposal of industrial, consumer and agro-chemicals,
- Establishing sustainable land use plans and promoting clean production and environmentally friendly technologies/practice in agriculture and livestock production.
- Working towards compliance to relevant regional and international conventions/ agreements/ treaties/ protocols/ on the conservation and sustainable utilisation of agro-biodiversity resources,
- Developing and operationalizing mechanisms for famine and drought management.
- Encouraging, revive and preservation of indigenous knowledge on sustainable utilisation and management of agro-biodiversity resources.

*(b) Promote sound utilization of biotechnology.*

#### **Strategic choices**

- Enhancing institutional capacity to monitor and regulate importation, production, and introduction of biotechnologically developed organisms GMO's in the country.
- Safeguarding indigenous intellectual property rights (IPR) to ensure their continued access to *locally* developed biodiversity resources.

### **5.2.6. Biodiversity Monitoring and Evaluation**

*(a) Establish a reliable and sustainable monitoring and evaluation system for sustainable use and conservation of agro-biodiversity resources.*

#### **Strategic choices**

- Introducing monitoring and evaluation systems in all public and private institutions responsible for the management of agro-biodiversity resources,
- Introducing and enforce performance budgeting in sectoral budgets to evaluate appropriate utilisation of resources allocated for agro-biodiversity resources development, management and utilisation.

#### **5.2.7. Capacity Building (personnel, institutional, and financial activities)**

*(a) Establish and promote appropriate training program to build capacity and technological innovations for identification, conservation and sustainable use of agro-biodiversity.*

#### **Strategic choices**

- Facilitating our research and development institutions access to biotechnology resources and *technology* from within, regional and international levels for ensuring sustainable utilisation and management of our biodiversity resources.
- Strengthening (facilities and manpower) the existing agro-biodiversity resources training institutions.
- Developing and operationalization of a national training curricula to promote sustainable utilisation and conservation of agro-biodiversity.
- Allowing progressive capacity building (skilled manpower, facilitation and financing) for agro-biodiversity research and training.
- Enhancing co-operation and linkages with national, regional and international bodies/institutions in promoting research and transfer of agro-biodiversity technology.
- Enhancing farmers' participation in the generation and dissemination of agro-biodiversity technologies.

*(b) Develop human resources within the sector in order to build the capacity to undertake development, research, and training and support services.*

#### **Strategic Choices**

- Implementing the three-year General Agricultural Diploma Course to produce graduates who would be able to perform in the field of new agricultural extension paradigm, agricultural research, and training and in general agricultural production enterprises.
- Incorporating into MARTIs and LITIs curriculum extension paradigm, which is, based on clients-oriented communication methods and techniques and a systems approach for improved linkages with research, participating organisations and others.
- Ensuring that the necessary critical mass of agricultural and livestock research personnel exists and managerial, technical and support staff work performance, research strength and capabilities should be enhanced to make them more effective.
- Intensifying the collaboration and communication with international research institutions, to minimise the risk of duplication of work on agro-biodiversity resources and to take full advantage of research results from elsewhere.
- Developing an education curriculum for youths with respect to co-operative, conservation and sustainable use of agro-biodiversity resources, in collaboration with the ME&C.

### **5.3 TERRESTRIAL BIODIVERSITY STRATEGIC CHOICES**

#### **5.3.1 Policy, Regulatory issues and International Co-operation**

*(a) Strengthen and facilitate regional and international collaboration in sustainable exploitation, management and conservation of terrestrial biodiversity.*

### **Strategic Choices**

- Encouraging the involvement of donors and conservation agencies and local communities to support Tanzania to conserve her biological resources both for national, regional and international benefits.
- Co-operating with any party including neighbouring countries in the conservation of transboundary ecosystem and migratory species.
- Participating in relevant international treaties and conventions.
- Promoting policies within the framework of such treaties and conventions as are consistent with Tanzania position on conservation of biodiversity.

*(b) Provide support services to ensure sustainable utilisation and conservation of Terrestrial biodiversity resources.*

- Developing sound management policies and enabling, legal, regulatory, and institutional environment for rural communities and private sector to participate in biological resources utilisation.
- Combating illegal use of biological resources.
- Encouraging private sector to invest in the sustainable utilisation of biological resources e.g. hunting and photographic safaris, ranching and farming, developing tourism infrastructure, resident hunting, wood industries.
- Reviewing the existing conservation legislations. WCA No. 12 of 1974, NCA Ordinance Cap. 413 of 1959, TANAPA Ordinance Cap. 412 of 1959, SWRI Act of 1980, Forests and Beekeeping Ordinance, Cap. 389 of 1959, Fisheries Act of 1970 in order to include management and development of important wetlands community participation in biodiversity conservation.
- Managing specific types of PAs and specific components of biodiversity through relevant institutions.
- Issuing permits required by law for biodiversity related activities and for regulating the access to, utilisation of and trade in the terrestrial biodiversity.
- Encouraging legal and sustainable trade in biodiversity and its components or species in which it is appropriate to trade.
- Enforcing Environmental Impact Assessment (EIA) process for proposed development in PA in order to minimise potential damage to the PA environment.
- Developing mechanism for technological and financial Co-operation to enhance the capacity for sustainable utilization and management of terrestrial biodiversity
- Reviewing the existing conservation legislations under Forest and Beekeeping, Fisheries and Wildlife Divisions in order to include management and development of important and fragile ecosystems such as wetland, mountainous, arid and semi arid ecosystems.
- Encouraging community participation in biodiversity conservation through establishment of community based conservation areas.

### **5.3.2 Planning and Co-ordination**

*(a) Develop and strengthen sectoral and cross-sectoral institutional co-ordination for harmonisation of planning and management of terrestrial biodiversity.*

### **Strategic Choices**

- Enhancing intra cross-sectoral co-ordination of sectors responsible for biodiversity administrations and other government institutions at all levels.
- Strengthening the capacity of local governments to administer and manage biodiversity resources.
- Establishing co-ordination mechanisms between the local and central governments.

*(b) Ensure increased welfare of riparian communities and associate areas by sustainably increasing output, quality and availability of terrestrial biodiversity resources.*

### **Strategic Choices**

- Enhancing rural development through ensuring community participation and access to sustainable utilisation of terrestrial biodiversity resources
- Minimising the pressure on biodiversity resources through ensuring that biodiversity products and services are valued at market prices

*(c) Improve community standard of living through equitable sharing of income generated from the sustainable utilization of terrestrial biodiversity resources at national and international levels.*

### **Strategic Choices**

- Adopt an efficient and flexible approach to collecting revenue and benefit sharing.

### **5.3.3 Education and Information**

*(a) Establish and promote appropriate research, education, and training programmes to build capacity for conservation and sustainable utilization of terrestrial biodiversity resources.*

### **Strategic Choices**

- Creating the widest possible public awareness, understanding and support for terrestrial biodiversity conservation by preparing and distributing posters, magazines and pamphlets and use of other news media.
- Co-operating with the sectors responsible for education and higher learning institutions to promote the integration of biodiversity issues into school syllabi and educational programmes so that biodiversity conservation education receives a broad foundation of support.
- Enhancing and Institutionalising where necessary extension services and supporting them with adequate levels of manpower, funds and equipment in order to strengthen their capability.
- Promoting rural extension services
- Enhancing co-ordination and linkages between extension services, research and training and integrate them in the planning process.
- Designing the extension messages in a gender sensitive manner.
- Developing public awareness programmes with respect to conservation and sustainable use of biological diversity.
- Providing opportunities for people and decision-makers to appreciate nature varieties (through guided tours, visits).

### **5.3.4 Research and Development**

*(a) Establish and promote research and development programs with a view to building the capacity for sustainable utilization and conservation of terrestrial biodiversity resources.*

### **Strategic Choices**

- Putting special effort to train experts in taxonomy, physiology, pathology and anatomy who are at present very few in higher learning institutions (Research and University levels).
- Regulating and monitoring biodiversity (wildlife and forestry) research in Tanzania.
- Providing sufficient financial resources through cost sharing mechanisms and research funding in order to regulate and monitor biodiversity.
- Reviewing biodiversity research and development priorities based on the specific demand driven research principle.
- Focussing research and monitoring on levels of economics of biological resources use, human - wildlife interaction, sociology of rural communities, basic knowledge of ecosystems process and biology of indigenous threatened/endemic species.
- Promoting biotechnology research that evaluates the economic value of native genetic resources (zebu/poultry classification conducted at Mpwapwa and Sokoine University).

- Co-ordinating research in genetic engineering related to native species and revives traditional knowledge of the uses, such as medicinal plants.
- Ensuring the maintenance and application of indigenous knowledge and practice.
- Promoting and encouraging research which contribute to the conservation and sustainable use of biological diversity and its components.
- Promoting collaboration and co-operation between the research institutions of both national and international levels.
- Developing close linkages between research institutions and users through information exchange, symposiums, and seminars and joint development of research plans.
- Understanding the complex links between modified and natural systems through research.
- Encouraging and motivating Tanzania researchers to undertake research on terrestrial biodiversity.
- Promoting and adopting research findings for increased productivity of terrestrial biodiversity resources.

### **5.3.5 Ecosystems and Species Conservation and Sustainable Utilisation**

*(b) Increase production and yield of terrestrial biodiversity resources for nutritional and socio-economic development.*

#### **Strategic Choices**

- Adopting measures that bring equitable share of revenue and other benefits to the rural communities on whose lands conservation of biodiversity is practised.
- Protect, regulate and manage biodiversity resources productivity in particular threatened and endemic biodiversity resources through prevention of habitat destruction, pollution and over-exploitation
- Continuing to maintain PA network to ensure that the biodiversity within them is not eroded and its use is sustainably managed
- Identifying, creating and upgrading series of protected area network and important wetland in order to safeguard the biological diversity of Tanzania.
- Extending the present PA network to ensure that biological diversity yet to be included within any categories of PAs becomes adequately represented.
- Developing criteria for selecting areas for protection.
- Give special conservation status to rare threatened or endangered species of fauna and flora.
- Identifying component of terrestrial biological diversity resources important for their conservation and sustainable use.
- Protecting areas of scenic beauty and special or cultural interest.
- Providing for rehabilitation of particular habitats, introduction and reintroduction of particular fauna or flora species
- Preparing management plans with other stakeholders for some species or taxonomic groups of particular concern in order to ensure their survival.
- Promoting establishment of ex-situ measures (botanic and zoological gardens gene banks, tissue culture collection and captive breeding).
- Maintaining biological diversity at the ecosystem, species and genetic levels by conserving core areas of high biodiversity value and species habitats including wetlands through in situ measures (Protected Areas).
- Retaining the ownership of, and overall responsibility for management of core biodiversity Protected Areas (NP, NCA, GRs, FRs) by the state, to ensure that national priorities are addressed and abuses are controlled.
- Developing management plans and zoning prescribing levels and types of use in each zone, to ensure attainment of management objective of each PA.
- Managing biodiversity resources based on the ecosystem approach rather than the administrative boundaries, due to mobility nature of wild animals, availability of resources and habitat coverage.

- Preparing management plans that include biodiversity conservation and management guidelines with emphasis, on threatened ecosystems and habitats in order to ensure their survival.
- Promoting the involvement of local communities and other stakeholders in conservation and management planning initiatives through joint management agreements.
- Ensuring effective partnership with rural communities and private sector outside PAs and providing them with direct and indirect benefit from biodiversity utilisation.
- Adding, up-grade and extend PA network on the basis of a system plan, prepared in co-ordination with different sectors, including consideration of the distribution of species and habitats, particularly wetlands, present coverage of PAs and patterns of land use.
- Enforcing EIA process for proposed development both inside and outside PAs net work in order to minimise negative impacts.
- Ensuring that local communities benefit from living adjacent to PAs and among natural resources.
- Controlling and minimising the damage caused by repeated wild fires.
- Restoring degraded habitats and population of endangered species.
- Promoting alternative source of domestic and industrial fuel in order to alleviate the current pressure from Protected Areas (FRs, GRs).

### **5.3.6 Biodiversity Monitoring and Evaluation**

*(a) Put in place reliable and monitoring evaluation system for sustainable use and conservation of terrestrial-biodiversity resources.*

#### **Strategic Choices**

- Initiating and facilitating regular inventories and mapping of existing biodiversity, status coverage of catchment and habitats and coastal forests and wetlands.
- Emphasising monitoring in management planning of PAs according to national research plans.
- Documenting the components, distribution, structure and function of biodiversity through inventory, data management and research activities

### **5.3.7 Capacity Building (personnel, institutional, facilities, and financial)**

*(a) Establish and promote appropriate training programs to build capacity and technological innovations for identification, conservation and sustainable use of biological diversity,*

#### **Strategic Choices**

- Encouraging and facilitating training in ecology and management and other skills necessary for the development and conservation of biological diversity (fauna and flora).
- Improving and monitoring training standards in terrestrial biodiversity institutions in the country.
- Developing programmes and criteria for staff development based on manpower needs assessment.
- Motivating stakeholders in natural resources management by improving working tools, conditions, remuneration, providing adequate working equipment and other incentives.

## **6.0 PART II ACTION PLAN**

### **6.1 GENERAL**

This action plan is meant to address the implementation of the strategic choices within the broader categories as outlined above namely:-

- Policy, Regulatory issues and International Co-operation.
- Planning and Co-ordination.
- Education and Information.
- Research and Development.
- Ecosystems and Species Conservation and Sustainable Utilisation.
- Biodiversity Monitoring and Evaluation.
- Capacity building (personnel, institutional, facilities, and financial capacities).

## 6.2 AQUATIC BIODIVERSITY

### 6.2.1 POLICY, REGULATORY ISSUES AND INTERNATIONAL CO-OPERATION

Action Programmes	Activities	Time Frame	Lead Institutions	Collaborating Institutions	Budget Line
Priority I: 1.1.1 Formulate and effect regulations for the Deep - Sea Fishing Authority as per Act No. 1 of 1998.	1.1.1.1 Make consultation with Tanzania Mainland and Zanzibar on benefit sharing for exploitation of biodiversity components in the EEZ, establish regulations and facilitate the take-off of the Authority	ST	MNRT	VPO/ Fisheries Zanzibar MF	
1.1.2 Develop Contingency measure for management and containment of environmental adverse impacts to aquatic resources.	1.1.2.1 Establish strategic centres for natural disasters (e.g. Fires and pest outbreaks).  1.1.2.2 Put in place measure to address Anthropogenic disasters, (e.g. release of contaminants in the ocean).	MT	VPO NEMC PMO	Sectoral Ministries	
1.1.3 Facilitate availability and access to inputs for harvesting aquatic biodiversity.	1.2.1.1 Arrange for import support or credit schemes to enable both industrial and artisanal fishermen to obtain MAFShinery, spare-parts, fishing capture gear and boats. Implement during the first 36 months	MT	MNRT	VPO MFA & IC	
Priority II: 1.2.1 Establish regional fisheries management bodies for the Great Lakes.	1.2.1.1 Initiate consultations with riparian states on Lake Tanganyika and Lake Nyasa for establishment of regional fisheries management bodies- be in place after 36 months of negotiations	MT	MNRT	VPO Foreign Affairs	
1.2.2 Establish regional research and management collaboration with some	1.2.2.1 Develop research linkages among Western Indian Ocean Countries (Kenya, Mozambique,	LT	TAFIRI MNRT	IMS -Zanzibar, Botany & Zoology Departments, Kunduchi Fish Institute, Mbegani	



countries of the West Indian Ocean Region	Comoro, Seychelles, Madagascar and Tanzania) to facilitate collection of biodiversity information in the EEZ (Two joint research work be conducted twice every year for 5 years )			Fish Dev. Centre.	
1.2.3 Establish legal boundaries of the EEZ for Tanzania	1.2.3.1 Undertake consultation with Comoro and the Seychelles to agree on the boundaries (Boundaries to be established during the first year of implementation)	ST	Ministry of Foreign Affairs	MNRT VPO	
Priority III: 1.2.4 Establish environmental tribunals at district level.	1.2.4.1 Facilitate the enhancement of the Local Government capacity to enforce (inspectorate, prosecution and punishment of defaulters) environmental legislation for management of aquatic biodiversity. Each region to establish a tribunal within a period of 26 months	ST	PO-RALG	VPO MNRT MJ & CA	
Priority I: 1.3.1 Enact legislation for aquatic resources management	1.3.1.1 Collate all available legislation on aquatic biodiversity conservation and utilization in the country. 1.3.1.2 Incorporate needs provided by related regional and international protocols/treaties (e.g. MARPOL, UNFCCC, UNCLOS, Ramsar, CBD, UNCCD, Nairobi Convention, Cites, etc.) in order to set national standards. The Law to be in place during the first 36 months.	MT	VPO, MNRT	MW	
1.3.2 Establish coastal zone Management strategy and consolidate the current initiatives.	1.3.2.1 Integrate current projects into the national coastal zone management initiatives (e.g. TCMP Lindi and Mtwara - Rural Integrated Project Support (RIPS)	MT	VPO	NEMC MRA & LG MNRT	
1.3.3 Establish operational	1.3.3.1 Review, update, harmonise (or	MT	MRA & LG	VPO	

by-Laws to safeguard conservation and sustainable utilization of aquatic biodiversity.	introduce where lacking) aquatic management by-laws by a participatory process to be completed in 3 years with estimated coverage of 2 districts per month			MNRT MJ& CA	
Priority II: 1.3.4 Review and update the Fisheries - Act. No. 6 of 1970	1.3.4.1 Include provisions to protect benthic fauna and flora especially control the harvesting of shells, coral, sponges, echinoderms, starfishes etc	ST	MNRT	MJ & CA	
1.3.5 Assess and improve current aquatic biodiversity marketing infrastructure.	1.3.5.1 Evaluate current infrastructure to establish areas for improvement within a period of 24 months	ST	Fisheries Division TAFIRI	MTI NGOs PO & RALG.	
<b>2. PLANNING AND CO-ORDINATION</b>					
2.1.1 Promote aquaculture, water sports and sport fishing. Enhance marketing and quality control	2.1.1.1 Make deliberate efforts and consultations to prepare aquaculture and sport fishing guidelines so as to promote emerging economic opportunities, which may provide alternatives for biodiversity conservation. Guidelines to be approved within the project operational period	ST	MNRT TCMP	TAFIRI IMS - Zanzibar MW NGOs	
	2.1.2.1 Strengthen the available bodies at district level and establish new bodies where none exists to later for this new initiative. 2.1.2.2 Establish environmental committees in each village. Establishment of these instruments should be accomplished within 36 months	MT	MRA& LG VPO	MNRT MCDWA&C	
	2.1.3.1 Establish and mobilise contributions to trust funds.	MT	MNRT	MF Financial Institutions MTI, NGOs	

	2.1.3.2 Develop and implement incentives for sustainable utilization and marketing of biodiversity components. Connect with financial institutions for favourable credit schemes for artisanal fishermen			Private investors	
	2.2.1.1 Establish two laboratories - one at TAFIRI Mwanza and the other at TAFIRI Dar es Salaam for quality control and monitoring 2.2.1.2 Establish strategic inspectorate centres to cater for local markets, preferably one centre in each region (two laboratories to be constructed during the first two year and five inspectorate centres be developed in each year during the period of 5 years)	LT	MNRT	MNRT TAFIRI PO-RALG	
Priority II: 2.2.2 Develop marine resource harvesting and processing technologies as well as market intelligence.	2.2.2.1 Develop and promote application of technologies which offer alternatives for biomass conservation 2.2.2.2 Devise and improve methods and gears for deep-sea fishing of highly migratory species and inshore shrimp fisheries. 2.2.2.3 Penetrate local and foreign markets by reinforcing the market intelligence network	LT	MNRT	TAFIRI Mbegani FDC Kunduchi FT Nyegezi FI MTI NGO's Private investors	
Priority I: 2.3.1 Integrate biodiversity conservation in national economic planning.	2.3.1.1 Produce and circulate guidelines and handbooks for bottom - up planning within a period of 24 months of the project.	ST	Planning Commission, PO-PCP VPO	All govt. Sectors and Ministries PO&RALG	
2.3.2 Establish sectoral and cross-sectoral co-ordination and	2.3.1.2 Establish Fisheries Policy review/elaboration Workshops/meetings to be attended by	ST	MNRT MWLD	MFS MNRT NMEC	

harmonisation flora.	all sectors. Establish aquatic cross sectoral meetings and workshops /seminars to be attended by representative from fisheries, water, agriculture, forestry wildlife, tourism, mining, energy, vpo, industries, lands etc			MTI MLHUD	
Priority III: 2.3.1 Establish environmental impact assessment (EIA) guidelines for aquatic biodiversity	2.3.1.1 EIA - guidelines for different activities/projects, for example, ocean mining, construction, irrigation, damming & industrial development. Guidelines be in place within 24 months of the operational period of this project	ST	MNRT	MAFS MTI MEM IRA - UDSM	
<b>3. EDUCATION AND INFORMATION</b>					
Priority I: 3.1.1 Review, improve and update academic curriculum of schools (Primary, Secondary, High Schools and Higher Learning Institutions).	3.1.1.1 Establish training/academic schemes which fully equip students with concepts and expertise in conservation and sustainable utilisation of aquatic biodiversity. To be accomplished within 36 months.	MT	ME & C MEMC MST&HE	PO-RALG MCDWA&C	
3.2.1 Create awareness and sensitisation of stakeholders on the need for aquatic biodiversity conservation and its sustainable utilization.	3.2.1.1 Use available methods to create awareness in all districts of Tanzania e.g. by workshops, mass media, drama, extension services etc. Accomplish the task in 36 months.	MT	VPO	ME & C, MNRT, Media, MAFS	
Priority II: 3.3.1 Establish national, institutional and regional biodiversity database and information centres.	3.3.1.1 Establish new database and information centre and/or strengthen those that are already established. Accomplish the programmes within 36	MT	VPO MNRT	PO-RALG TAFIRI IRA NEMC COSTECH	

	months				
<b>4. RESEARCH AND DEVELOPMENT</b>					
Priority I: 4.1.1 Assess biodiversity base potential in marine and freshwaters of Tanzania to govern exploitation and avoid depletion of stocks.	4.1.1.1 Short-term rapid assessments be conducted in marine waters (fin fish-pelagics, shellfish, shrimp and marine mammals) and in large inland lakes (Victoria, Tanganyika & Nyasa) for finfish. 4.1.1.2 Long-term assessments based on LFSA and CA methods be conducted in the same aquatic systems. This project is to be completed in 48 months	LT	MNRT TAFIRI	IMS UDSM NGO	
4.1.2 Aquaculture research to generate applied information and development of pamphlets to guide fish farming in the country.	4.1.2.1 Select pilot area for research e.g. selection of species that are good performers, management of pilot hatcheries, etc. Initial research under this program is to be completed in 36 months	MT	MNRT TAFIRI	UDSM IMS NGOs	
Priority II: 4.1.3 Conduct Applied Research in Taxonomy, Biology and Ecosystem diversity, Oceanography and limnology	4.1.3.1 Focus on benthic communities and physical chemical factors as they relate to small and large pelagics	MT	TAFIRI	IMS, UDSM, NGOs, NEMC	
4.1.4 Research in Hydrobiology and environmental pollution in aquatic Wetlands.	4.1.4.1 Study the influence of water circulation and pollution to survival of biodiversity in aquatic systems.	LT	TAFIRI, IMS	NEMC , MWLD	
<b>5. ECOSYSTEMS, SPECIES CONSERVATION AND SUSTAINABLE UTILIZATION</b>					
Priority I 5.1 1 Prevent and control illegal fishing practice through inspectorate services/surveillance	5.1.1.1 Establish and build capacity of enforcement units	LT	MNRT	NEMC	

5.2.1 Water quality monitoring and inspection	5.2.2.1 Control domestic, industrial and agricultural pollution caused by heavy metals, hydrocarbons, cyanides, detergents, organic matter, herbicides, insecticide, etc. All the seven basin water bodies should be monitored.	LT	MW	NEMC	
5.2.2 Biodiversity Research/Inventory Studies for conservation information (endemism, rare, endangered, vulnerability).	5.2.2.1 Taxonomic materials (species and field guides-fish of little economic importance, zooplankton, phytoplankton, echinoderms and sponges) as well as status and impacts of exotic introductions be given priority: Marine subtidal wetlands (coral, seagrass beds) Marine intertidal (rocky shores, salt flats, mangrove swamps). Marine Deltaic/Estuarine water. Pilot sodic lakes. Freshwater inland lakes, Selected highland rivers, Selected artificial dams	LT	MNRT TAFIRI IMS UDSM Zoology	NEMC	
5.2.3 Identify any new important areas for in-situ conservation and consolidate the existing Parks and reserves	5.2.3.1 Select new conservation sites based on their global, functional habitat communities, populations and species values Up-date status of current conservation areas.	LT	MNRT TAFIRI IMS	MRA & LG NGO's	
5.2.4 Assess and inspect industrial effluent treatment and engagement of clean production standards	5.2.4.1 Design and implement a reliable system for monitoring effluents. This will be done within 48 months	MT	MTI, MWLD	NEMC	
5.2.5 Inspect, monitor and dispose obsolete agro-chemicals	5.2.5.1 Development of technologies for disposal of obsolete chemicals and identification of what has to be disposed. To be planned for 36 months	MT	MAFS TPRI	NEMC	
5.2.6 Develop mechanisms to prevent the introductions and	5.2.6.1 Water hyacinth in Lake Victoria systems be covered within the LVEMP time frame.	ST	TPRI MAFS EAC	NGOs MWLD NEMC	

spread of noxious waterweed and related pests.	5.2.6.2 Have in place a compliance programme to address biodiversity in water bodies.		VPO		
5.2.7 Establish Community Based Conservation areas under special agreements, e.g. fish spawning and nursery areas	5.2.7.1 Agree on the management scheme with communities for implementation. Identifying spawning areas, prohibited gears, etc.	LT	MNRT	MRA&LG NGO's	
5.2.8.Rehabilitate degraded ecosystems	5.2.8.1 Surveys and culturing of fast growing corals in four pilot areas of Tanzania Coastal Waters. Inventory surveys and restoration of some wetlands to address coastal beach erosion in pilot areas of Dar es Salaam. Activities should covered within 36 months.	MT	IMS MNRT	NEMC PO-RALG DSM City Council	
Priority II: 5.2.9 Strengthen and support municipal solid and liquid waste disposal.	5.2.9.1 Support services to address solid and liquid waste in various cities and towns. This activity is continuous	MT	PO-RALG	MWLD, NEMC, VPO	
5.2.10 Revisit and establish sustainable land use plans and coastal zoning for multi-use management.	5.2.10.1 Zoning will mitigate encroachment of wetlands and allow appropriate management measures of impacts. Finalise the work in 48 months	LT	MLHUD PO-RALG	MNRT, NEMC TCMP	
Priority 1I: 5.3.1 Establishment of mechanisms for benefit sharing among stakeholders as incentives for conservation	5.3.1.1 Establish good scheme for proportional allocation of benefits for conservation	ST	MNRT	PO-RALG MF	
<b>6. BIODIVERSITY MONITORING AND EVALUATION</b>					
Priority II: 6.1.1 Monitor and evaluate	6.1.1.1 Make follow-up studies on biodiversity status and trends usually	LT	MWLD IMS	NEMC	

biodiversity status and trends.	conducted in pilot areas. They include: Water quality monitoring (physical /chemical/biological aspects). Coral reefs, mangroves and degraded intertidal zone (beach erosion). Other aquatic wetlands especially small lakes and river basins whose ecological roles are impaired by encroachment, silting, irrigation, and invasion by aquatic weeds and plants. Fish production through catch statistics, visual census, underwater camera and other techniques.		TAFIRI  TAFIRI Fisheries Division  TAFIRI,	IRA          IRA	
Priority III: 6.1.2 Develop mechanism for aquatic biodiversity project co-ordination, monitoring and evaluation of projects, which are funded by government, foreign investors and donors.	6.1.2.1 Establish M&E system. This should be accomplished within a period of 24 months of the project.	ST	VPO Planning Commission, MNRT		
<b>7. CAPACITY BUILDING</b>					
Priority I: 7.1.1 Support observer and surveillance activities	7.1.1.1 Train and equip observers who go aboard Deep-sea fishing vessels and inshore prawn fishing vessels. At least 25 observers be trained and equipped annually	MT	MNRT	Private Sector and NGOs	
7.1.2 Research and training institutional support	7.1.2.1 Construct a biodiversity marine laboratory, museum and aquarium at TAFIRI Kunduchi 7.1.2.2 Provide laboratory equipment, sampling gears, boats, engines, spare-parts, plants and vehicles for institutions including: TAFIRI, Mbegani FDC, Kunduchi FI, Nyegezi FI, Maji Laboratories, UDSM-Zoology & IMS	LT	MNRT,	TAFIRI Mbegani FDC Kunduchi FI MSTHE, Nyegezi FI Maji Ubungo IMS UDSM - Botany & Zoology	



	7.1.2.3 Improve capacity of available staff by training and employing more staff to fill vacant posts or proposed establishment in all research and training institutions that are involved in biodiversity issues.				
Priority II: 7.1.3 Improve capacity of Law enforcement and extension services staff.	7.1.3.1 Train, upgrade and harmonise skills of extension services staff and Community Development Officers.  7.1.3.2 Offer special short courses or workshops for Magistrates, Police staff /Prosecutors and other Law enforcement agents on the value of aquatic biodiversity.	ST	MNRT MJ MHA	MCDWC	
7.1.4 Establish Biodiversity Information support centres in Districts.	7.1.4.1 Establish and strengthen biodiversity information centres in districts as part of the environmental management approaches.	MT	MNRT, VPO, PO-RALG	MCDWC	

### 6.3 AGRO-BIODIVERSITY ACTION PLAN

#### 6.3.1. POLICY, REGULATORY ISSUES AND INTERNATIONAL CO-OPERATION

Action/ Plan	Activities	Time Frame	Lead institutions	Collaborating Institutions	Budget Line
<i>Priority I:</i> 1.1.1 Harmonise policies and legislation of MAFS with those of VPO, the Ministry of Natural Resources and Tourism (MNRT), Ministry of Water and Livestock Development, Ministry of	1.1.1.1 Harmonise guidelines for using riverbanks and catchment areas for crop production to be achieved by year 2004. 1.1.1.2 Harmonise guidelines for using Forest reserves for crop and livestock production. This is to be achieved by 2004.	MT	MAFT	PO-RALG MNRT, MW, and MEM	

Energy and Minerals (MEM), etc.					
1.1.2 Enhance use of biogas and harness solar and wind energies.	1.1.2.1 Develop alternative sources of energy from biogas solar and wind to be achieved by year 2006.	MT	MAFS	MEM, MW, COSTECH, PO-PCP	
1.1.3 Enhance sectoral Ministries to address biodiversity issues.	1.1.3.1 Establish of Environmental Unit within MAFS to be achieved by year 2002.	ST	MAFS	PO-PCP MF And VPO	
1.1.4 Establish proper policy, legislative framework for conservation and sustainable utilisation of agro-biodiversity.	1.1.4.1 Enact policies to increase the edible food varieties to be achieved by year 2003. 1.1.4.2 Enact policies that will ensure enlargement of the genetic diversity in the cultivated crops to be achieved by year 2003. 1.1.4.3 Enact regulations and regulatory provisions for the protection of endangered and threatened agro-biodiversity resources to achieved by year 2004.	MT	MAFS	PO-RALG NGOs, Private Sector, VPO	
1.1.5 Review and amend obsolete laws and legislation.	1.1.5.1 Review the Agricultural and Livestock Policy of 1997 to accommodate provisions for conservation and sustainable utilisation of agro-biodiversity resources to be achieved by year 2003. 1.1.5.2 Review laws and legislation in MFAS and MWLD to accomodate environmental concerns to be achieved by year 2005.	ST	MAFS MWLD	MRA & LG, VPO	
1.1.6 Improve enforcement of laws and by-laws at district and village levels.	1.1.6.1 Involve communities and local leadership in laws and by-laws enforcement. 1.1.6.2 Increase the number of enforcement agents for agro-biodiversity laws and regulations at District and Village levels to be achieved by year 2005. 1.1.6.3 Monitor the degree to which laws and by-laws are enforced at district and village levels to be achieved by year 2005.	LT	MAFS	PO-RALG, MCDWAC All district councils, Farmers and Private sector, NGOs	
<i>Priority I:</i> 1.2.1 Improve the centres of technology transfer	1.2.1.1 Establish and/or strengthen the centres' for technology transfer in order to collaborate with international organisations to transfer environmentally sustainable technologies for agro-biodiversity development, conservation and sustainable utilisation.	ST	COSTECH, MAFS	All Research and Development Institutions and NGOs, Higher Learning	

	To be achieved by year 2006.			Institutions	
1.2.2 Enact environmental laws.	1.2.2.1 Prepare environmental laws that will also address agro-biodiversity conservation. To be achieved by year 2004.	ST	MAFS	VPO and PO-RALG	
1.2.3 Establish community based environmental tribunals Baraza at district and village levels .	1.2.3.1 Sensitise all stakeholders and interested groups on the significance of environmental courts. To be achieved by year 2004. 1.2.3.2 Establish and effectively use the environmental courts to be achieved by year 2004.	ST	VPO	-MAFS -PO-RALG	
1.2.4 Establish agro-biodiversity environmental impact assessment guidelines	1.2.4.1 To adapt appropriate EIA for agro-biodiversity resource use and conservation in Tanzania to be achieved by year 2004.	MT	VPO	- MAFS, SUA, Morogoro. IRA, - NEMC - MNRT - TAFORI	
Priority II 1.2.5 Enact laws to empower Local Government to protect agro-biodiversity resources	1.2.5.1 Establish environmental committees at District and Village levels. To be achieved by year 2004. 1.2.5.2 Ensure that local government administrators at district and village councils are responsible for agro-biodiversity resource use requirements.	ST	PO-RALG	-Division of Environment District and Village councils	
Priority III 1.2.6 Establish economic incentives.	1.2.6.1 Establish guidelines to ensure that agro-biodiversity resources are used wisely benefiting particularly local communities. To be achieved by year 2005.	ST	MNRT,MAFS PO-PCP, VPO	PO & RALG	
1.2.7 Strengthen environmental committees at district, ward and village levels. Ensure inclusion of stakeholders.	1.2.7.1 Strengthen districts wards and villages in terms of environmentally aware human resources. To be achieved by year 2004. 1.2.7.2 Facilitate districts, wards and villages to establish and strengthen environmental committees. To be achieved by year 2003.	MT	MAFS	PO-RALG All Districts	
Priority I:		LT	MAFS VPO	COSTECH MF, VPO	

1.3.1 Establish agro-biodiversity networks to enhance sustainable productivity	1.3.1.1 Assess the needs for regional and international collaboration and networks for sustainable exploitation, management and conservation of agro-biodiversity resources. To be achieved by year 2004. 1.3.1.2 Establish guidelines for regional and international collaboration in sustainable exploitation, management and conservation of agro-biodiversity resources. To be achieved by year 2004.			MFA&IC	
<b>2. PLANNING AND CO-ORDINATION</b>					
<i>Priority I:</i> 2.1.1 Establish agro-biodiversity environment impact assessment guidelines	2.1.1.1 Adapt EIA guidelines that are appropriate for sustainable management of agro-biodiversity resources sustainable Tanzania. To be achieved by year 2004. 2.1.1.2 Develop coordinated and sustainable mechanism for EIA and monitoring.	MT	VPO	- MAFS, SUA, Morogoro. IRA, - NEMC - MNRT - TAFORI	
<i>Priority II:</i> 2.1.2 Formulate and institute sustainable land use plans.	2.1.2.1 Build capacity and involve all stakeholders at district and village levels in formulating land use plans. To be achieved by year 2003. 2.1.1.2 Prepare land use plans at national, regional, District and village level. To be achieved by year 2005. 2.1.1.3 Use plans developed at village level to satisfy economic and social needs of the population in a sustainable manner, ensuring that the resource base is conserved for future generations. To achieved by year 2005. 2.1.1.4 Use land in accordance with the principles for optimal use through local by-laws regulating land use. To be achieved by year 2005.	LT	MLHUD	MAFS NLUPC	
<i>Priority III:</i> 2.1.3 Establish a mechanism for better communities participation in planning and management of agrobiodiversity.	2.1.3.1 Enlighten communities on their roles in agro-biodiversity conservation activities. To be achieved by year 2005.	MT	MAFS	All district councils, Farmers and Private sector, NGOs, CB0s	
2.1.4 Establish cultural and	2.1.4.1 Carry out an inventory of agro-biodiversity	MT	MAFS	PO-RALG	

legal mechanisms for agro-biodiversity resources control	resources and their cultural values (achieved by year 2005). 2.1.4.2 Establish, cultural and legal mechanisms for biodiversity management in Tanzania. To be achieved by year 2005.			All district councils	
Priority I: 2.2.1 Establish and maintain facilities for in-situ and ex-situ conservation of agro-biodiversity.	2.2.1.1 Accelerate efforts for in-situ and ex-situ conservation to ensure genetic variability. To be achieved by year 2005. 2.2.1.2 Establish genetic enhancement centres to provide grass root level breeders novel genetic combination of value in improving the productivity, profitability and sustainability of major farming systems. To be achieved by year 2005.	LT	MAFS	MAFS- Research Institutions	
2.2.2 Develop reliable markets and marketing infrastructures to enhance exchange of goods and services.	2.2.2.1 Launch awareness campaigns on the potential role of the non-traditional export crops such as fruits and vegetables. To be achieved by year 2005. 2.2.2.2 Develop strategies to meet specifications and export procedures. To be achieved by year 2005. 2.2.2.3 Rehabilitate stock routes to facilitate livestock marketing. enhance Tanzania Livestock. To be achieved by year 2005.	LT	MAFS MWLD	MRA & LG, MW, All district councils, Private sector, NGOs	
Priority III: 2.2.4 Improve and integrate current traditional conservation practices/technologies in the production systems.	2.2.4.1 Undertake survey and document the roles played by the traditional conservation practices technologies in agro-biodiversity conservation. To be achieved by year 2005. 2.2.4.2 Verify different traditional agro-biodiversity conservation practices. 2.2.4.3 Integrate sound agro-biodiversity conservation practices into the production systems.	LT	MAFS	PO-RALG, MCD WA&C All district councils, Farmers and Private sector, NGOs	
2.2.5 Establish livestock and human migration guidelines.	2.2.5.1 To launch awareness campaigns on the loss of agro-biodiversity as a result of livestock and human migration to new areas. To be achieved by year 2003. 2.2.5.2 To establish guidelines to safeguard biodiversity loss due to livestock and human migration in new areas. To be achieved by year 2002.	MT	MAFS MJ&CA PO-RALG	PALHUS	
		MT	MAFS	MF, MCDWC,	

Priority I: 2.3.1 Develop reliable and feasible rural credit schemes	2.3.1.1 Mobilise communities into economic groups so that they could qualify for bank loans or grants from non –government organisations and international organizations to enable them address biodiversity conservation and sustainable utilisation needs. To be achieved by year 2005.		PO-RALG	Planning Commission, NGOs and Private Enterprises	
Priority II: 2.3.2 Disseminate information and technologies appropriate for women and youth.	2.3.2.1 Gather market data/information at national, regional and district levels and monitor market performance. This is continuous. 2.3.2.2 Process data/information for different categories of stakeholders and disseminate the appropriate information and technologies to the same. This is continuous.	MT	MAFS MWLD MCM	PO-RALG, MCD WA&C All district councils, Private sector, NGOs and TCCI	
Priority III: 2.3.3 Diversify production activities.	2.3.3.1 Establish alternative enterprises for livelihood in semi-arid and arid areas. To be achieved by year 2005. 2.3.3.2 Launch awareness campaigns on alternative enterprises from which farmers can earn incomes. This is continuous. 2.3.3.3 Develop strategies and mechanisms to obtain funding to meet investment costs for diversification. This is continuous.	MT	MAFS	MRA & LG, MCD WA&C All district councils, Private sector, NGOs, MTI, VPO	
Priority I: 2.4.1 Strengthen the quality control and inspectorate centres for agro-biodiversity components.	2.4.1.1 Strengthen the quality control and inspectorate centres for agro-biodiversity components at borders and ports of entry. 2.4.1.1 Institute stringent measures to reduce and/or avoid bio-invasions.	MT	MAFS	MRA & LG, MCD WA&C All district councils, NGOs	
Priority II: 2.4.2 Establish sectoral and cross-sectoral co-ordination and harmonisation mechanism for better	2.4.2.1 Establish sectoral and cross-sectoral co-ordination and harmonisation force	ST	MAFS	MNRT, NEMC, MTI, MLHUD, VPO	

management of agro-biodiversity					
<b>3. EDUCATION AND INFORMATION</b>					
<p>Priority I: 3.1.1 Improve agriculture and livestock extension systems</p>	<p>3.1.1.1 Create force for technology development and transfer by involving researchers, extension workers and farmers (including women representatives). To be achieved by year 2005. 3.1.1.2 Involve all key stakeholders in the financing and joint implementation of programmes. To be achieved by year 2003. 3.1.1.3 Increase the number of extension staff so that 1-Village Extension Officer serves 2 villages. 3.1.1.4 Change the culture of research and extension methods to undertake the challenges of privatisation. To be achieved by year 2005. 3.1.1.5 Incorporate environmental issues in extension messages</p>	MT	MAFS	MRA & LG, NGOs, CBOs, VPO	
<p>Priority II: 3.1.2 Involve the private sector in industrial commodity research and extension services.</p>	<p>3.1.2.1 Launch awareness campaigns to enhance private sector involvement in commodity research. To be achieved by year 2006. 3.1.2.2 Establish mechanism for private sector involvement in commodity research. To be achieved by year 2005. 3.1.2.3 Ensure all stakeholders involved in extension services have harmonised messages going to farmers. To be achieved by year 2005. 3.1.2.4 Publish the harmonised and simplified information for farmers to transform the agricultural economy in a sustainable manner (achieved by year 2005).</p>	MT	MAFS	PO-PCP MF, MTI, MCDWC PO-RALG	
<p>Priority I: 3.2.1 Raising the standard and curriculum of primary and secondary schools and also the Institutions of Higher Learning.</p>	<p>3.2.1.4 Incorporate environment concerns in primary and secondary schools and institutions of higher learning curricula. To be achieved by year 2005.</p>	LT	ME&C	MAFS, MST&HE Planning Commission	

<p>Priority II: 3.2.1 Promote and encourage exchange of experience among districts and regions.</p>	<p>3.2.1.1 To hold joint workshops amongst stakeholders at district level to share experiences in biodiversity resource conservation. To be achieved by year 2006. 3.2.1.2 Enhance co-operation between technicians and politicians. 3.2.2.3 Hold flora to discuss the need to use scarce agro biodiversity resources for common good. To be achieved by year 2005.</p>	MT	MAFS	MRA & LG, MCDWC	
<p>Priority III: 3.1.3 Encourage women to participate in farmers and agricultural training groups to facilitate on-farm research.</p>	<p>3.1.3.1 Launch awareness campaigns as to the role of women in farmers and agricultural training groups. To be achieved by year 2005. 3.1.3.2 Involve women in farmers and agricultural training groups. To be achieved by year 2005.</p>	MT	MAFS	MRA & LG, NGOs and Private sector.	
<p>3.1.4 Educate rural communities in conservation and sustainable utilisation of agro-biodiversity resources. 3.2.4.3 Promote highly productive crops and livestock in order to limit enrolment to fragile ecosystems.</p>	<p>3.1.4.1 Launch awareness campaigns on the use of fragile ecosystems, particularly Semi-arid and arid areas; mountainous areas; wetlands and fire prone areas. Also on commercial potential of agro-biodiversity production (achieved by year 2005).  3.2.4.2 Disseminate methods for sustainable utilisation of Agrobiodiversity through mass media, folklore, seminars, and extension services. This is continuous.</p>	MT	MAFS	PO-RALG Farmers/ NGOs, MCDWC	
<p>3.1.5 Establish multi-sectoral committees to co-ordinate environmental issues at national and district levels.</p>	<p>3.1.5.1 Establish multi-sectoral environmental committees from national to district levels. To be achieved by year 2005.</p>	MT	MRA & LG, VPO	MAFS, MNRT, MW, ME, MCDWC All district councils	
<p>Priority I: 3.2.1 Facilitate the production and dissemination of new technologies for sustainable agro-biodiversity.</p>	<p>3.2.1.1 Launch awareness campaigns on various sustainable ways to increase food security through sustainable use of agrobiodiversity. To be achieved by year 2004. 3.3.1.2 Establish strategies to transfer low cost technology into the production systems. To be</p>	LT	COSTECH, MAFS	SUA, UDSM, MST&HE, Institutions, IRA, Private sectors, NGOs and Farmers	



	achieved by year 2004. 3.3.1.3 Use effectively low cost technology in food production and processing to be achieved by year 2005.				
Priority III  3.2.2 Establish agro-biodiversity information exchange and co-ordination mechanism and guidelines.	3.2.2.1 Carry out an inventory of the existing agro-biodiversity database in the country. To be achieved by year 2005. 3.2.2.2 Establish mechanism for safe storage, use and dissemination of information to end-users. To be achieved by year 2005.	ST	VPO	IRA, SUA, Private sectors, NGOs	
3.2.3 Establish agro-biodiversity database/information centers	3.2.3.1 Assess the need for agro-biodiversity information system at different levels. 3.2.3.2 To establish agro-biodiversity information systems at different levels.	LT	NEMC	MAFS, SUA, IRA, Private Sector, and NGOs,	
<b>4. RESEARCH AND DEVELOPMENT</b>					
Priority I: 4.1.1 Improve vegetable seed production	4.1.1.1 Carry out a diagnostic survey and assess needs for improved seeds using the available indigenous genetic resources. 4.1.1.2 Produce improved seeds according to the needs assessment. (achieved by year 2005).	ST	MAFS	SUA Private Sector, and NGOs	
Priority II: 4.1.2 Establishing real value of agro-biodiversity.	4.1.2.1 Carry out an inventory and identification of all agro-biodiversity resources available in the country. 4.1.2.2 Establish production coefficients [these coefficients are then used to estimate yields which when given value, provides the estimated value of the agrobiodiversity.	MT	MAFS	IRA SUA, Private Sector, and NGOs	
4.1.3 Improve management of resources and other fragile ecosystems.	4.1.3.1 Carry out a diagnostic survey to see which specific parts of the dryland, mountainous ecosystems, wetlands and other fragile ecosystems need improved management. 4.1.3.2 Conduct management studies on identified mountainous and dryland areas undertaken under UNCCD NAP. 4.1.3.3 Carry out on-farm experimentation on the elite	LT	MAFS	IRA, SUA Private sector, NGOs and	

	management practices identified.				
4.1.4 Establish appropriate irrigation systems under wetlands.	4.1.4.1 Carry out an inventory of the existing wet lands and establish which ones could be used for food crop development. 4.1.4.2 Undertake research to establish the best methods to use the wetlands' water bodies for the production of maize, paddy, vegetables etc.	LT	PO-RA LG, MAFS	IRA, Private sector, NGOs and NEMC	
4.1.5 Adapt to climate change.	4.1.5.1 Carry out mitigation studies on greenhouse gasses emissions. 4.1.5.2 Undertake adaptation measures to climate change with regard to agriculture, water, natural resources and coastal and marine resources. 4.1.5.3 Undertake CDM related projects relevant to agricultural development.	LT	VPO MAFS	IRA SUA Private sector, NGOs and	
4.1.6 Develop integrated pest management plan and integrated plant nutrition system.	4.1.6.1 Adopt good farm practices that advocate use of organic fertilisers and appropriate use of chemical fertilisers. 4.1.6.2 Manage the weeds effectively using sustainable methods. 4.1.6.3 Control the target pests using biological control methods and use of selective herbicides. 4.1.6.4 Develop and use pest resistant varieties. 4.1.6.5 Promote the use of natural botanicals. 4.1.6.6 Enforce quarantines.	LT	MAFS	SUA VPO Research Institutions	
Priority I: 4.2.1 Develop grazing management systems for sustainable use of Agrobiodiversity.	4.2.1.1 Determine the potential carrying capacities, stocking rates and off-take rates of different ecological zones. 4.2.1.2 Develop destocking mechanism in areas with heavy populations of livestock.	LT	MWLD	MAFS IRA Private sectors, NGOs	
4.2.2 Enhance development of science and technology through increased spending on R&D.	4.2.2.1 Increase spending on R&D to 1% from the current 0.1% of GDP.	MT	MAFS, MF	MST&HE Research Institutions PO- PCP	
4.2.3 Enhance working	4.2.3.1 Complete rehabilitation of all research and	MT	MAFS MWLD		

conditions of researchers and extension workers.	extension infrastructures and facilities. 4.2.3.2 Establish an amicable scheme of service for MAFS employees.		MCM		
<b>5. ECOSYSTEMS AND SPECIES CONSERVATION AND SUSTAINABLE UTILISATION</b>					
Priority 1: 5.1.1 Pesticide quality control, importation and application of user-friendly technologies (Integrated Pest Management (IPM)).	5.1.1.1 Ensure that highly toxic agro-chemicals are prohibited and replaced by those with Maximum Residue Level Standards (MRLS).	ST	MAFS TPRI	NGO's Private sectors,	
Priority I: 5.1.1 Establish new agro-forestry lots and protect agro-biodiversity resources.	5.1.1.1 Identify species to be used and establish a required agro-forestry lots.	MT	MAFS	PO_RALG MNRT	
Priority II: 5.1.2 Reclaim degraded land including mines.	5.1.2.1 Reclaim degraded areas in agricultural ecosystems including those that are due to minerals after minerals exploitation.	ST	MEM MAFS	MAFS PO-RALG IRA NGOs Private sector	
5.1.3 Prepare implementable long term sustainable land use plans and practices.	5.1.3.1 Gather information on land uses. 5.1.3.3 Prepare and implement long term sustainable land use plans and practices at all levels.	MT	MAFS	MLHUD, MNRT PO-RALG.	
Priority III 5.2.1 Promote agro-biodiversity resources use [sustainable and equitable].	5.2.1.1 Undertake awareness campaigns to show how agro-biodiversity resources can be used sustainably and equitably. 5.1.4.2 Establish guidelines on how agro-biodiversity resources should be used for the present and future generations.	LT	MAFS	MNRT, VPO PO-RALG MCDWAC Media	
5.2.2 Promote indigenous knowledge and practices in conservation of Agro biodiversity resources.	5.2.2.1 Use awareness campaigns to emphasise on the merits of indigenous knowledge and practices in conservation of biological resources. 5.2.2.2 Establish guidelines for using existing indigenous knowledge.	ST	MAFS	MNRT, VPO, PO-RALG MCDWAC Media	
5.2.3 Promote conservation,	5.2.3.1 Use awareness campaigns to show the	MT	MAFS	PO-RALG,	

sustainable and equitable utilisation of indigenous agro-biodiversity.	usefulness of indigenous agro-biodiversity in the livelihood of the people. 5.2.3.2 Establish guidelines for conservation, sustainable and equitable utilisation of indigenous biodiversity.			MCDWAC NGOs Private Sector Media	
<b>6. BIODIVERSITY MONITORING AND EVALUATION</b>					
Priority I: 6.1.1 Enhance monitoring and evaluation of agro-biodiversity.	6.1.1.1 Collect and collate data on agro-biodiversity conservation, sustainable and equitable use. 6.1.1.2 Produce reports through an established field monitoring system.	LT	MAFS	PO-RALG.	
<b>7. CAPACITY BUILDING (PERSONNEL, INSTITUTIONAL, AND FINANCIAL CAPACITIES)</b>					
Priority I: 7.1.1 Retrain extension workers to appreciate the need for agro-biodiversity conservation and sustainable utilisation.	7.1.1.1 Determine the number of extension workers and their areas of competence that need retraining in biodiversity conservation and community participation. 7.1.1.2 Training extension workers to enhance their working effectively.	ST	MAFS	PO-RA LG MCDWAC	
7.1.2 On-farm research to foster capacity building on individual farmers.	7.1.2.1 Enhance farmer's participating in on-farm research with a view to increasing their skills.	MT	MAFS	PO-RALG NGOs Private Sectors.	
Priority II: 7.1.3 Increase the number of community development officers [as change agents and catalysts in development programmes] at village level	7.1.3.1 Recruit Community Development Officers in order to be able to cover all districts/wards. 7.1.3.2 Train Community Development Officers to appreciate the importance of sustainable exploitation of agrobiodiversity.	MT	PO-RA LG MCDWC	MAFS,	
7.1.4 Revive and equip hydrometeorology stations.	7.1.4.1 Revive the stations and equip them accordingly.	ST	MW	MET. DEPT	
Priority I: 7.2.1 Diploma, undergraduate, graduate and post graduate management training	7.2.1.1 Train Tanzanians locally and abroad in different professions related to Agrobiodiversity conservation and sustainable utilisation.	LT	MST&HE MAFS	ME&C	

#### 6.4.TERRESTRIAL BIODIVERSITY

<b>6.4.1. POLICY, REGULATORY ISSUES AND INTERNATIONAL CO-OPERATION</b>					
<b>ACTION PROGRAMME</b>	<b>ACTIVITIES</b>	<b>Time Frame</b>	<b>Leading Institution</b>	<b>Collaborating institutions</b>	<b>Budget line</b>
Priority I: 1.1.1 Encourage the involvement of donors and conservation agencies to support conservation biological resources.	1.1.1.1 Identify potential donors 1.1.1.2 Hold meetings with potential donors 1.1.1.3 Avail policy implementation programmes/strategies to donors	ST	MNRT,	VPO DONORS NGO	
1.1.2 Co-operate with any party including neighbouring countries in the conservation of trans-boundary ecosystem and migratory species	1.1.2.1 Attend meetings of parties 1.1.2.2 Implement conventions and treaties 1.1.2.3 Hold regular meetings with neighbouring countries 1.1.2.4 Prepare and implement joint biodiversity conservation programmes 1.1.2.5 Involve neighbouring countries in the planning initiative of trans-boundary species and ecosystem	LT	MNRT EAC	VPO Ministry of Foreign Affairs	
1.1.3 Participate in relevant international treaties and conventions	1.1.3.1 Identify parties to co-operate for conservation of terrestrial biodiversity. 1.1.3.2 Review various Environment related laws to provide for treaties and conventions 1.1.3.3 Identify International and Regional Conventions and Treaties relevant to biodiversity conservation 1.1.3.4 Set and review guidelines for co-operation with NGOs, CBOs, private organisations, etc. 1.1.3.5 Acceed to conventions and treaties as necessary. 1.1.3.6 Implement conventions and treaties	MT	MNRT,	VPO, Parliament	

Priority II 1.1.4 Promote policies within the framework of such treaties and conventions as are consistent with Tanzania positions on conservation of terrestrial biodiversity	1.1.4.1 Promote policies within the framework of such treaties and conventions	MT	MNRT,	VPO, Parliament	
1.2.1. Enforce EIA process for proposed developments in PAs in order to minimise potential damage to the PAs environment.	1.2.1.1 Make EIA a mandatory process for all proposed development in PAs. 1.2.1.2 Adopt EIA guidelines for proposed Development in PAs 1.2.1.3 Appoint scheduled officer for administering EIA Process 1.2.1.4 Prepare EIA monitoring and evaluation format for PAs. 1.2.1.5 Prepare a checklist of Biodiversity resources to be considered by districts in the EIA process outside PAs. 1.2.1.6 Distribute the checklist to all relevant authorities	ST	WD VPO	MNRT VPO PO-RALG, NGOs	
1.2.2 Encourage legal and sustainable trade in terrestrial biodiversity and its components or species in which it is appropriate to trade	1.2.2.1 Set quotas basing on scientific data 1.2.2.2 Set and review fees 1.2.2.3 Provide public information on the economics of investing in Biodiversity resources. 1.2.2.4 Amend laws and regulations to provide for collection of certain natural products from protected areas	LT	MNRT	MIT	
Priority II: 1.2.3 Develop mechanism for technological and financial co-operation to enhance the capacity for sustainable utilisation and management of terrestrial biodiversity	1.2.3.1 Broaden access to information on technologies. 1.2.3.2 Hold meetings with potential agencies on sustainable utilisation and management of terrestrial biodiversity.	MT  LT	MNRT	VPO CBOs PO-RALG NGOs Private Sector	

1.2.4 Develop sound management policies and enabling legal, regulatory and institutional environment for rural communities and private sector to participate in biological resource management and utilisation.	1.2.4.1 Prepare and provide information on legal use of biodiversity resources by Public notices. 1.2.4.2. Amend environmental laws in order to allow use of biodiversity resources by rural communities.	MT LT	MNRT	VPO PO-RALG NGOs Private Sector	
1.2.5 Review and up-date the existing conservation legislation	1.2.5.1 Review WCA No.12 of 1974, NCA Ordinance Cap 413 of 1959, and TANAPA Ordinance Cap. 412 of 1959, SWRI Act 1980, Forest Ordinance Cap. 389 of 1959, Fisheries Act of 1970. 1.2.5.2 Update the above legislation.	ST	MNRT	TANAPA, SWRI NCAA	
Priority III 1.2.6 Manage species types and specific components of biodiversity through relevant institutions.	1.2.6.1 Review and amend the legislation of relevant institutions to accommodate biodiversity resources in the laws	MT	MNRT		
1.2.7 Issue permits required by law for biodiversity related activities and for regulating the access to, utilisation of and trade in, the terrestrial biodiversity resources.	1.2.7.1 Updated legislation	LT	MNRT	MIT	
1.2.8 Issue Policy guidelines relevant for the implementation of the Biosafety Protocol.	1.2.8.1 develop guidelines for the Biosafety Protocol and distribute them to all stakeholders	MT	VPO	MNRT	
<b>2. PLANNING AND CO-ORDINATION.</b>					
Priority I: 2.1.1 Strengthen the capacity of local communities to administer and manage PAs they have established (WMA, Community Forest)	2.1.1.1 Prepare training manual for local communities on biodiversity management and protection 2.1.1.2. Provide guidelines for CBC 2.1.1.2 Support CBC Training Institutes	ST	MNRT	VPO NEMC	
Priority II: 2.1.2 Involve relevant stakeholders in determining distribution of revenue accrued from biodiversity resources	2.1.2.1 Prepare regulations on internal trade in wildlife products 2.1.2.2 Hold workshop/meetings with stakeholders to determine distribution and use.	ST	MNRT	Stakeholders, Investors	

2.1.3 Recognise local community's user-rights	<p>2.1.3.1 Amend natural resources legislation to empower rural communities to conserve natural resources</p> <p>2.1.3.2 Conduct joint anti-poaching patrols with rural communities</p> <p>2.1.3.3 Review laws in order to accommodate utilisation in WMAs/Community Forests</p> <p>2.1.3.4 Amend the regulations to allow appropriate traditional hunting methods in WMAs</p>	ST	MNRT	VPO, Communities, Parliament, Law Enforcement Agencies, Antipoaching, Police, Local Councils	
2.1.4 Ensure biological resources are not undervalued by setting appropriate competitive prices and fees for various forms of biological resource utilization	<p>2.1.4.1 Determine optimum number of dealers, companies to trade in different species and its products</p> <p>2.1.4.2 Set and review prices and fees for tourist and local hunting, capture of live animals and various wildlife products</p>	ST	MNRT		
<p>PRIORITY III:</p> <p>2.1.5 Assume overall responsibility (Wildlife and Forest Division) for the management of all terrestrial species of mammals, birds, reptiles, amphibians and invertebrates, forest plants and marine species not covered by fisheries legislation.</p>	2.1.5.1 Update legislation	LT	MNRT		
<p>Priority I:</p> <p>2.2.3 Adopt efficient and flexible approaches to collecting revenue</p>	<p>2.2.3.1 Determine price for each natural biological product</p> <p>2.2.3.2 Prepare monitoring and auditing procedure</p> <p>2.2.3.3 Prepare marketing strategies</p>	LT	MNRT	MNRT, Communities, Private Sector	
<b>3. EDUCATION AND INFORMATION</b>					



Priority I: 3.1.1 Institutionalise extension and support services with adequate levels of manpower, funds and equipment.	3.1.1.1 Equip extension and publicity units with appropriate facilities 3.1.1.2 Maintain extension and publicity equipment 3.1.1.3 Train adequate manpower	MT	MNRT	VPO, News Media Private Sector NGOs	
Priority II: 3.1.2 Promote communication and collaboration with other sectoral community based extension services	3.1.2.1 Conduct workshop for exchange of experience	LT	MNRT	MNRT, PMO, Districts	
3.1.3 Create the widest possible understanding and support for terrestrial biodiversity conservation by preparing and distributing posters, magazine and pamphlets and use of other news media.	3.1.3.1 Prepare posters, pamphlets and articles in both English and Swahili 3.1.3.2 Prepare Radio and TV programmes, 3.1.3.3 Organise tours	MT LT	MNRT	VPO Media NGOs Private sector	
3.1.4 Co-operate with sectors responsible for education and continuing to promote the integration of biodiversity issues into school syllabi and educational programs so that biodiversity conservation education receives a broad foundation of support.	3.1.4.1 Facilitate the Ministry of Education to incorporate conservation education into School syllabi 3.1.4.2 Establish visitors centres, hostels, and research centres.	MT	MNRT	Universities, Research Institutions,	
Priority I: 3.2.1 Ensure that the public and decision-makers have access to information on biodiversity.	3.2.1.1 Launch awareness campaigns on the availability, accessibility of information pertaining to sustainable utilisation of terrestrial biodiversity	LT	MNRT	PMO PO-RALG	
<b>4. RESEARCH AND DEVELOPMENT</b>					
4.1.1 Focus research and monitoring on various levels; on economics of biological resource use, human wildlife interactions, sociology of rural communities, basic knowledge of ecosystem processes and threatened endemic species.	4.1.1.1 Prepare and review priorities for research and monitoring in PAs and WMAs 4.1.1.2 Distribute research priorities to potential users	ST	MNRT	Research Institutions	
Priority III: 4.1.2 Regulate and monitor biodiversity (wildlife and forestry) research in Tanzania.	4.1.2.1 Prepare national guidelines for natural resources research and monitoring	MT	MNRT	VPO Research Institutions, Universities	
<b>5. ECOSYSTEMS AND SPECIES CONSERVATION AND SUSTAINABLE UTILISATION</b>					

<p>Priority I: 5.1.1 Maintain biological diversity of the ecosystem, species and genetic level by conserving core areas of high biodiversity value and species habitats including fragile ecosystems such as dryland, mountainous areas and wetlands through in-situ measures (Protected areas)</p>	<p>5.1.1.1 Demarcate and maintain boundaries of core PAs 1000 Km 5.1.1.2 Develop and maintain infrastructure in PAs according to General Management Plans (GMPs 5.1.1.3. Avail and maintain equipment for PAs</p>	LT	MNRT	TANAPA	
<p>5.1.2 Retain the ownership of, and overall responsibility for management of core biodiversity protected areas (NP, NCA, GR, and FR) by the state, to ensure that national priorities are addressed and abuses are controlled.</p>	<p>5.1.2.1 Enforce the law on State ownership of natural resources and management responsibility of the core protected areas and fragile ecosystems</p>	LT	MNRT	NCA, VPO MJ&CA	
<p>5.1.3. Co-operate with other law enforcement agencies in the execution of functions relating to biological resources offences.</p>	<p>5.1.3.1 Use other agencies to train staff in specialised skills 5.1.3.2 Conduct joint investigations 5.1.2.3 Update regulations governing the management of Biodiversity at different levels of administration (from village level to national level) 5.1.2.4 Conduct anti-poaching operations 5.1.2.5 Train in anti-poaching activities</p>	MT	MNRT	Police & Law Enforcement Agencies, VPO NEMC MJ&CA	
<p>5.1.4 Co-operate and enrol the good will of rural communities ensuring sustainable utilisation of terrestrial biodiversity.</p>	<p>5.1.4.1 Recruit and train informers in rural communities 5.1.4.2 Obtain intelligence report from informers 5.1.4.3 Conduct joint operations with rural communities 5.1.4.4 Monitor and evaluate performance of V/Game Scouts</p>	MT	MNRT	PO-RALg MCDWAC Police MJ&CA	

<p>Priority II: 5.1.5 Develop management plans and zones prescribing level and types of use in each zone, to ensure attainment of management objectives of each PA and other ecosystems of significant values.</p>	<p>5.1.5.1 Identify and prioritise PAs for GMP 5.1.5.2 Identify and prioritise areas for setting aside as PAs 5.1.5.3 Prepare guidelines for developing GMPs to ensure consistence 5.1.5.4 Collect baseline data and identify stakeholders 5.1.5.5 Consult stakeholders 5.1.5.6 Prepare Draft GMPs using guidelines 5.1.5.7 Prepare framework for prioritising areas for inclusion in PA network</p>	<p>LT</p>	<p>MNRT</p>	<p>MLHUD LUPC</p>	
<p>5.1.6 Manage wildlife resources basing on the ecosystem rather than administrative boundaries, due to mobility nature of wildlife, availability of resources and habitat coverage.</p>	<p>5.1.6.1 Identify potential wildlife areas ecosystems. 5.1.6.2 Include such areas in management planning of respective PAs</p>	<p>LT</p>	<p>MNRT</p>	<p>PO-RALG NGOs</p>	

<p>5.1.7 Prepare management plans that include biodiversity conservation and management guidelines with emphasis on endangered/threatened ecosystem and habitats in order to ensure their survival</p>	<p>5.1.7.1 Collect information on potential areas/habitats of high Biodiversity value  5.1.7.2 Identify and prioritise threatened ecosystems and habitats and also endangered species.  5.1.7.3 Consult various stakeholders for developing draft GMP  5.1.7.4 Prepare the draft GMP in collaboration with relevant professionals  5.1.7.5 Survey and map the areas  5.1.7.6 Review the draft GMP with stakeholders  5.1.7.7 Present the GMP for endorsement by relevant authorities  5.1.7.8 Monitor and evaluate implementation</p>	<p>LT</p>	<p>MNRT</p>	<p>PO-RALG  NGOs  Universities, research institutions  VPO</p>	
<p>5.1.8 Adopt measures that bring an equitable share of revenue from tourist hunting to the rural communities, on whose land the industry is practised.</p>	<p>5.1.8.1 Hold workshops with stakeholders to set modalities for benefit sharing from tourist hunting in WMAs,  5.1.8.2 Review, publish and distribute modalities to interested parties</p>	<p>ST</p>	<p>MNRT</p>	<p>PO-RALG  VPO</p>	
<p>5.1.9. Adopt a flexible approach to collecting revenue from harvests of biological natural products in PA</p>	<p>5.1.9.1 Determine price for each Natural Biological product  5.1.9.2 Prepare monitoring and auditing procedure  5.1.9.3 Prepare marketing strategies  5.1.9.4 Establish trend and identify rare, threatened and endangered species.  5.1.9.5 Categorise species according to IUCN /CITES/CBD Criteria.  5.1.9.6 Prepare and review species management plans /guidelines.  5.1.9.7 Prepare and review national criteria for rare and endangered species  5.1.9.8 Monitor, evaluate performance.</p>	<p>LT</p>	<p>MNRT</p>	<p>PO-RALG  Private sector  NGOs</p>	

5.1.10. Encourage legal and sustainable trade in biodiversity and its components or species in which it is appropriate to trade	5.1.10.1 Set quotas basing on scientific data 5.1.10.2 Set and review fees 5.1.10.3 Provide information to the public on the economics of investing in Biodiversity resources by publishing articles 5.1.10.4 Amend laws and regulations to provide for collection of certain natural products from protected areas	LT	MNRT	PO-RALG Private sector NGOs	
Priority I 5.2.1 Promote the involvement of local communities and other stakeholders in conservation and management planning initiatives through joint management agreements.	5.2.1.1 Publicise the conservation related Policy 5.2.1.2 Create committees between PAs and adjacent communities 5.2.1.3 Identify potential private sector 5.2.1.4 Monitor and evaluate the performance of the private sector in forest / wildlife protection and development 5.2.1.5 Prepare and review priority list for involvement and potential investment opportunities 5.2.1.6 Conduct regular meetings with private sector as necessary 5.2.1.7 Provide incentives to stakeholders	LT	MNRT	Research and training Institutions	
5.2.2 Establish effective informer networks and intelligence databases at local and national levels.	5.2.2.1 Recruit informers 5.2.2.2 Train on management of data base	LT <sup>1</sup>	MNRT	MNRT TANAPA PO-RALG	

5.2.3 Ensure effective partnership with rural communities and private sector outside PAs..	<p>5.2.3.1 Advertise potential investment opportunities through local and international media</p> <p>5.2.3.2 Review natural resources legislation in order to allow cropping and ranching</p> <p>5.2.3.3 Amend natural resources legislation to empower rural communities to conserve the resources</p> <p>5.2.3.4 Determine and publish various benefits to be shared</p> <p>5.2.3.5 Determine proportions based on the effort put in the conservation of the resource</p>	LT	MNRT	Research and training Institutions Media NGOs,	
5.2.4 Prepare management plans with other stakeholders for species or taxonomic group of particular concern in order to ensure their survival.	<p>5.2.4.1 Collect information on species concerned</p> <p>5.2.4.2 Draft species management plan in participatory manner</p> <p>5.2.4.3 Review existing management plans</p>	LT	MNRT	PO-RALG MLHUD NGOs, Universities, Research Institutions	
5.2.5 Seek to bring under control and minimise damages caused by repeated wildfires.	<p>5.2.5.1 Prepare GMPs for core PAs which include fire control programs</p> <p>5.2.5.2 Prepare fire management plan for all core PAs and implement</p> <p>5.2.5.3 Develop fire monitoring and evaluation schedule</p> <p>5.2.5.4 Conduct fire campaigns</p> <p>5.2.5.5 Purchase fire fighting equipment</p> <p>5.2.5.6 Establish and train fire fighting units in each PA and WMA</p>	LT	MNRT	PO-RALG	
5.2.6. Develop responsibility for containing illegal use of biological resources in WMAs to rural communities,	<p>5.2.6.1 Amend legislation to provide for rural communities to contain illegal use in WMAs</p> <p>5.2.6.2 Train village game/forest staff on anti-poaching activities</p>	MT	MNRT	NGOs CBOs	

<p>Priority III: 5.2.7 Add, upgrade and extend PA network on the basis of a system plan, prepared in co-ordination among different sectors, including consideration of the distribution of species and habitats, particularly wetlands, present coverage of PAs and patterns of land use.</p>	<p>5.2.7.1 Collect information on potential areas/habitats of high Biodiversity value 5.2.7.2 Conduct studies on movements and distribution of wild animals in different seasons 5.2.7.3 Determine the extent of different habitat coverage in the present PA network 5.2.7.4 Identify and prioritise important biodiversity areas for inclusion in the PA network 5.2.7.5 Survey and map the areas 5.2.7.6 Seek for consent of relevant authorities /stakeholders 5.2.7.7 Add/extend into PA network habitats which are less presented (those which are 5% of habitat coverage)</p>	ST	MNRT	Universities, Research Institutions, PO-RALG MLHUD	
<p>5.2.8 Give special conservation status to rare, threatened or endangered species of fauna and flora</p>	<p>5.2.8.1 Collect information on population status of all species (fauna and flora) 5.2.8.2 Collect information on plant species in various vegetation types 5.2.8.3 Establish trends and identify rare, endangered species 5.2.8.4 Categorise species according to IUCN/CITES criteria</p>	ST	MNRT	Research Institutions NGOs.	
<p>5.2.9 Ensure the local communities benefit from living adjacent to PAs and among natural resources.</p>	<p>5.2.9.1 Review natural resources legislation to provide for equitable sharing of benefits accrued from adjacent PAs</p>	LT	MNRT	PO-RALG	

5.2.10 Adopt measures that bring an equitable share of revenue from tourist hunting to the rural communities, on whose land the industry is practised.	5.2.10.1 Hold workshops with stakeholders to set modalities for benefit sharing from tourist hunting in WMAs 5.2.10.2 Review, publish and distribute modalities to interested parties	ST	MNRT	PO-RALG NGOs Private sector	
5.1.11. Establish a new category of PA to be known as Wildlife Management Areas (WMAs) for the purpose of effecting CBC	5.1.1.1 Amend legislation to provide for the establishment of PA network.	LT	MNRT	TANAPA PO-RALG	
<b>6. BIODIVERSITY MONITORING AND EVALUATION</b>					
6.1.1 Undertake regular inventories and mapping of existing biodiversity, status coverage of catchment and habitats and coastal forest and wetlands.	6.1.1.1 Prepare schedules for monitoring biodiversity and avail to research institutions. 6.1.1.2 Monitor catchment and habitats and coastal forest and wetlands.	ST	MNRT	Research institutions and Universities	
6.1.2 Emphasise research and monitoring in management planning of PAs according to national research plans.	6.1.2.1 Prioritise research and monitoring areas/species in each PA, and include in GMPs 6.1.2.2 Seek for funds and conduct applied research 6.1.2.3.Acquire research results from foreign researchers	ST	MNRT	Research institutions and Universities	
<b>6.1.3 Document the components, distribution, structure and function of biodiversity through inventory, data management and research activities.</b>	6.1.3.1 Prepare and review priority areas for research and monitoring in PAs and wildlife management areas (WMAs) 6.1.3.2 Distribute research priorities to potential areas	ST	MNRT	Research institutions and TANAPA	
<b>7 CAPACITY BUILDING</b>					



<p>Priority I:</p> <p>7.1.1 Encourage and facilitate training in ecology and management and other skills necessary for the development of the biological diversity (fauna and flora).</p>	<p>7.1.1.1 Implement existing training programmes</p> <p>7.1.1.2 Conduct regular training needs assessment and review the training programmes</p> <p>7.1.1.3 Conduct regional and international staff exchange programmes</p>	LT	MNRT	COSTECH Universities and training Institutions	
<p>7.1.2. Monitor training standards in training institutions in the country</p>	<p>7.1.2.1 Make consultations with the Ministry of Higher Education, Science and Technology for maintaining training standards</p> <p>7.1.2.2 Set and maintain standards for low cadre biodiversity related training institutions</p> <p>7.1.2.3 Make study visits to similar regional/international institutions</p> <p>7.1.2.4 Monitor and evaluate implementation of the Biodiversity curriculum</p>	ST	MNRT	MST&HE, Universities and training Institutions MEC	
<p>Priority II:</p> <p>7.1.3 Motivate the natural resources sector personnel who are protecting and conserving biodiversity resource by improving working conditions, remuneration, providing adequate working equipment and sufficient incentives.</p>	<p>7.1.3.1 Negotiate with Treasury for increased retention.</p> <p>7.1.3.2 Prepare proposal for negotiation with Treasury for all PAs to retain 50% of the revenue accrued</p> <p>7.1.3.3 Prepare proposal for funding to facilitate training of Natural resources staff and procurement of social welfare facilities.</p>	ST	MNRT	VPO, MF	
<p>7.1.4 Develop programmes and criteria for staff development based on manpower needs assessment.</p>	<p>7.1.4.1 Identify training needs assessment and review the training programme.</p>	LT	MNRT	CSD MST&HE,	

7.1.5 Train and support village wildlife scouts to protect wildlife resources under their control in the context of CBC.	7.1.5.1 Prepare training manual on wildlife protection	LT	MNRT	Research and training institutions	
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**ST = Short term (up to two years)**

**MT = Medium term (two to five years)**

**LT = Long term (beyond five years)**

**Note: The budget line will be filled in by relevant institutions prior to soliciting funds for implementing the identified activities.**

## **PART III IMPLEMENTATION SCHEDULE**

The NBSAP covers a period of 5 years during which action plans/programmes are to be implemented as shown below. Priority one programmes are those, which are wholly or partly in progress and their start, is therefore scheduled from year one. Priority two programmes are those which are yet to start and require some groundwork preparations for their start (facilitation/capacity building). These programmes are scheduled to start during the third year. Priority three programmes are scheduled to start during the fourth year. Priority two and three activities that might have partial ground work done can start in year one. The five year action programme schedule for the aquatic, agro and terrestrial biodiversity components are as follows:

## 7.0 IMPLEMENTATION SCHEDULE

### 7.1 AQUATIC BIODIVERSITY IMPLEMENTATION SCHEDULE

Action Programmes	1st Year	2nd Year	3rd Year	4th Year	5th Year
	JFM/AMJ/JAS/OND	JFM/AMJ/JAS/ OND	JFM/AMJ/JAS/ OND	JFM/AMJ/JAS/ OND	JFM/AMJ/JAS/ OND
Legal Boundaries of EEZ (Priority 2)			xxx xxx xxx		
Develop contingency Measures (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Enact Environmental Law (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx			
Review Fisheries Legislation (Priority 2)			xxx xxx xxx		
Have in place coastal zone Management Strategy Guidelines (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx		
Establish Environmental by- Laws (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx		
Wetlands management Guidelines (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx		
Improve Marketing			xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx

Infrastructures (Priority 2)					
Deep Sea Fishing Act and Regulations (Priority 1)	xxx xxx xxx				
Environmental Tribunals (Priority 3)				xxx xxx xxx xxx	xxx xxx xxx xxx
Facilitate inputs for harvesting (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx			
Improve Centre for Transfer of Technology (Priority 1)	xxx xxx xxx xxx				
Implement Science and Technology Initiatives (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx		
EIA Guidelines (Priority 3)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Aquatic management Guidelines (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx			
Planning Guidelines /Handbooks (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx			
Cross-sectoral Co-ordination & Harmonisation (Priority 1)	xxx xxxxxxxxxxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Quality control and Monitoring (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	
Village Environmental Committees (Priority 1)	xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx		

Review /Improve Academic Curricula (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx		
Awareness & Sensitization of Stakeholders (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Database Information Centres Hydrobiology and Environmental Pollution (Priority 2)			xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Assessment of Biodiversity base Potential (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx		
Aquaculture/ aquatic Research (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	
Inventory survey for in-situ conservation (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx		
Research and inventory studies (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Control of illegal Fishing (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Benefit sharing & incentives for conservation (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Water Quality Monitoring & Inspection (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Monitoring Industrial Effluents	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	

& Clean Production (Priority 1)					
Monitor municipal Waste Disposal (Priority 2)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx		
Monitor disposal of obsolete agrochemicals (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Control of Noxious Fauna and Pests (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Rehabilitate Degraded Ecosystems (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Observer Support & Surveillance Programme (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx		
Establish Regional Fish Management Bodies (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	
Regional Research Collaboration & Management (Priority 2)		xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Establish Trust Fund/ Incentives/Credit schemes (Priority 2)			xxx xxx xxx xxx	xxx xxx xxx xxx	
Development of Fishing, Processing Technology and Marketing Intelligence (Priority 2)			xxx xxx xxx xxx	xxx xxx xxx xxx	
Research in limunology, oceanography, Biology and	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx

Ecosystems Diversity (Priority 1)					
Community Based Conservation Area (Priority 2)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Coastal Zoning and Sustainable land use Plans (Priority 2)			xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Monitoring and Evaluation of Biodiversity (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Capacity Building of Law Enforcement agents & Extension workers (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Rehabilitate Hydrometeorology Stations (Priority 2)			xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Strengthen District Information Centres (Priority 2)			xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx



## 7.2 AGRO-BIODIVERSITY IMPLEMENTATION SCHEDULE

ACTION PROGRAMMES	1 <sup>ST</sup> YR	2 <sup>ND</sup> YR	3 <sup>RD</sup> YR	4 <sup>TH</sup> YR	5 <sup>TH</sup> YR
	JAM/AM/AS/ NOD	JAM/AM/AS/ NOD	JAM/AM/AS/ NOD	JAM/AM/AS/ NOD	JAM/AM/AS/ NOD
Strengthen environmental committees at regional, ward and village levels. ( <i>Priority 3</i> )	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Establish proper policy, legislative frame-work for conservation and sustainable utilization of agro-biodiversity: <i>Priority 2)</i>			xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Harmonise policies and legislation of MAFS with those of MNRT, MWLD, MEM) etc. ( <i>Priority 1</i> )	xxx xxx xxx	xxx xxx xxx			
Review and amend obsolete laws and legislation ( <i>Priority 2)</i>			xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Enhance use of biogas and harness solar / wind energies( <i>Priority 1)</i>	xxx xxx xxx	xxx xxx xxx			
Build the capacity of sectoral Ministries to address biodiversity issues ( <i>Priority 1</i> )	xxx xxx xxx	xxx xxx xxx			
Establish mechanism for technological co-operation . <i>Priority 2.</i>			xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Enact environmental laws ( <i>Priority 1)</i>	xxx xxx xxx	xxx xxx xxx			
Establish community based environmental tribunals at District and village levels ( <i>Priority 1)</i>	xxx xxx xxx	xxx xxx xxx			
Enact By-laws to empower Local Government to protect agro-biodiversity resources in Districts ( <i>Priority 2</i> )		xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Establish mechanism to enhance agrobiodiversity management ( <i>Priority 3)</i>				xxx xxx xxx	xxx xxx xxx
Establish agro-Biodiversity information exchange and co-ordination guidelines ( <i>Priority 3)</i>				xxx xxx xxx	xxx xxx xxx
Establish guidelines for livestock and human migration ( <i>Priority 3)</i>				xxx xxx xxx	xxx xxx xxx

Establish agrobiodiversity environmental impact assessment guidelines <i>(Priority 1)</i>	xxx xxx xxx	xxx xxx xxx			
Establish agro-Biodiversity management networks. <i>(Priority 1)</i>	xxx xxx xxx	xxx xxx xxx			
Formulate and institute sustainable land use plans. <i>(Priority 2).</i>			xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Facilitate the acquisition, development and dissemination of new technologies <i>(Priority 1).</i>	xxx xxx xxx	xxx xxx xxx			
Improve and integrate current traditional conservation practices /technologies in the production systems <i>(Priority 3)</i>	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Improve enforcement of laws and by-laws at district and village levels. <i>(Priority 2)</i>	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Rehabilitate and facilitate centres to monitor pests and diseases <i>(Priority 2)</i>	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Establish and maintain facilities for in-situ and ex-situ conservation. <i>(Priority 1)</i>	xxx xxx xxx	xxx xxx xxx			
Develop reliable markets and marketing infrastructures. <i>(Priority 1)</i>	xxx xxx xxx	xxx xxx xxx			
Disseminate information and appropriate technologies. <i>(Priority 3)</i>				xxx xxx xxx	xxx xxx xxx
Diversify activities at both national and village levels. <i>(Priority 3)</i>				xxx xxx xxx	xxx xxx xxx
Establish personal, cultural and legal official mandate of agro-Biodiversity resources control. <i>(Priority 3).</i>				xxx xxx xxx xxx	xxx xxx xxx xxx
Enhance working conditions for Researchers and Extension workers <i>(Priority 2)</i>	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Involve private sector in industrial commodity research <i>(Priority 2).</i>	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Encourage women to participate in farmers and agricultural training groups [ to facilitate on-farm research]. <i>(Priority 3).</i>	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Improve training curriculum <i>(Priority 2)</i>			xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Harmonise messages from extension staff and farmers.			xxx xxx xxx	xxx xxx xxx	xxx xxx xxx

<i>(Priority 2</i>					
Educate rural communities in conservation and sustainable utilisation of agrobiodiversity resources <i>(Priority 3)</i>				XXX XXX XXX	XXX XXX XXX
Raise the standard and curriculum of primary and secondary education schools <i>(Priority 3)</i>				XXX XXX XXX	XXX XXX XXX
Promote and encourage exchange of experience between districts. <i>(Priority 2)</i>			XXX XXX	XXX XXX XXX	XXX XXX XXX
Enhance co-operation between technicians and politicians <i>(Priority 2)</i>			XXX XXX XXX XXX	XXX XXX XXX XXX	XXX XXX XXX XXX
Establish multi-sectoral committees to co-ordinate environmental issues at national, and district levels <i>(Priority 3)</i>	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX
Improve and or establish agro-Biodiversity information centres. <i>(Priority 3)</i>	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX
Improve agriculture and livestock extension systems <i>(Priority 1).</i>	XXX XXX XXX	XXX XXX XXX			
establish real value of agro-Biodiversity. <i>(Priority 2)</i>			XXX XXX XXX XXX	XXX XXX XXX XXX	XXX XXX XXX XXX
Improve management of dryland resources <i>(Priority 2).</i>	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX
Develop grazing management systems. <i>(Priority 1).</i>	XXX XXX XXX	XXX XXX XXX			
Establish appropriate irrigation systems under wetlands to increase the quantity of food and income for the farmers: <i>(Priority 2)</i>		XXX XXX XXX	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX
Put in place measures to adapt to climate change. <i>(Priority 2).</i>			XXX XXX XXX	XXX XXX XXX	XXX XXX XXX
Develop integrated pest management plan and integrated plant nutrition system. <i>(Priority 2).</i>	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX
Enhance development of science and technology through increased spending on R&D. <i>(Priority 2).</i>			XXX XXX XXX	XXX XXX XXX	XXX
Promote agrobiodiversity resources use. <i>(Priority 3).</i>	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX	XXX XXX XXX

Promote indigenous knowledge and practices in conservation of biological resource].(Priority 3).	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Reclaim degraded land including mines. (Priority 2).			xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Promote conservation, sustainable and equitable utilisation of endemic biodiversity.(Priority 3).	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Establish new forest lots and protect resources for the present and future Tanzanians. (Priority 1).	xxx xxx xxx	xxx xxx xxx			
Enhance monitoring and evaluation of agro-biodiversity (Priority 1).	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Prepare implementable long term sustainable land use plans and practices to enhance ecological and socio-economic issues. (Priority 2.)			xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Rehabilitate and facilitate centres to monitor pests and diseases. (Priority 2)			xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Retrain extension workers (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
On- farm research to foster capacity building in individual farms.(Priority 1)	xxx xxx xxx	xxx xxx xxx			
Increase the number of community development officers at village level. [ (Priority 2).			xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Graduate and post graduate on agrobiodiversity management training.(Priority 1)	xxx xxx xxx	xxx xxx xxx			

### 7.3 TERRESTRIAL BIODIVERSITY IMPLEMENTATION SCHEDULE

ACTION PROGRAMME	1 <sup>ST</sup> YR	2 <sup>ND</sup> YR	3 <sup>RD</sup> YR	4 <sup>TH</sup> YR	5 <sup>TH</sup> YR
	JAM/AM/AS/ NOD	JAM/AM/AS/ NOD	JAM/AM/AS/ NOD	JAM/AM/AS/ NOD	JAM/AM/AS/ NOD
Encourage the involvement of donors and conservation agencies to support Tanzania to conserve biological resources. (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Co-operate with any party including neighbouring countries in the conservation of trans-boundary ecosystem and migratory species. (Priority 2)			xxx xxx xxx xxx		
Participate in relevant international treaties and conventions. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Involve various stakeholders in determining distribution of revenue and benefits among themselves. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Strengthen the capacity of local communities to administer and manage Pas. (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Enhance local community's user-rights (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Manage species types and specific components of biodiversity through relevant institutions. (Priority 2)			xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
MNRT assume overall responsibility for the management of all terrestrial and aquatic biodiversity. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx
Issue permits required by law for biodiversity related activities and for regulating the access to, utilisation of and trade in, the terrestrial Biodiversity resource. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx
Ensure that the biological resources is not undervalued by setting appropriate competitive prices and fees for various forms of biological resource utilization. (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Enforce EIA process for proposed developments in PAs in order to minimise potential damage to the PA environment. (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Create the widest possible understanding and support for terrestrial biodiversity conservation by preparing and distributing posters, magazine and pamphlets and use of other news media. (Priority 1)	xxx xxx xxx	xxx xxx xxx			

Co-operate with the sectors responsible for education to promote the integration of biodiversity issues into school syllabi and educational programmes. (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Regulate and monit biodiversity (wildlife and forestry) research in Tanzania. (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Facilitate regular inventories and mapping of existing biodiversity, status coverage of catchment and habitats and coastal forests and wetlands. (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Focus research and monitoring on levels, on economics of biological resource use, human- wildlife interactions, sociology of rural communities, basic knowledge of ecosystem processes and biology of indigenous threatened/endemic species. (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Emphasise research and monitoring in management planning of PAs according to national research plans. (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Maintain biological diversity of the ecosystem, species and genetic level by conserving core areas of high Biodiversity value and species habitats including wetlands through in situ measures by PAs. (Priority 2)			xxx xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx
Assume the overall responsibility for management of core Biodiversity protected areas (NP, NCA, GR, FR) by the state, to ensure that national priorities are addressed and abuses are controlled. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx
Develop management plans and zones prescribing level and types of use in each zone, to ensure attainment of management objectives of each PA. (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Manage wildlife resources basing on the ecosystem rather than administrative boundaries, due to mobility nature of wildlife, availability of resources and habitat coverage. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx
Prepare management plans that include biodiversity conservation and management guidelines with emphasis on threatened ecosystem and habitats. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx
Promote the involvement of local communities and other stakeholders in conservation and management planning initiatives. (Priority 1)	xxx xxx xxx	xxx xxx xxx			

Ensure effective partnership with rural communities, NGOs and private sector outside Pas. (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Add, upgrade and extend PA network on the basis of a systematic plan baselands use. (Priority 2)	xxx xxx xxx		xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Enforce EIA process for proposed developments within and outside PAs. (Priority 1)	xxx xxx xxx	xxx xxx xxx			
Ensure that local communities benefit from living adjacent to PAs. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Undertake activities to minimise damages caused by repeated wildfires. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx
Prepare management plans for species and taxonomic groups of particular concern in order to ensure their survival. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Give special conservation status to rare, threatened or endangered species of fauna and flora. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Establish a new category of PA to be known as Wildlife Management Areas (WMAs) for the purpose of effecting CBC. (Priority 1)	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx
Establish effective informer networks and intelligence databases at local and national levels for biodiversity management. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Develop mechanism for containing illegal use of biological resources in WMAs. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Train and support village wildlife scouts to protect wildlife resources under their control in the context of CBC. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Encourage legal and sustainable trade in biodiversity and its components or species. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Adopt measures that bring an equitable share of revenue from tourist hunting to the rural communities. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Adopt a flexible approach to collecting revenue from harvests of biological natural products in Pas. (Priority 1)	xxx xxx xxx xx	xxx xxx xxx x	xxx xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx
Develop sound management policies and enabling legal, regulatory and institutional environment for rural communities and private sector participation in biological resources utilization and management. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx

Co-operate with other law enforcement agencies in the execution of functions relating to biological resources offences. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Establish effective information networks and intelligence databases at local and national levels. (Priority 1)	xxx xxx xxx xx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx
Undertake regular inventories and mapping of existing biodiversity. (Priority 1)	xxx xxx xxx xx	xxx xxx xxx x	xxx xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx xxx
Monitor management plans of PAs according to national research plans. (Priority 1)	xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx
Document the components, distribution, structure and function of biodiversity through inventory, data management and research activities. (Priority 1)	xxx xxx xxx x	xxx xxx xxx x	xxx xxx xxx x	xxx xxx xxx	xxx xxx xxx x
Encourage and facilitate training in ecology and management and other skills necessary for the development of the biological diversity (fauna and flora). (Priority 1)	xxx xxx xxx xx	xxx xxx xxx x	xxx xxx xxx xxx	xxx xxx xxx	xxx xxx xxx xxx



## **8.0 MONITORING**

Regular and continued monitoring of (i) the status of aquatic, agro and terrestrial biodiversity in terms of species diversity, abundance and distribution, (ii) activities and processes which have or are likely to have adverse impacts on conservation or sustainable utilisation, and (iii) implementation of NBSAP should be implicit for any successful strategy for conservation, restoration and management of biological resources.

A special Biodiversity Unit need to be established in the Vice President's Office's to coordinate implementation of the strategy and report to heads of the government and other stakeholders on its implementation. The Unit should provide 5-year progress reviews of NBSAP. An Interministerial Steering Committee, chaired by the Permanent Secretary, Vice President's Office will provide the overall guidance for the implementation of this strategy. This Committee should meet twice a year, unless otherwise requested by the chairperson. An interministerial National Biodiversity Technical Committee (NBTC) will be formed to act as the Secretariat to the Steering Committee.

### **8.1 Aquatic Biodiversity**

#### **8.1.1 Monitoring the status of Aquatic Biodiversity**

Both rapid assessment techniques and intensive quantitative assessments in strategic areas or pilot zones are required. Emphasis on monitoring should be devoted to coral reefs, mangrove forests, and fish production in aquatic systems as well as water quality in terms of bacteria, phytoplankton, and zooplankton abundance and species composition. Experiences indicate that coral reefs can be well monitored by observations in permanent quadrats and line intercept transects at different levels of reefs. Under water photography and video shots should provide very useful information as well. Mangroves can be monitored by making observations in permanent plots of 10m x 10m whereas other ecosystems like seagrass beds and intertidal areas are usually monitored by examining quadrats along random transects. Fish production is usually monitored by visual census techniques involving SCUBA diving, use of under water video cameras, acoustic remote sensing and by sizes of individuals (Length-Based Fish Stock Assessment – LFSA). The role of biodiversity monitoring will be undertaken by the lead institutions, which will liaise with the National Biodiversity Technical Committee – NBTC on specific tasks or actions. Lead Institutions will prepare and present reports of their monitoring activities to the NBTC twice every year.

#### **8.1.2 Monitoring activities and processes likely to impact aquatic biodiversity conservation and sustainable utilization**

One area of monitoring impact of land based activities to aquatic Biodiversity is by water quality assessments to determine nutrient and pollutant levels. Ecological functions and performance of aquatic wetlands have to be monitored in order to render sustainable uses of wetlands. Likewise coastal tourism and beach erosion should be among strategic areas for monitoring. NBTC should co-ordinate with lead institutions on specific actions/activities for monitoring. Actual monitoring work is the responsibility of lead institutions.

### **8.2 Agro Biodiversity**

Monitoring would be carried out to measure changes in the rate of decline with respect to the status of and narrowing the knowledge gap in both cultivated plants and domesticated animal diversity; activities according to Article 7 of CBD and implementation of agro-Biodiversity strategy and action plan.

### **8.2.1 Monitoring cultivated plants and domesticated animal diversity**

Information would be gathered from production, management and utilisation processes and categories of activities on identified plant and domesticated animal diversity. The information would be gathered by monitoring through sampling and other techniques (such as EIA, Geographical Information Systems-GIS etc.) paying particular attention to enhance genetic diversity and therefore expand the food basket.

### **8.2.2 Monitoring activities according to Article 7 of CBD**

In *in-situ* conservation, information would be gathered from rehabilitation and restoration of degraded ecosystems and promotion of the recovery of threatened species; risks associated with the use and release of biological agents, such as wasps for cassava mealy-bugs, TECOBLAX for black-quarter and anthrax in livestock; alien species, such as grain-borers, Mexican poppy etc. and adoption, of indigenous knowledge. In *ex-situ* conservation, information would be gathered from measures adopted for conservation of diversity, performance of facilities established to maintain conservation of and research on cultivated plants and domesticated animal diversity and micro-organisms; measures adopted for recovery and rehabilitation of threatened species and for their reintroduction into their natural habitats and collection of wild relatives of cultivated plants. Under sustainable use of biodiversity, information would be collected from integrated conservation and sustainable use of biodiversity resources into national decision-making, adopted measures related to the use of biological resources to avoid/minimise adverse impacts on biological diversity. Also from protection and encouragement of traditional and cultural use of Biodiversity, and encouragement of co-operation between government and private sectors in developing methods for sustainable use of biodiversity resources.

### **8.2.3 Monitoring the implementation of the NBSAP**

Cultivated plants: Information will be collected on the extent to which field gene-banks, such as, sisal, coffee, tea, cocoa, etc. have been used in crop improvement programmes; replacement rate of local cultivars by introduced improved cultivars and the influence of mono-culture and extensive use of agro-chemicals on genetic erosion. Also on the potentiality of oil palms and traditional food crops and the role of indigenous agriculture in biodiversity conservation.

Horticultural plants: Information will be collected on the transmission of knowledge from one generation to another; changes in food habits; extent of consumption of traditional vegetables and fruits; external market for flowers and changes in the ecology of many areas.

Domesticated Animals: Information will be collected on the reduction of threats to domesticated animals; and closure of the knowledge gap on genetic characteristics, population dynamics and behaviour of both domesticated and wild animals; impact of ruminant animal population on environment, optimal plant-animal interaction and contribution of domesticated animals to the national economy.

Micro-organisms: Information will be collected on microbial diversity important to plants and domesticated animal diversity such as *mycorrhiza*, *rhizobium* spp., etc. For instance a survey on the effective rhizobia strains and optimum population size of rhizobia will be needed to establish successful nitrogen fixation by leguminous plants.

Local institutions will be responsible for the implementation of the above activities.

## **8.3 Terrestrial Biodiversity**

### **8.3.1 Monitoring the status of Terrestrial Biodiversity**

Both rapid assessment techniques and intensive quantitative assessments in PAs are required. Emphasis on monitoring should be devoted to NPs, GRs, CA and GCAs productivity in the network in terms of flora and fauna abundance and composition. Experiences indicate that flora in network can be monitored effectively by periodic observations made in permanent transects. For fauna, particularly, those above ground can be

monitored by aerial counting and capture-mark and recapture methods. Monitoring will be carried out once in a year by the lead institution in collaboration with other legible institutions. It will also be the responsibility of the lead institution for reporting to Vice President's Office as desired.

### **8.3.2 Monitoring activities and processes likely to impact terrestrial biodiversity conservation and sustainable utilization**

Encroachment in network areas by human activities is envisaged to be an area that impact biological diversity greatly. Therefore, these activities will be monitored to see their trend. The intensity and degree of poaching will also be an area of immense interest in monitoring.

### **8.3.3 Monitoring the implementation of NBSAP**

The lead institutions will be responsible for the implementation of respective activities. They will also evaluate to what extent has the plan minimised the threats to terrestrial Biodiversity.

## **9.0 DATA MANAGEMENT**

A need exists for establishment of biodiversity information centres at institutional, national and regional levels. This will create appropriate biodiversity database under which relevant information will be identified, acquired, organised stored/preserved and disseminated.

Capacity building for each new centre will include; foundation elements (buildings, furniture equipment – soft and hardware, resources both human and financial), support elements (planning and management of information) as well as primary elements (outputs).

The NEMC information centre be strengthened in terms of human resource, capacity, facilities (both hard and softwares) to form a strong network with database centres at SUA, National Agricultural Library, Tanzania Library Services, Tanzania Natural Resources Information Centre at IRA, Commission of Science and Technology, TISCO, Government Ministries, Muhimbili University College of Health and Allied Sciences (MUCHS) National Hospital and MUCHS, ADRI-Temeke, LPRI - Mpwapwa, NCDP, National Biodiversity Unit (VPO) etc. The networking should also involve international organisations and institutions. The Vice President's Office should establish a small committee composed of representatives of database centres to oversee biodiversity data management and establish guidelines for getting access to the database, acquiring and dissemination of information from the database.

## **10.0 REVIEW AND EVALUATION**

It is recommended that after every five years the biodiversity Unit, under the Vice President's Office should engage a team of experts or consultants to evaluate action programmes of this strategy in terms of relevance, effectiveness, efficiency, impact and sustainability. It is envisaged that the evaluation report will establish a basis for further planning and revision of the strategy and action plan.

It should be deemed important that the process of evaluating the programmes is very much banking on the availability of information from monitoring. This includes periodic reports, field evaluation and visits, symposia and seminars as well as internal program reviews. Lead institutions and collaborating institutions should submit annual progress reports to the Biodiversity unit and it is the responsibility of the Unit to arrange field evaluation visits or internal programme reviews.

## **11.0 REPORTING AND INFORMATION EXCHANGE**

### **11.1 General:**

Article 17 of the CBD provides for exchange of information. Contracting parties shall facilitate the exchange of information and such exchange shall include exchange of results of technical, scientific and socio-economic research, as well as information on training and surveying programmes, specialised knowledge, indigenous and traditional knowledge as such and in combination with the technologies referred to in Article 16. Article 26 of CBD provides that contracting parties shall at intervals to be determined by the conference of Parties, present to the conference of parties, reports on measures taken to implement the provisions of the convention. Both reporting and exchange of information are to be done locally and internationally.

### **11.2 Reporting At Local And National Level**

The Biodiversity Unit within the VPO shall maintain a national information center with on-line capabilities of information exchange, to be performed interactively with institutional sectoral information centres as well as international information centres.

Lead institutions and collaborating institutions and are expected to prepare and submit the following reports:

Half yearly monitory progress report to the NBTC  
Annual review/progress reports to the Biodiversity Unit.

The Biodiversity Unit is also responsible for the following reports:

Annual reports to the Government leaders and stakeholders.  
Five-year evaluation reports to Government leaders and all stakeholders.

### **11.3 Reporting in the context of the Convention**

It is the responsibility of the Biodiversity unit in the Vice President's Office to produce periodic reports to the conference of the parties, as called for in the Article 26 of the CBD.

## **12. REVISION**

this Biodiversity Strategy and Action Plan shall berevised after every five years. Revision should take into account strategy and programmes evaluation reports.

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## 14. ANNEXES:

### ANNEX 1:

The institutions, agencies, ministries, companies and NGOs visited during the consultations:

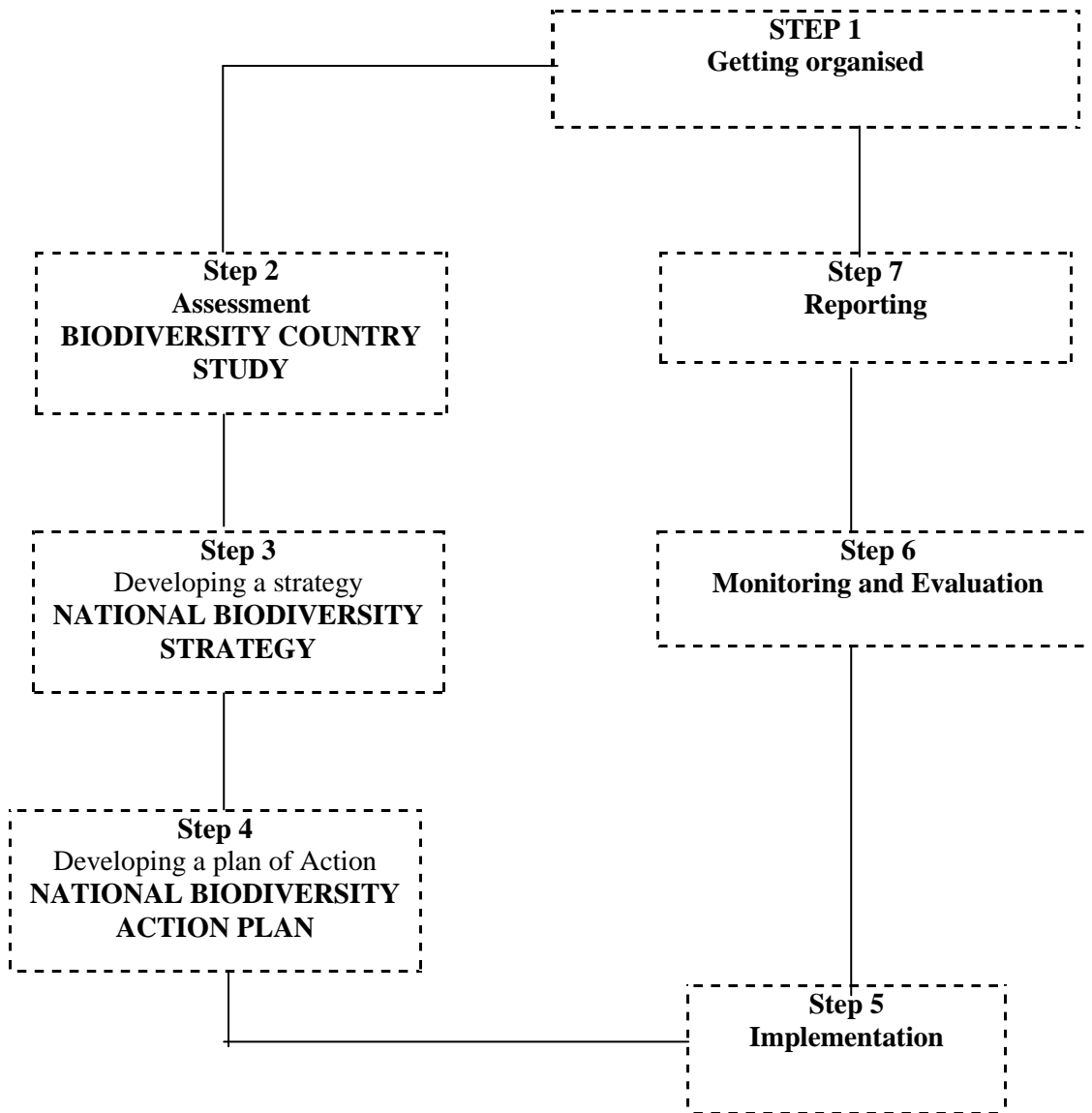
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6. Ministry of Land and Human Settlements Development.
7. Fisheries Division
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17. NGO-Oxfam-Arusha
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## ANNEX 2

### DEVELOPMENT OF A NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN: THE PROCESS

The NBSAP process adopted by Tanzania was formulated on a step by step basis guided by the jointly published guidelines for the National Biodiversity Planning by the World Resources Institute in co-operation with UNEP and IUCN in 1995 (Figure 1). The planning team also underwent a one-week training on the formulation of a NBSAP.

**Figure 1: The Process**





The Vice President's Office - Division of Environment, which is the focal point for the Convention on Biological Diversity was mandated to establish partnerships with other Government sectors and institutions, NGOs, community leaders as well as industry and business community with a view to soliciting balanced and viable inputs for the formulation the NBSAP. The co-ordinating mechanism of the NBSAP process was well tailored to accommodate consultative and participatory forums. The Vice President's Office established both a National Steering Committee composed of Permanent Secretaries from relevant ministries and a multi-sectoral Technical Committee to co-ordinate the implementation of the process under the assistance of three consultants and a National Co-ordinator. The composition of a National Steering Committee and their terms of reference are shown in Annex 1. The Composition of the Technical Committee and their terms of reference are also shown in Annex 2. The consultants were selected with respect to their expertise in three broad areas of biodiversity; namely; terrestrial biodiversity, aquatic biodiversity and agro- biodiversity. The terms of reference of the consultants and the Co-ordinator are given in Annex 3. An international consultant was also involved in the initial training and backstopping during the consultation process.

The process began with a training workshop for the planning team [Technical Committee members, the Co-ordinator and the three consultants], conducted by the international consultant in March, 1998. Sectoral consultations were launched in May 1998, and covered over twenty governmental and non-Governmental sectors and agencies throughout the country by August 1998.

Sectoral consultations ended in August 1998, paving room for yet other consultative forums. Five zonal consultative workshops were organised. These workshops focused on identification and analysis of threats, constraints, challenges and opportunities for conservation and sustainable use of biodiversity with accent on selected fragile areas, which elicit limited coverage by current or previous programmes. The workshops covered the following zonal areas: Coastal and marine (Tanga), arid and semi-arid lands (Dodoma), wetlands (Mwanza), mountainous (Morogoro) and agricultural lands (Iringa)\*. In addition, the national workshops are intended to provide a forum for engaging policy makers in the finalisation of the strategy. It is envisaged that issues of policy, legislation, institutional frameworks, public participation, awareness, resource economics and economic incentives as have been analysed in this NBSAP proposal will be discussed with a view to providing further guidance towards drawing a practical, implementable, viable and concrete NBSAP for Tanzania.

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## Annex 4

### PROPOSED ACTION PROGRAMMES

69. Table 1: Prionitized Action Programmes for aquatic, agro and terrestrial biodiversity presented under seven major categories.

#### 1. POLICY, REGULATORY ISSUES AND INTERNATIONAL CO-OPERATION

Aquatic biodiversit-Action Programmes	Agro-biodiversit-Action Programmes	Terrestrial biodiversit-Action Programmes.
<p>Priority I: 1.1.1 Formulate and effect regulations for the Deep - Sea Fishing Authority as per Act No. 1 of 1998.</p>	<p>Priority I: 1.1.1 Harmonise policies and legislation of MAFS with those of VPO the Ministry of Natural Resources and Tourism (MNRT), Ministry of Water and Livestock Development (MWLD), Ministry of Energy and Minerals (MEM) etc.</p>	<p>Priority I: 1.1.1 Encourage the involvement of donors and conservation agencies to support Tanzania to conserve her biological resources for national, regional and international benefits</p>
<p>1.1.2 Develop contingency measure for management and containment of environmental adverse impacts to aquatic resources.</p>	<p>1.1.2 Enhance THE use of biogas and harness solar and wind energies.</p>	<p>1.1.2 Co-operate with any party including neighbouring countries in the conservation of trans-boundary ecosystems and migratory species</p>
<p>1.1.3 Facilitate availability and access of inputs for harvesting of aquatic biodiversity.</p>	<p>1.1.3 Enhance sectoral ministries to address biodiversity issues.</p>	<p>1.1.3 Participate in relevant international treaties and conventions</p>
<p>Priority II: 1.2.1 Establish Regional fisheries management bodies for the Great Lakes.</p>	<p>1.1.4 Establish proper policy, legislative framework for conservation and sustainable utilisation of agro-biodiversity.</p>	<p>Priority II 1.1.4 Promote policies within the framework of such treaties and conventions as are consistent with Tanzania positions on conservation of terrestrial Biodiversity</p>
<p>1.2.2 Establish regional research and management collaboration with some countries of the Western Indian Ocean Region</p>	<p>1.1.5 Review and amend obsolete laws and legislation</p>	<p>1.2.1.Ensure EIA process for proposed developments in PAs in order to minimise potential damage to the PAs environment</p>
<p>1.2.3 Establish legal boundaries of the EEZ for Tanzania</p>	<p>1.1.6 Improve enforcement of laws and by-laws at district and village levels.</p>	<p>1.2.2 Encourage legal and sustainable trade in Terrestrial Biodiversity and its components or species in which it is appropriate to trade</p>

Priority III: 1.2.4 Establish Environmental Tribunals at District level.	<i>Priority I:</i> 1.2.1 Improve the Centres of technology transfer	Priority II: 1.2.3 Develop mechanism for technological and financial co-operation to enhance the capacity for sustainable utilisation and management of terrestrial Biodiversity
Priority I: 1.3.1 Enact legislation for aquatic resources management	1.2.2 Enact environmental laws.	1.2.4 Develop sound management policies and enabling, legal regulatory and institutional environment for rural communities and private sector to participate in biological resources utilisation.
1.3.2 Establish Coastal Zone Management strategy and consolidate the current initiatives.	1.2.3 Establish community based environmental tribunals [Baraza] at District and village levels.	1.2.5 Reviewing and up-dating of the existing conservation legislation
1.3.3 Establish operational by Laws to safeguard conservation and sustainable utilization of aquatic biodiversity.	1.2.4 Establish agro-biodiversity environmental impact assessment guidelines.	Priority III 1.2.6 Manage Species types and specific components of Biodiversity through relevant institutions.
Priority II: 1.3.4 Review and update the Fisheries legislation - Act. No. 6 of 1970	Priority II 1.2.5 Enact laws to empower Local Government to protect agro-biodiversity resources	1.2.7 Issue permits required by law for Biodiversity related activities and for regulating the access to, utilisation of trade in, the terrestrial Biodiversity resource
1.3.5 Assess and improve current biodiversity marketing infrastructure.	Priority III 1.2.6 Establish economic incentives	
<b>2. PLANNING AND CO-ORDINATION</b>		
Priority I: 2.1.1 Develop policy guidelines for aquaculture /mariculture and sports fishing.	<i>Priority I:</i> 2.1.1 Establish agro-biodiversity environment impact assessment guidelines	Priority I: 2.1.1 Strengthen the capacity of local communities to administer and manage Pas, (WMA, Community Forest)
2.1.2 Initiate establishment of voluntary CBOs, NGOs, Cooperatives and Associations at District level and establish environmental committees at village level	Priority II: 2.1.2 Formulate and ensure use of sustainable land use plans.	Priority II: 2.1.2 Involve relevant stakeholders in determining and distribution of revenue and benefits
Priority II: 2.1.3 Establish Development Trust Funds, Incentives and Credit Schemes to promote artisanal exploitation of biodiversity	Priority III: 2.1.3 Establish a mechanism for better community participation in planning and management of Agrobiodiversity.	2.1.3 Recognise local community's user-rights
Priority I: 2.2.1 Establish quality control and inspection Centres	2.1.4 Establish cultural and legal mandate of agro-biodiversity resources control	2.1.4 Ensure biological resources are not undervalued by setting appropriate competitive prices and fees for various forms of

for aquatic biodiversity components		biological resource utilization
Priority II: 2.2.2 Develop marine resources harvesting and processing technologies as well as market information.	Priority I: 2.2.1 Establish and maintain facilities for in-situ and ex-situ conservation of agro-biodiversity.	Priority III: 2.1.5 Assume overall responsibility (Wildlife and Forest Division) for the management of all terrestrial species of mammals, birds, reptiles, amphibians and invertebrates, forest plants and marine species not covered by fisheries legislation.
Priority I: 2.3.1 Integrate biodiversity conservation in national economic planning.	2.2.2 Develop reliable markets and marketing infrastructures to enhance exchange of goods and services (Tanzania)	Priority I: 2.2.3 Adopt an efficient and flexible approach to collecting revenue
2.3.2 Establish sectoral and cross-sectoral co-ordination and harmonisation mechanism.	Priority III: 2.2.4 Improve and integrate current traditional conservation practices/ technologies in the production systems.	
Priority III: 2.3.1 Establish environmental legislation.	2.2.5 Establish livestock and human migration guidelines.	
<b>3. EDUCATION AND INFORMATION</b>		
Priority I: 3.1.1 Review, improve and update academic curriculum of schools (Primary, Secondary, High Schools and Higher Learning Institutions).	Priority I: 3.1.1 Improve agriculture and livestock extension system	Priority I: 3.1.1 Institutionalise extension services and supporting them with adequate levels of manpower, funds and equipment in order to strengthen their capability.
3.2.1 Create awareness and sensitisation of stakeholders on the need for aquatic biodiversity conservation and its sustainable utilization.	Priority II: 3.1.2 Involve private sector in industrial commodity research and extension services.	Priority II: 3.1.2 Promote communication and collaboration with other sectoral community based extension services
Priority II: 3.3.1 Establish national, institutional and regional biodiversity database /information centres.	Priority I: 3.2.1 Raise the educational standard and improve curriculum of primary and secondary schools and also Institutions of Higher Learning.	3.1.3 Create the widest possible understanding and support for terrestrial Biodiversity conservation by preparing and distributing posters, magazine and pamphlets and use of other news media.
<b>4. RESEARCH AND DEVELOPMENT</b>		
Priority I: 4.1.1 Assess biodiversity base potential in marine and freshwaters of Tanzania to govern exploitation and avoid depletion of stocks.	Priority I: 4.1.1 Improve vegetable seed production	4.1.1 Focus research and monitoring on levels, on economics of biological resource use, human-wildlife interactions, sociology of rural communities, basic knowledge of ecosystem processes and biology of indigenous threatened endemic species.



4.1.2 Aquaculture research to generate applied information and development of pamphlets to guide fish farming in the country.	Priority II: 4.1.2 Establish real value of agro-Biodiversity.	Priority III: 4.1.2 Regulate and monitor Biodiversity (wildlife and forestry) research in Tanzania.
Priority II: 4.1.3 Conduct Applied Research in Taxonomy and Ecosystem diversity.	4.1.3 Improve management of dryland resources.	
4.1.4 Research in Hydrobiology and environmental pollution in aquatic Wetlands.	4.1.4 Establish appropriate irrigation systems under wetlands.	
<b>5. ECOSYSTEMS, SPECIES CONSERVATION AND SUSTAINABLE UTILIZATION</b>		
Priority I 5.1.1 Prevention and control of illegal fishing practice through inspectorate services/surveillance	Priority I: Ensure 5.1.1 Pesticide quality control, importation and application of user-friendly technologies (Integrated Pest Management (IPM) Technologies)	Priority I: 5.1.1 Maintain biological diversity of the ecosystem, species and genetic levels by conserving core areas of high Biodiversity value and species habitats including fragile ecosystems such as dryland, mountainous areas and wetlands through in-situ measures (Protected areas)
5.2.1 Water quality monitoring and inspection	Priority I: 5.1.1 Establish new agro-forest lots and protect resources for the present and future generations.	5.1.2 Ensure ownership of, and overall responsibility for management of core Biodiversity protected areas by the state, to ensure that national priorities are addressed and abuses are controlled.
5.2.2 Biodiversity Research/Inventory Studies for conservation information (endemism, rare, endangered, vulnerability).	Priority II: 5.1.2 Reclaim mines.	5.1.3. Co-operate with other law enforcement agencies in the execution of functions relating to biological resources offences,
5.2.3 Identify any new important areas for in-situ conservation and consolidate the existing Parks and reserves	5.1.3 Prepare implementable long-term sustainable land use plans and practices.	5.1.4 Co-operate and enrol the good will of rural communities ensuring sustainable utilisation of terrestrial Biodiversity.
5.2.4 Assess and inspect industrial effluent treatment and engagement of clean production standards	Priority III 5.2.1 Promote agro-biodiversity resources use.	Priority II: 5.1.5 Develop management plans and zones prescribing level and types of use in each zone, to ensure attainment of management objectives of each PA and other ecosystems of significant values.
5.2.5 Inspect, monitor and dispose obsolete agro-chemicals	5.2.2 Promote indigenous knowledge and practices in conservation of agro biodiversity resources.	5.1.6 Manage wildlife resources basing on the ecosystem rather than administrative boundaries, due to mobility nature of wildlife, availability of resources and habitat coverage.
5.2.6 Develop mechanisms to prevent the introduction and spread of noxious waterweeds and related pests.	5.2.3 Promote conservation, sustainable and equitable utilisation of indigenous Agro-Biodiversity.	5.1.7 Prepare management plans that include Biodiversity conservation and management guidelines with emphasis on endangered/threatened ecosystem and habitats in order to ensure their survival

Priority II: 5.3.1 Establish of mechanisms for benefit sharing among stakeholders as incentives for conservation	4.1.5 Adapt to climate change.	5.2.2 Establish effective informal networks and databases at local and national levels.
<b>6. BIODIVERSITY MONITORING AND EVALUATION</b>		
Priority II: 6.1.1 Monitor and evaluate Biodiversity status and trends.	Priority I: 6.1.1 Enhance monitoring and evaluation of agro-biodiversity	6.1.1 Facilitate regular inventories and mapping of existing Biodiversity, status coverage of catchment and habitats and coastal forest and wetlands.
Priority III: 6.1.2 Develop mechanism for aquatic Biodiversity project co-ordination, monitoring and evaluation of projects, which are funded by government, foreign investors and donors.		6.1.2 Promote research and monitoring in management planning of PAs according to national research plans.
<b>7. CAPACITY BUILDING</b>		
Priority I: 7.1.1.Enhance local capacity through/training.	Priority I: 7.1.1 Retrain extension workers to appreciate the need for Agro-Biodiversity conservation and sustainable utilisation.	Priority I: 7.1.1 Encourage and facilitating training in ecology and management and other skills necessary for the development of the biological diversity (fauna and flora).
7.1.2 Provide Research and training institutional support	7.1.2 Ensure On farm research to foster capacity building on individual farmers.	7.1.2.Monitor training standards in training institutions in the country
Priority II: 7.1.3 Improve capacity of Law enforcement and extension services staff.	Priority II: 7.1.3 Increase the number of community development officers [as change agents and act as catalysts in development programmes] at village level	Priority II: 7.1.3 Motivate the natural resources sector personnel who are protecting and conserving Biodiversity resource by improving working conditions, remuneration, providing adequate working equipment and sufficient incentives.
7.1.4 Establish Biodiversity Information support Centres in Districts.	7.1.4 Revive and equip Hydrometeorology Stations.	7.1.4 Develop programmes and criteria for staff development based on manpower needs assessment.

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**ANNEX 5:** TOR for the Consultants

Under the direction of the National Project Coordinator and in close co-operation with other consultants for the National Biodiversity Strategy and Action Plan of the Convention on Biological Diversity, the consultant shall develop strategies and actions relating to Aquatic, Agro and Terrestrial Biodiversity for their conservation and rational utilisation.

The specific terms of reference for the consultant on Aquatic, Agro and Terrestrial Biodiversity will be as follows:

### Scope of work

Evaluate available information on the status and trends of country's Aquatic, Agro, and Terrestrial Biodiversity and its management, with respect to existing laws, policies, strategies, programmes, budget and human capacity and assemble the necessary information to fill the gap.

Collaborate closely with members of the Technical Committee; undertake sectoral consultations process (Forestry, water, Fisheries, wildlife, Agriculture, Livestock including their related institutions, and other related sectors) with a view to establish proposals for a National Biodiversity Strategy and Action Plan on Aquatic, Agro and Terrestrial Biodiversity.

Organize zonal consultations to obtain necessary information for Strategy and Action Plan formulation relating to Aquatic, Agro and Terrestrial Biodiversity.

Propose national goals and objectives for a National Biodiversity Strategy with respect to Aquatic, Agro and Terrestrial Biodiversity.

Propose a Strategy and Action for Aquatic, Agro and Terrestrial Biodiversity.

### Timing and reporting

Submit to the Coordinator a 30 page report (A4 paper; single spacing, font 12 and a Diskette containing the same report), which should summarise the findings above and define the following:-

-which organisation, institutions, ministries will implement which activities in the National Biodiversity Strategy as it relates to Aquatic, Agro and Terrestrial Biodiversity.

-In which location, or region by what means, and with which people, institutions, facilities, and funds, and set a time table for action.

Duration of the assignment

The assignment will be conducted for a total of five months spread over a period of ten months.

### Remuneration

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The consultants will be remunerated according to NORAD guidelines for remuneration of consultants and allowances for short and long-term studies for consultants in Tanzania November 1996.