REPUBLIC OF GHANA

MINISTRY OF ENVIORNMENT, SCIENCE, TECHNOLOGY, AND INNOVATION

NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN

ACCRA

NOVEMBER 2016

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ABBREVIATIONS/ ACRONYMS

ABS	Access and Benefit Sharing
BBOP*	Biodiversity and Business Offset Programme
BOD	Biochemical Oxygen Demand
CARIAA	Collaborative Adaptive Research Initiative in Africa and Asia
CBD	Convention on Biological Diversity
CCRF	Code of Conduct for Responsible Fisheries
CHM	Clearing House Mechanism
CITES	Convention on the International Trade in Endangered Species of Wild Fauna and Flora
CREMA*	Community Resource Management Area
CRIG	Cocoa Research Institute of Ghana
CSIR	Council for Scientific and Industrial Research
CSOs	Civil Society Organisations
DGN	Drift Gill Nets
DPs	Development Partners
ECOWAS	Economic Community of West African States
EPA	Environmental Protection Agency
FASDEP*	Food and Agriculture Development Policy
FC	Forestry Commission
FDMP	Forestry Development Master Plan
GAEC	Ghana Atomic Energy Commission
GCLME	Gulf of Guinea Current Large Marine Ecosystem
GEC	Global Environmental Change
GES	Ghana Education Service
GFIP	Ghana Forest Investment Plan
GMA	Ghana Maritime Authority
GMOs	Genetically Modified Organisms
GOOS	Global Ocean Observing System
GSA	Ghana Standards Authority
GTI	Global Taxonomy Initiative
FAO	Food and Agriculture Organisation
FIP	Forest Investment Plan
IAS*	Invasive Alien Species
IBC	Institutional Biosafety Committees
ICFG	Integrated Coastal and Fisheries Governance
IGCC	Interim Guinea Current Commission
IPCC	Intergovernmental Panel on Climate Change
LMOs	Living Modified Organisms
MCSE	Monitoring, Control, Surveillance & Enforcement
MDAs	Ministries, Departments and Agencies
MESA	Monitoring of Environment and Security of Africa
MESTI	Ministry of Environment, Science, Technology & Innovation
METASIP	Medium Term Agriculture Sector Investment Plan
MFARI	Ministry of Foreign Affairs and Regional Integration

MMDAs	Metropolitan, Municipal and District Assemblies
MOE	Ministry of Energy
MOFA	Ministry of Food & Agriculture
MoFAD	Ministry of Fisheries and Aquaculture Development
MoJ&AGD	Ministry of Justice and Attorney General's Department
MoTCCA	Ministry of Tourism, Culture and Creative Arts
MOTH	Ministry of Transport and Highways
MOTI	Ministry of Trade and Industry
MLNR	Ministry of Lands and Natural Resources
NADMO	National Disaster Management Organisation
NBA	National Biosafety Authority
NBSAP	National Biodiversity Strategy and Action Plan
NBC	National Biodiversity Committee
NDPC	National Development Planning Commission
NEPAD	New Partnership for African Development
NGOs	Non-Governmental Organizations
NREG*	Natural Resource Environmental Governance
NRMP	Natural Resources Management Programme
PADP*	Protected Areas Development Programme
PGRRI	Plant Genetic Resources Research Institute (CSIR)
PPRSD	Plant Protection Regulatory Services Directorate (MoFA)
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SDGs	Sustainable Development Goals
SFMP	Sustainable Fisheries Management Programme
TAC	Technical Advisory Committee
TK	Traditional Knowledge
UNCED	United Nations Conference on Environment and Development
USAID	United States Agency for International Development
WARFP	West African Regional Fisheries Programme
WRC	Water Resources Commission

**Abbreviations with asterisks are defined in the glossary of terms*

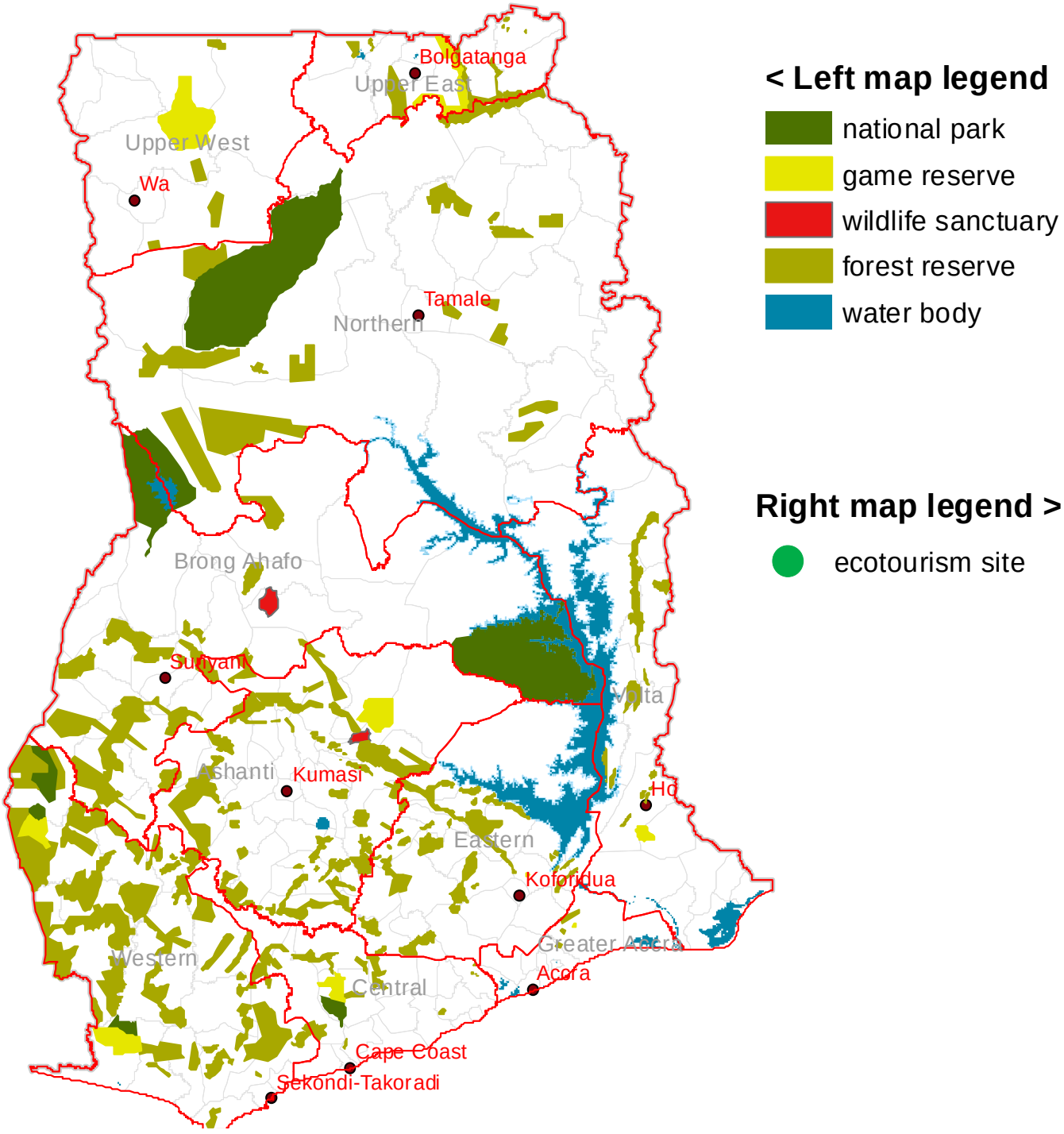

Figure 1: Protected Areas in Ghana

FOREWORD

Ghana is rich in terms of biodiversity. As a developing economy, majority of the population depends on biodiversity for their livelihoods. The benefits of plant, animal, water resources and microbial biodiversity to the people of Ghana are enormous. These range from economic (source of rural and urban income, export earnings), social (as sources of food and food security, medicine for health maintenance and cure of diseases and ailments), religious and cultural (avenue for spiritual inspiration), aesthetic and recreational to ecological (watershed and catchment area protection, wind/storm break, forest regeneration, soil fertility maintenance, etc.) and environmental (maintenance of atmospheric carbon levels, absorption of pollutants, etc.). Therefore, there is an urgent responsibility on our generation to pay particular attention to biodiversity conservation. We need to conserve and manage biodiversity to ensure continuous and equitable distribution of the benefits associated. Biodiversity must therefore be managed in the context of ensuring equitable benefits to people – both current and future generations.

Biodiversity is our heritage, a valuable asset ecological integrity and economic transformation. If managed intelligently, biodiversity can serve as the catalyst for development and a conduit for poverty alleviation. We must put our hands on the deck to conserve biodiversity in the spirit of sustainable development. Mainstreaming biodiversity into our developmental efforts should not be by default. It requires careful planning and strategies that will keep our commitments under the Convention on Biological Diversity alive.

Ghana has updated and reformulated the National Biodiversity Strategy and Action Plan (NBSAP) with the view to mainstreaming biodiversity in national development and protecting and conserving our valuable biological resources in all the ecological zones. The NBSAP seeks to conserve and manage terrestrial and aquatic biodiversity to ensure sustainable and equitable benefits to all Ghanaians now and in the future. The plan puts strong emphasis on developing systems and technologies that will protect threatened species whiles promoting sustainable management of the endangered natural environments. The innovative aspects of the plan are measures to safeguard parts of the deep marine environment that are particularly rich in biodiversity. The plan seeks to create marine protected areas in light of existing protection mechanisms.

The era has come for Ghana to tread on the path of humanist ecology. We need to integrate, in our quest for economic and human progress, an awareness of our duties to nature and our responsibilities to future generations. We need to develop good scientific information and understanding; strong institutional capacity and commitment; strategic cross-sectoral and public private partnership; and biodiversity-friendly policies for socio-economic transformation. Better co-ordination between the different agencies responsible for managing the natural environment will create a veritable force to conserve and sustainably utilise our natural resource base, upon which we ultimately depend for our basic needs, survival, and development.

We have the responsibility to ensure that Ghana becomes and remains the beacon of hope for biodiversity conservation globally. In all these our communities must stand as the custodians of conservation and the guarantors of biological diversity.

Hon. Mahama Ayariga, MP
Minister of Environment, Science, Technology and Innovation
Accra

EXECUTIVE SUMMARY

Ghana signed and ratified the Convention Biological Diversity during the Earth summit in June 1992 and 1994 respectively. Article 6 of the Convention provides for countries to develop national strategies for the conservation and sustainable use of their biological diversity. In fulfilment of this provision in the Convention, the Ministry of Environment, Science Technology and Innovation (MESTI) in collaboration with relevant stakeholders developed the first National Biodiversity Strategy in 2000 as the principal instrument for implementing the Convention at the national level.

In spite of the rich biological resources, and the existence of the national strategy since 2002, Ghana continues to suffer from rapid deforestation and destruction of biodiversity. Ghana's land cover profile has been changing rapidly**.** During the last two decades, grasslands have decreased while the other types have increased. Grasslands reduced by about 34,000 km^2, or 32 percent; forests gained 6,000 km^2 or 6 percent, crop cover gained 22,000 km^2 or 66 percent; settlements gained 2,400 km^2 or about 170 percent; and wetlands gained 2,000 km^2 or 13 percent. The loss of grassland nationally and the gains in forests, cropland and wetlands have contributed to habitat loss thereby having a negative effects on biodiversity composition.

Excessive timber harvesting, slash-and-burn agriculture, illegal surface mining, uncontrolled hunting, wildfires and woodfuel production are the greatest threats. Official estimates suggest that logging is at about 4 times the sustainable rate. Indeed, Ghana was the first country to have lost a major primate species like red colobus monkey since the Convention on Biological Diversity came into force. Habitat loss is the key factor in loss of biodiversity in Ghana.

A recent review of the status of biodiversity conservation in Ghana concluded the 2000 National Biodiversity Strategy did not adequately respond to the AICHI targets of the global strategic plan for biodiversity. The strategy was now out-dated and needed a review to reflect current national efforts in fulfilling the objectives of the Convention. The MESTI therefore constituted a national task force, initiated studies, and conducted stakeholder's workshops to update and reformulate the National Biodiversity Strategy and Action Plan by aligning the targets and the action plans to the national priorities and stakeholder's expectations.

Within the framework of national development agenda, Sustainable Development Goals, National Climate Change Action Plan, Forestry Development Master Plan and the international conventions that Ghana has signed, the national biodiversity conservation **vision** is that:

> *By 2030, effective systems would be in place to ensure that biodiversity in Ghana is valued, conserved, restored and wisely used to maintain ecosystem services, and sustain life support services for a healthy planet whiles ensuring continuous and equitable sharing of the costs and benefits arising therefrom, to the well-being, prosperity and security of all Ghanaians*.

Following from this vision the **mission** is

> *To take effective and urgent actions to minimise the loss of biodiversity in order to ensure that by 2030 ecosystems in Ghana are resilient and continue to provide essential*

services, thereby securing the country's variety of life, and contribute to human well-being, and poverty eradication.

As a signatory to the international convention on biodiversity the goal of the NBSAP is

> *To pursue effective policies, regulations, and programmes that would ensure that biodiversity is valued, conserved, restored and wisely used to maintain ecosystem services, sustain life support services and promote continuous and equitable flow of benefits to all Ghanaians.*

The effective management of biodiversity to meet the national development objectives on biodiversity is guided by the four strategic objectives:

- to address the underlying causes of biodiversity loss by mainstreaming biodiversity into all sectors of government and society programmes;
- to improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity;
- to enhance the benefits of biodiversity to all sectors of the economy;
- to enhance implementation of national biodiversity action plan through participatory planning, knowledge management and capacity building.

The strategic objectives are to be achieved over 25 years within a three phase programme - a short term programme of 5 year (2016-2020); 10-year medium term programme (2021-2030) and a 10-year long term programme (20301-2040). The total cost of implementing the short term programme is GHS 534.5 million.

In keeping with Ghana's commitment under the Convention, the strategic objectives have been formulated into a short term programme and actions plans to be implemented between now and 2020 by various sector ministries. The activities identified fit into the on-going national development agenda with funding from national annual budget and development partners. Guided by the Aichi objectives, the implementation of the each target has been summarised into action plans to indicate the main planned activities, target and indicators that will provide the enabling conditions and incentives necessary to achieve the goals or priority areas and targets of the NBSAP. The action plan determines what is to be done, who does what, where, when, and how. For easy monitoring each plan has been presented in tabular form.

The NBSAP has four components and 20 action plans as follows:

COMPONENT 1: ADDRESS THE UNDERLYING CAUSES OF BIODIVERSITY LOSS BY MAINSTREAMING BIODIVERSITY ACROSS GOVERNMENT AND SOCIETY

The planned action plans are:

Action Plan 1: Create public awareness of the values of biodiversity to promote conservation, restoration and sustainably usage (Aichi Target 1)

Action Plan 2: Integrate and mainstream biodiversity values into national accounts and local development and poverty reduction strategies and planning processes with reporting systems (Aichi Target 2)

Action Plan 3: Incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed (Aichi target 3).

Action Plan 4: Governments, business and stakeholders develop plans for sustainable production and consumption and keep the impacts on resource use within safe ecological limits (Aichi Target 4).

Action Plan 5: Reducing the rate of loss of all natural habitats, including forests, to at least half and where feasible brought close to zero, and degradation and fragmentation significantly reduced. (Aichi Target 5)

Action Plan 6 All stocks managed and harvested sustainably, so that overfishing is avoided (Aichi Target 6).

Action Plan 7: Areas under agriculture, aquaculture and forestry managed sustainably, to ensure conservation of biodiversity (Aichi Target 7).

Action Plan 8: Minimizing pollution, including excess nutrients, to levels that are not detrimental to ecosystem function and biodiversity (Aichi Target 8).

Action Plan 9: Ensuring that invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment (Aichi Target 9)

Action Plan 10: Minimizing the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification, so as to maintain their integrity and functioning. (Aichi Target 10)

COMPONENT 2: IMPROVE THE STATUS OF BIODIVERSITY BY SAFEGUARDING ECOSYSTEMS, SPECIES AND GENETIC DIVERSITY

Action Plan 11: Ensuring that at least 17 per cent of Terrestrial and Inland water, and 10 per cent of Coastal and Marine Areas are Conserved through Systems of Protected Areas (Aichi Target 11)

Action Plan 12: Preventing the extinction of known threatened species and their conservation status, particularly of those most in decline, and improving and sustaining their status (Aichi Target 12)

Action Plan 13: Maintaining the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives (Aichi Target 13)

COMPONENT 3: ENHANCE THE BENEFITS TO ALL FROM BIODIVERSITY AND ECOSYSTEM SERVICES

Action Plan 14: Restoring and safeguarding ecosystems that provide essential services, including ecosystem services (Aichi Target 14)

Action Plan 15: Enhancing ecosystem resilience and restoration to promote the contribution of biodiversity conservation to carbon stocks and ensure restoration of at least 15 per cent of degraded ecosystems restoration. (Aichi Target 15)

Action Plan 16: Operationalising the Nagoya protocol on access and benefits sharing (Aichi Target 16)

COMPONENT 4: ENHANCE STRATEGY IMPLEMENTATION THROUGH PARTICIPATORY PLANNING, KNOWLEDGE MANAGEMENT AND CAPACITY BUILDING

Action Plan 17: Developing and adopting a policy instrument, for the implementation of an effective, participatory and updated NBSAP (Aichi Target 17)

Action Plan 18: Ensuring that the traditional knowledge, innovations and practices of indigenous and local communities and their customary use, are respected (Aichi Target 18)

Action Plan 19: Knowledge, on the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied (Aichi Target 19)

Action Plan 20: Mobilizing increased financial resources for effectively implementing the strategic plan for biodiversity 2016- 2020 from all sources (Aichi Target 20)

The implementation of the NBSAP has been designed to be implemented by ministries, departments and agencies outside the Ministry of Environment Science, Technology and Innovation. The successful implementation of the NBSAP requires a concerted action on all levels of governance including the traditional authorities, the private sector, civil society organizations and the Government of Ghana as a whole. The key considerations in the implementation of NBSAP will be efficient allocation of resources, building institutional capacities, strengthening linkages between different stakeholders and coordinating their activities. MESTI will be the lead ministry in the implementation and, in most cases, lead in the coordination of the sector activities.

In order to ensure effective monitoring and reporting on the NBSAP, an overall results framework has been developed. The framework gives a clear guidance on the indicators, which can be used to monitor the programme implementation and to review the plan.

CHAPTER ONE: GENERAL INTRODUCTION

1.1 Territorial Area

Ghana is a West African State lying along the Gulf of Guinea and stretching between longitudes 3^o 5'W and 1^o 10'E and latitudes 4^o 35'N and 11^o N. It covers an area of about some 239,000 km^2, with the Exclusive Economic Zone (EEZ) constituting an additional 110,000 km^2 of the sea to the territorial area. Ghana has a southern coastal shoreline of 550 km and is bordered by Togo to the east, La Cote d'Ivoire to the west and Burkina Faso to the north (Figure 2).

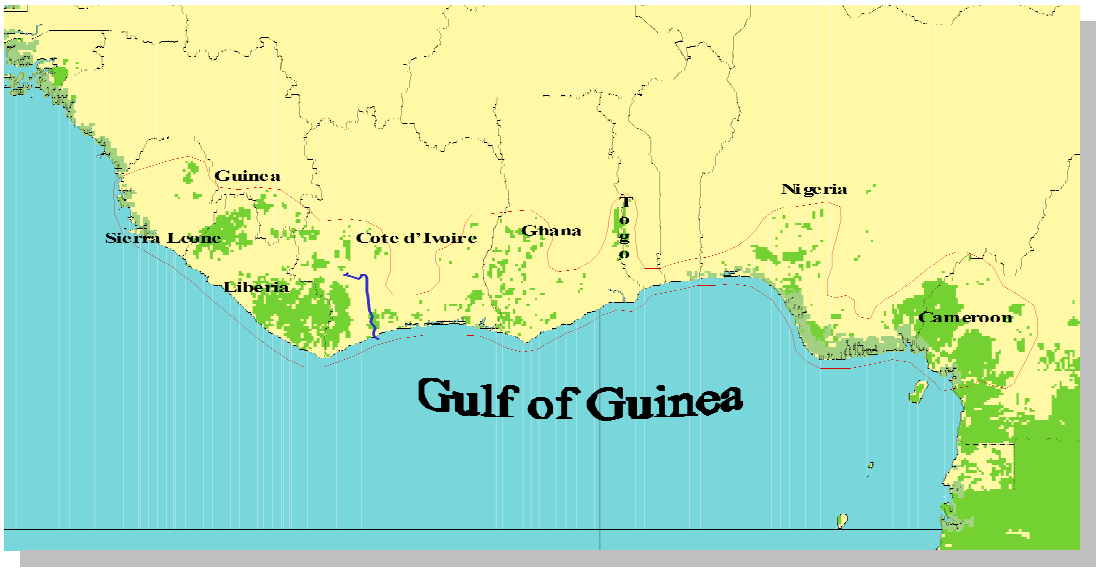

Figure 2: Remaining Fragments of Guinea Forest

1.2 Biogeographical Zones

Ghana extends over three main biogeographic regions (Figure 3): the Guinea Congolian in the south-west (2); the Sudanian in the north (4); and the Guinea-Congolian/Sudanian transitional zone in the middle and in the south-east (3). A fourth region, the Volta mainly mountainous, has recently been identified based on the butterfly fauna in the country.

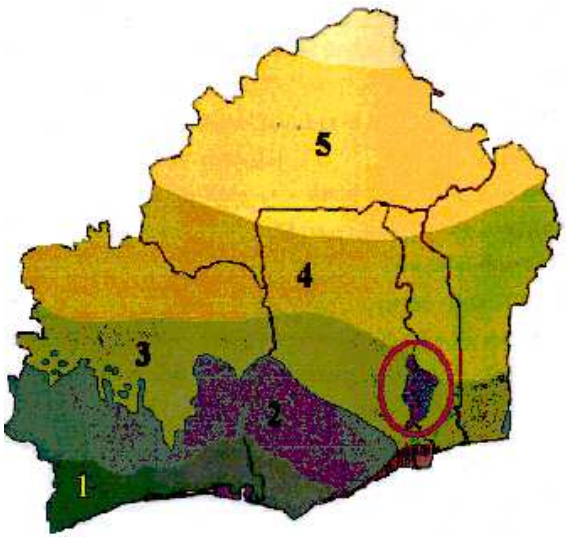

Figure 3: Biogeographic zones

1.3 Biodiversity and its Significance

Biological diversity has been defined 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 (Convention on Biological Diversity (CBD), 1992 Article 2). Within this context, biodiversity refers to the variability of earth's living things and their interactions in nature among themselves and their habitats. Biological diversity is not confined solely to the species of animals, higher plants, mosses, lichens, fungi and microorganisms but is further subdivided into sub-species and regional varieties, and also into different genetic populations. For this reason, biological diversity includes genetic diversity within a species, as well as the habitats of organisms and ecosystems. Invariably, biodiversity encompasses everything which contributes to the diversity of living nature. The richness of species in an area indicates the total biodiversity of that particular area as these species exhibit the genetic variation among individuals and populations.

Biodiversity involves an understanding of the form and functions of the individual organism as it exists and interactions with other individual organisms of the same or different form, function and character in that habitat. It also involves an understanding of its importance in the ecological system to which it contributes and the services it provides which benefit human populations. Biodiversity may thus be conceived as that which provides food, feed, fuel, shelter, medicines and other tangible and intangible products which contribute to human wellbeing. Biodiversity is indeed the natural capital, the stock of natural ecosystems, which provide valuable services for any human activity.

Biological diversity is the fabric of human life on earth for plants, animals, fungi and micro-organisms and supports the pillars of the substance cycle. They purify water and air, ensure fertile soils and a pleasant climate, are used for human nutrition and health, and provide both the basis and impetus for pioneering innovations.

Over the years the world has experienced tremendous increase in human numbers resulting in unsound environmental technologies to promote economic growth and unsustainable patterns of consumption of the goods and services provided by nature. These human activities are degrading and in some cases destroying the ability of biological diversity to continue to perform these services and thus undermining human welfare. For example, the total landings of the small pelagic in Ghana have decreased from a high of 277,000 MT in 1996 to 92,000 MT in 2011 (USAID/Ghana ICFG Project, 2015). This situation has attracted global concerns about environmental destruction and loss of species and ecosystems in Ghana.

The United Nations Convention on Biological Diversity (CBD) was one of the three multilateral agreements on the environment which all nations of the world signed and approved during the United Nations Conference on Environment and Development (UNCED) meeting in Rio de Janeiro, Brazil in June 1992. The objectives of the CBD are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding. Ghana signed and later ratified

the CBD in August 1994. In signing and ratifying the Convention, it was understood that Ghana will implement all the Articles enshrined therein. Ghana thus became a Party to the convention with all the privileges and rights associated with it.

The Convention and its accompanying National Strategy are based on the principle that the protection and use of biodiversity should always be considered from both an ecological, economic and social viewpoint. Ecological supportability should be the yardstick of all economic and social decisions. Within the context of the Convention, this is referred to as the "ecosystem approach" (resolution V/6 of the CBD).

1.4 Biodiversity of Terrestrial Ecosystem in Ghana

The terrestrial ecosystem of the country spread in two major biomes, namely, the tropical high forest and the savannahs subdivided into six agro-ecological zones to reflect the climate, vegetation and soils. These zones are: Sudan, Guinea and Coastal Savannahs; the Forest-Savannah Transitional, the Semi-deciduous Forest and the High Forest zones (Figure 4). Each of these ecological zones has unique biological resources that define the area's human, faunal and floral population. In addition, there is the wetland ecosystem where water is the primary factors controlling the environment and the associated plant and animal life. They occur where the water table is at or near the surface of the land or where the land is covered by shallow water. Wetlands in Ghana are unique ecosystems that provide valuable products and services to satisfy social, economic and ecological needs at the local, national and international levels. Ghana's wetlands support fisheries, play an important role in flood assimilation and provide a source of food, medicines, fuel and building materials for local people and are, therefore, important.

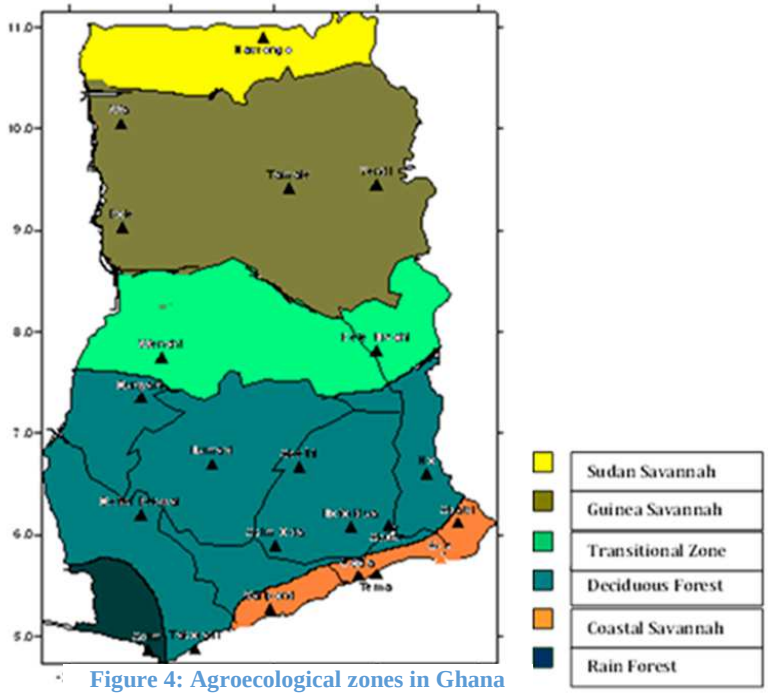

Figure 4: Agroecological zones in Ghana

1.4.1 The Flora of Terrestrial Systems

Both indigenous and introduced species have been considered in the assessments of the country's floral diversity. A total of 3,600 species of the major regional centres of endemism (see White, 1965) represent the three major taxonomic groups. Floral diversity is more pronounced among the angiosperms represented with well over 2,974 indigenous and 253 introduced species. Among the various vegetation types of the tropical rain forest, it is the wet evergreen forest type

in the south-western part of the country that exhibits the highest level of endemism and species richness. Information on species diversity and endemism in the savannah biomes is very sparse. Biological diversity of species in the savannah woodlands and gallery forests of the savannahs may show greater species richness than the dry savannahs.

Within Ghana there are areas of high biological diversity, referred to as "biological hotspots" the so-called "hot spots". The most notable of such areas is the Ankasa and Nini-Suhien Conservation Area in the south-western portion of Ghana (Conservation International (CI), 2002a). The apparent climatic diversity and inherent stratification of this type of vegetation explains why biological diversity is greatest here.

In West African, the Upper Guinea Forest Ecosystems is also recognized as one of the 25 global biodiversity hotspots. This is attributable to the fact that even though there is a very high concentration of biological diversity, the entire area has lost about 80% of the original forest cover and the remnants continued to be threatened with destruction. There is only one known gymnosperm, *Encephalartos barteri*, which is indigenous to Ghana. The few others growing in various ecological zones in the country are introduced species for purposes including aesthetics and economic. The third taxonomic group, pteridophytes, is well represented with 124 known species.

Table 1: *Vascular Plant Census of Ghana*

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(a) Indigenous			
Group	**Families**	**Genera**	**Species**
Pteridophytes	15	43	124
Gymnosperms	1	1	1
Angioperms:			
Monocotyledons	30	227	780
Dicotyledons	127	806	2069
	173	1077	2974
(b) Introduced (Naturalised)			
Group	**Families**	**Genera**	**Species**
Monocotyledons	15	42	53
Dicotyledons	63	149	200
	78	191	253

1.4.2 The Fauna of Terrestrial Systems

The fauna of Ghana, like the flora, is composed of the following elements:

- species which are found throughout the entire Guinea-Congolian tropical forest such as the Forest Elephant (Loxodonta Africana cyclotis) and the Chimpanzee (Pan troglodytes);

- species which are limited to the Upper Guinea block of forest, such as the Zebra Duiker, Jentinks Duiker; Red Colobus Monkey (Procolobus badius waldronii) and Diana Monkey (Cercopithicus diana) . Bird species here include Wattled Cuckoo-Shrike (Campephaga lobata) and White-breasted Guinea Fowl (Agelates meliagrides);

- species which are found in the Guinea-Congolian Forest/Savannah Transitional zone; such as the Tawny Eagle (Aquila rapax);

- species which are found in only the Sudan savannah such as the Korrigum (Damaliscus lunatus korrigum).

The fauna of the terrestrial ecosystem, though relatively impoverished, comprise a diverse array of species including several of conservation concern. Current records show that there could be as many as 221 species of amphibians and reptiles, 748 species of birds, 225 mammalian species (with 93 recorded to inhabit the savannah ecological zone). Threatened species recorded in the country include four species of marine turtles and three species of crocodiles. Bird species of conservation concern include seven threatened species, including four species endemic to the Upper Guinea forest block and seven near-threatened species. Keystone species such as hornbills, parrots and birds of prey are well represented in the country.

Of the 748 birds species confirmed to be occurring, 408 are non-passerines and 320 passerines, of which 494 are known or thought to be resident and 176 are regular seasonal migrants, including 100 from the Palaearctic. Of the total number of species occurring, 180 restricted to the Guinea-Congo Forests Biome and 37 restricted to the Sudan-Guinea Savannah biome have been recorded (Ntiamoa-Baidu *et al*, 2001; Ntiamoa-Baidu *et al*, 2000 a & b). Furthermore, eleven of the 15 endemic bird species within the Upper Guinea Forest occur in Ghana (See Plate 5). Six of the total species are considered threatened and 12 near-threatened (BirdLife International, 2000). The country is also important for water-birds being on the boundary of the East Atlantic Flyway and the Mediterranean Flyway (Smit and Peirsma, 1989; Ntiamoa-Baidu *et al*, 2001).

Endemism among terrestrial fauna has been observed in three species of frogs, *Hyperolius baumanni, H. fusciventris* and *H. sylvaticus* and the lizard, *Agama sylvanus* found in the Bia Forest Reserve and the Atewa Range Forest Reserve. There is high degree of butterfly endemism in Ghana where about 23 species are classified endemic or near-endemic. As with floral diversity, “hot spots” for faunal diversity may be located in the high forest areas (accounting for 83% of the total number of species recorded), where canopy stratification and micro-climatic differentiation have provided habitats and niches for specific faunal organisms

1.5 Biodiversity of the Marine and Aquatic Systems

Work on diversity of organisms in marine and aquatic systems has concentrated mainly on those exploited for food (principally mammals, reptiles, fishes and large shelled invertebrates). In cases where certain animal species are found to be disease-causing, as in many water-borne vectors, some limited study on the organisms’ biology and possible eradication have been done. Aquatic plants (mostly those considered weeds and noxious to man) have been better studied than marine ones and little or no work appears to have been done on micro-organisms that inhabit such ecosystems.

1.5.1 Marine Systems

Indications of extremely high biodiversity of the benthos of the shallow waters of the continental shelf have been reported in recent studies by the Department of Oceanography & Fisheries of the University of Ghana. About 60% of the soft bottom benthic macro-fauna encountered are believed to be new and unrecorded. There is virtually no information on meio-fauna (dominated

by worms, oligocheates and crustaceans) and micro-fauna (such as ciliates, amoebas and foraminiferans) organisms in benthic waters.

About 392 marine species of organisms comprising 347 fish species belonging to 82 families has been recorded. There is also evidence available that the coastal waters of the country are being invaded by marine algae, a typical example is *Enteromorpha flexuosa,* which is believed to have drifted eastward from areas west of Ghana. In the recent past coral reefs has been found within the Ghanaian coastal environment and the entire continental shelf is traversed by the belt of dead madreporarian coral at a depth of 75cm.

1.5.2 Fresh Water and other Near Aquatic Systems

Ghana's freshwater fish fauna includes 28 families, 73 genera and 157 species. About 121 species have been recorded from the Volta system within Ghana, which drains more than a third of the entire country. About nine species viz. *Barbus subinensis (Cyprinidae), Irvinea voltae (Schilbeidae), Chrysichthys walkeri (Clarioteidae), Synodontis arnoulti, S. macrophthalmus, S. velifer (Mochokidae), Limbochromis robertsi, Steatocranus irvinea (Cichlidae)* and *Aethiomastacembelus praensis (Mastacembelidae)* are endemic to freshwater system of Ghana (Dankwa et al, 1999).

Economically, 81 species are of food importance. Species of cultural importance include *Heterotis niloticus (Osteoglossidae) Clarias gariepinus, Heterobranchus longifilis (Claridae) Chrysichthys nigrodigitatus (Clarioteidae), Oreochromis niloticus (Chichlidae)* and *Lates nilo\ticus (Centropomidae).* Some species need to be protected because of their restricted distribution or their habitat degradation or destruction.

Lake ecosystems are scarce in Ghana. The only natural lake system is the Lake Bosomtwi which covers an area approximately 50 square kilometres and has eleven (11) fish species belonging to nine (9) genera and five (5) families. The Volta Lake created in 1964 and inundating some 4,840 square kilometres of pristine natural forest and the two dams on the Volta river at Akosombo and Kpong have indisputably altered the biodiversity and ecology of the river and adjacent areas. The original Volta River was found to consist of at least 100 fish species (Petr, 1967). Recent studies in Yeji sector of the lake encountered 66 species representing 39 genera belonging to 19 families (Ofori-Danso, 1999). Fish species including *Brycinus nurse, B. macrolepidotus, Eleotris senegalensis,* the bivalve, the Volta clam (*Egeria radiate),* the shrimp, *Macrobrachium spp.,* the West African manatee, *Trichechus senegalensis,* etc. are under severe threat of extinction (Ofori-Danson & Agbogah, 1995).

Other freshwater ecosystems include the major rivers such as the White Volta, Black Volta, Lower Volta and Oti. Others are Pra, Tano, Ankobra, Bia, and Todzie-Aka. Also included are other impoundments serving as drinking water sources and/or for irrigation. It is estimated conservatively that about 124 fish species from 62 genera and 26 families inhabit the major rivers.

The coastline of Ghana is lined with about 90 lagoons, several estuaries and rocky shore habitats that exhibit distinct array of biological diversities. Information on faunal, microbial and floral diversity is sparse, except for the five (5) Ramsar sites namely the lagoons of Keta, Songor, Sakumo, Densu delta and Muni-Pomadze where an appreciable amount of knowledge is

available. The sixth Ramsar site, the Owabi Wildlife Sanctuary, is the only aquatic protected ecosystem. The Site protects the source of drinking water for Kumasi and its environs.

Access to, use and exploitation of biodiversity is therefore free and uncontrolled. The consequence is over-exploitation, pollution, weed invasions, habitat destruction, and eventual loss of biodiversity and possible extinction.

1.6 Status and Trends of Important Biodiversity Components

1.6.1 Forest Biodiversity

There is pressure on Ghana's forests, stemming from various aspects of land use. Many forest reserves are degraded due to wildfires, excessive extraction of timber and non-timber resources and human encroachment for agricultural purposes. Within the high forest zone (HFZ), cocoa farms, subsistence crops and fallow lands are dominant land use types. Off-reserve forests have roughly 6.5 million ha distributed as trees and forest patches in agricultural lands, forest fallows, riparian forests, sacred groves etc. Hansen, et al. (2009) provided the following estimates for land use classification of the HFZ: Natural forest (664,000 ha); Secondary forests (184,000 ha); Fallow (1,441,000 ha); Cleared (recently) farms (439,000 ha); Cocoa farms (1,001,000 ha); Food crops (1,236,000 ha); Grasslands (439,000 ha); and other land (102,000 ha) (FIP, 2012).

The recent forest assessment of the high forest zone estimated the total forest land in Ghana at 9.337 million ha in 2015.This is made up of 1.556 million ha closed forest and 7.781 million ha open forest. The forest degradation rate in Ghana is estimated at 45,931.03 ha per annum since 1990 (Forest Preservation Programme report (FPP), 2013). The size of the closed forest has decreased from 2.704 million ha in 1990 to 1.556 million in 2015 indicating a depreciating rate of 192,648.25 ha per 5 years. The assessment further revealed that less than 20% of forest reserve areas have acceptable levels of integrity. Only 2% are considered to be in "Excellent" condition and another 14% in "Good" condition. Currently, the survival of the remaining reserves is at risk of depletion from continued illegal-logging and agricultural clearing (RMSC, 2014). However, there are increases in populations of some forest species, and generally, there has been an increase in forest cover, but the forest quality has declined (Forestry Development Master Plan (FDMP), 2016).

1.6.2 Agricultural Biodiversity

There has been a decline in the biodiversity of crops. Particular examples of this decline are seen in numbers of the local banana, cocoa and some yam species. Some yam species have completely disappeared from the farm produce. For livestock, some cattle breeds are on the decline. The West African short horn cattle which used to constitute about 80% of the national cattle population in the 1990s now constitutes about 47% of the national cattle herd. Generally, there is decline in crop biodiversity, but there are some crops that have had their diversities enhanced as a result of introduction of other varieties from outside the country.

1.6.3. Dry and Sub-humid Lands Biodiversity

1.6.3.1 Coastal Savannah

There is severe reduction in the production of ecosystems goods and services through loss of fishing grounds, housing materials, grazing lands, farmlands and productivity, wildlife habitats, energy sources, local displacement of species and scarcity of water sources. Consequently, there is loss of livelihood options and a decline in living standards of the people leading to worsening poverty.

1.6.3.2 Transition Zone

The transitional zone is rapidly turning into savannah characterised by high deforestation and loss of watersheds. There is decline in soil fertility.

1.6.3.3 Northern Savannah

The northern savannah is characterised by rapid deforestation caused by high intensity of wild fires, woodfuel production, and illegal surface mining. There are also the increasing incidents of floods and droughts (leading to land degradation and desertification). This situation has exacerbated food insecurity, water scarcity, disruption of social structure (emigration), loss of cultural heritage, loss of energy sources, loss of lives and property. The trend has also led to loss of habitats, decline in species populations, local species extinctions, increasing vulnerability to climate change impact, increasing incidence of alien invasive species, human emigration from savannah to southern forest zones, increasing transhumance leading to local and national insecurity, increasing poverty incidence as a result of loss of livelihood options, declining living standards, decline in soil fertility and productivity, increasing food insecurity, decline in the contribution to the GDP, increasing urbanizations leading to expansion in some areas and decline in others.

In general all the savannah ecosystems are characterised by: decline in species; increasing poverty levels; over-exploitation of natural resources (e.g. woodfuel production); vulnerability to climate change, desertification and land degradation; degradation and loss of water sources; decline in agricultural productivity leading to agricultural land expansion; population increase and pressure; non application of improved agricultural and sustainable land management practices; land use conversions into mono-cultures for mango cultivation and other highly sought after agricultural produce; increasing incidence of invasive species; pollution of water bodies; high intensity of wild fires; increasing human migration into forest zone; and increasing incidents of floods and droughts.

1.6.4 Inland Water Biodiversity

1.6.4.1 Rivers/Streams

Some data exist on fish, molluscs, insects, crustaceans, zoo-plankton, phyto-plankton and macrophytes. Generally the trend is declining, Fish-populations also declining. Molluscs-Aquatic Macrophytes is increasing. Example is the invasive aquatic weeds (such as water hyacinth). However, information is scanty on other groups such as arachnids and micro-organisms.

1.6.4.2 Lakes/Reservoirs

Information is scanty e.g. Work on West African Manatee is on-going to establish species diversity.

1.6.4.3 Lagoons/Estuaries

Apart from fish species and water fowls, other species are unknown.

1.6.5 Marine and Coastal Biodiversity

1.6.5.1 Marine Mammals

All marine mammal species are threatened. However, there is the need to confirm present status.

1.6.5.2 Water Birds

Fifteen (15) species occur in internationally important numbers; Mixed trends with some species are increasing, a few stable, others decreasing.

1.6.5.3 Marine Turtles

Three species confirmed (Leatherback, Olive Ridley and Green; nesting on beaches and feeding offshore) threatened. Some monitoring and some detailed studies carried out at various points in time over the last 35 years. One species (Hawksbill) locally extinct; possible to make deductions on trends from nesting monitoring data (with Sources from: Centre for African Wetlands, Ghana Wildlife Society, Wildlife Division, Department of Oceanography & Fisheries - UG).

1.6.5.3 Fish

Three main marine groups (small pelagic, large pelagic and demersal species) and various brackish water species are present. Generally fish stocks are declining (data sources: Fisheries Research Division, Guinea Current Large Marine Ecosystem; O&F-UG; Fisheries & Aquatic Sciences of University of Cape Coast). The decline in small pelagic species has been too sharp raising international concerns.

1.6.5.4 Plants of the mangrove forests

Three species of mangroves are prominent, namely *Avicenia* sp., *Rhizophora* sp. and *Laguncularia* sp. There is rapid decline in the status of all three species. However, *Laguncularia* is the most threatened.

1.7 Values of Biodiversity and its Contribution to Human Well-Being in Ghana

The importance of biodiversity to the Ghanaian economy in terms of jobs creation, incomes for local communities, foreign exchange earnings through forest products export and protection of

the environment has not been fully estimated. Biodiversity in the form of timber and wood products, non-timber products (including bush meat and other wildlife products, bamboo /rattan, essential oils, tannins, resins, gums, dyes, cork, honey, and medicinal plants); environmental services,(such as watershed protection, biodiversity conservation, carbon sequestration and clean air, micro-climate regulation/modification, soil fertility improvement, soil conservation/soil erosion control, recreational (aesthetic) value); and ecotourism has been a major source of income and job creation for most Ghanaians since time immemorial. The GLSS 6 estimated that biodiversity products provide alternative income sources to over 6 million Ghanaians in the forestry and water sectors.

It is estimated 380,000 tonnes of bush meat are consumed annually with an estimated value of about US$350 million (FC, 2014). Animal and plant products used in traditional medicine and cultural practices have an estimated value of about US$13 million. Over 600,000 women in the northern Ghana collect about 130,000 tonnes of nuts yearly, 40 per cent of which are exported. This contributes about US$30 million annually to the national economy (Osei-Tutu et al. 2010). Two NTFPs (thaumatin, a sweetener from seeds of *Thaumatococus danielli*, which is easy to cultivate under plantation trees; and novella, an oil/margarine from seeds of *Allanblackia parviflora)* are on the export market. A small-scale processing facility for thaumatin production has been established at Samerboi and the value of exports of this product in 2014 was reportedly $430 million. Table 2 gives an indicative estimate of wood and non-wood small, medium scale forest-based enterprises in Ghana.

Table 2: ***Indicative Estimates of Biodiversity Products in Ghana***

Biodiversity products	Number of organizations/people/annual turnover
Small scale loggers, chainsaw operators, haulage and retailers	About 503 companies in GTA; 17,000 in chainsaw; 264,000 in haulage: 21,000 people in chainsaw milled lumber; 1,300 lumber brokers: Total turnover = US$ 90 million.
Small scale tertiary operators and artisans- furniture, windows, doors, coffins, wood carvers, handicrafts	About 30,000 small scale carpenters employing about 200,000 people. About 5000 wood carvers and 1500 canoe carvers.
Fuel wood and charcoal production	About 16 million m3 of wood valued at about US$200 million is consumed in various forms as energy per year: this account for about 86% of urban energy; in rural areas, wood fuel makes up more than 95% of energy consumption.
Herbal medicine	Plant and animal products used in traditional medicine and cultural practices are estimated at US $ 130 million.
Shea nut	Over 600,000 women in Northern Ghana collect about 130,000 metric tons of nuts yearly, about 40% is exported; the turnover is about US $30 million annually to the national economy.
Live animals and plant products exports	More than 21 animal exporters and 30 wild plant products exporters; estimated annual turnovers for 1997 and 2003 were US $ 12.9 million and US $ 18 million respectively.
Bush meat hunters, traditional chop bar operators (food	300,000 hunters in rural areas producing between 220,000 and 380,000 metric tons of bush meat valued at between US 210 million and US $ 350

Biodiversity products	Number of organizations/people/annual turnover
vendors)	million for domestic consumption annually.
Fish	The fishing industry provides employment to many rural people and urban dwellers, with one (1) in ten (10) Ghanaians dependent on fisheries (FAO, 2006). As many as 2.2 million people are dependent on the fisheries sector for their livelihoods, including 135,000 fishers in the marine sector, of which 92 percent are artisanal fishers. It generates GH¢1 billion (US$25 million) in revenue annually.

Source: GLSS 6

Rural/urban energy is an important aspect of the forest economy and depends largely on wood fuels (fuel wood and charcoal). Traditional energy accounts for 85.8 per cent of primary energy used in Ghanaian homes and provides income-generating activity (charcoal producers, transporters, and retailers) to a substantial part of the rural community. In 2000, 16 million metric tons of wood fuel was consumed, 9 million of which was converted to charcoal.

Ecotourism earns US$ 1.6 billion in annual revenue generation, and tourism will likely become the number one foreign exchange earner in the national economy in the future (Ghana Tourist Board, 2012). Table 3 gives a list of frequently visited ecotourism sites in Ghana.

Table 3 : *Frequently Visited Ecotourism Sites in Ghana*

Ecotourism site	Special attraction/products	Region
Amedzofe	Gbademe waterfall, Gemi mountain, hiking	Volta
Liate Wote	Afadzato mountain, Tagbo waterfall, hiking through the forest	Volta
Tafi-Atome monkey sanctuary	Sacred Mona monkeys	Volta
Xavi	Bird watching and canoeing	Volta
Boabeng-Fiema Monkey sanctuary	Mona monkeys, Black and White Colobus monkeys	Brong Ahafo
Tano Boase Sacred Grove	Hiking through towering rock formations in a semi-deciduous forest	Brong Ahafo
Tongo Hill	Natural caves in a landscape of granite rock formations	Upper East
Paga Crocodile pond	Crocodiles	Upper East
Wechiau Hippo Sanctuary	Watching hippo populations from a canoe on the Black Volta river, bird watching, mountain hiking, night on a silk cotton a platform built on a silt cotton tree.	Upper West
Bobire Forest and Butterfly Sanctuary	Butterfly sanctuary with over 500 species, Anurans (frogs), arboretum	Ashanti
Bomfobiri	Unique vegetation of transition zone waterfall	Ashanti
Bunsu Arboretum	Plant genetic resources: extensive variety of plants, trees and shrubs, more than 100 species of birds and a butterfly sanctuary	Eastern
Domama	Cave, bats	Central

Ecotourism site	Special attraction/products	Region
Bui	Pigmy hippos, canoeing, hydro-electric power station	Brong Ahafo
Kakum	Canopy walkway, varied wildlife with some 40 species of large animals, 400 species of butterflies	Central
Mole	Wildlife, savannah vegetation, over 90 mammal species, 4 primate species and 300 bird species	Northern
Kalakpa	Animal viewing, hiking, mountain trails	Volta
Shai Hills	Monkeys, coastal savannah vegetation	Greater Accra
Nzulenzu	Unique wetland ecosystem, stilt village	Western
Ankasa	Biodiversity, 43 mammals species, 10 primate species	Western
Bia	Elephants, chimpanzees	Western

Source: Wildlife Division (FC) (2014)

Kakum National Park remains a focus of Ghana's ecotourism programme. Forest elephants, seven species of primates and high antelope and bird diversity provide tremendous potential to ecotourism. The Kakum canopy walkway, perched 30 meters above the ground, gives a unique bird's eye view of the rainforest. It is the first of its kind in Africa.

1.8 Current Approaches to Biodiversity Conservation Practices in Ghana

Approaches to biodiversity conservation in Ghana is both in situ (use of both traditional and scientific methods – sacred growth and protected areas), and ex situ (gene banks, zoological and botanical gardens) approaches have been used in biodiversity conservation in Ghana. The ex situ conservation, conservation facilities in Ghana are located at the (i) University of Cape Coast (Botany Department Herbarium), (ii) University of Ghana (Zoology Department Entomology Museum, Botany Department Herbarium and Botanical Gardens and Noguchi Memorial Institute of Medical Research),(iii)Kwame Nkrumah University of Science and Technology Botanical Gardens and Forestry Herbarium, (iv) Accra Zoo, (v) Kumasi Zoo (vi) Aburi Botanical Gardens, (vii) Bunso Plant Genetics Research Centre and Arboretum, and (viii) Akropong Centre for Scientific Research into Plant Medicine Herbarium and Arboretum.

Within the in situ conservation approaches Ghana has established legal protected areas, notably forest reserves, wildlife conservation areas, and Ramsar sites. Currently, there are 280 forest reserves in Ghana under the management of the Forest Services Division (Forestry Commission), covering a total area of about 23,729 km2, or 11% of the total land area of Ghana. About 75% of these reserves have been designated production reserves, which are exploited for timber, while the remaining 25% are protection reserves, which are not currently under exploitation, probably because of inaccessibility.

For in situ conservation, wildlife conservation areas provide relatively better protection/ conservation for biodiversity than any of the other protection forms. There are 21 legally-constituted *wildlife conservation areas*, notably six *national parks*, *six resource reserves*, three *wildlife sanctuaries*, one *strict nature reserve a*s well as six Ramsar Sites. There are also two proposed wildlife conservation areas (one *national park* and one *wildlife sanctuary)*, under the

management of the Wildlife Division (Forestry Commission) (Table 4). Such large-scale protected areas are critical to the protection of many large wildlife species, especially elephants, bovids, primates, and carnivores (Decker, 1997).

Table 4: ***Wildlife Conservation Areas in Ghana***

Type	Name	Area (km^2)	Year of	Location / Region
National Park	Mole	4,840	1971	Northern
	Digya	3,478	1971	Volta
	Bui	1,821	1971	Northern / Brong Ahafo
	Kyabobo	360	2009	Volta
	Kakum	207	1990	Central
	Nini-Suhien	160.2	1976	Western
	Bia	78	1977	Western
Wildlife Sanctuary	Bomfobiri	*53*	1975	Ashanti
	Owabi	13	1971	Ashanti
	Buabeng-Fiema	4.4	1974	Brong-Ahafo
	Agumatsa	3	*Proposed*	*Volta*
Resource Reserve	Gbele	565	1975	Upper West
	Ankasa	343	1976	Western
	Kalakpa	320	1975	Volta
	Bia	228	1977	Western
	Assin-Attandaso	140	1990	Central
	Shai Hills	49	1971	Greater-Accra
Strict Nature Reserve	Kogyae	386	1971	Ashanti
Ramsar Site	Keta Lagoon Complex	1,200		Volta
	Songor	330		Greater-Accra
	Muni-Pomadze	90		Central
	Densu Delta	70		Greater-Accra
	Sakumo	*35*		Greater-Accra
		13		Ashanti
Total Area		14,173		

Source: FDMP (2016)

In recent times some innovations in biodiversity conservation have been introduced, with the establishment of Globally Significant Biodiversity Areas (GSBAs), Important Bird Areas (IBAs), and Community Resource Management Areas (CREMA). The Forestry Commission has currently designated 29 Forest Reserves as GSBAs, because of their importance as habitats for globally-significant biodiversity, whose commercial exploitation is prohibited and local community participation iii management is encouraged. The IBAs operate under the concept of birds as important bio-indicators, and were developed to conserve wildlife protected areas, some off-reserve areas, and forest reserves that harbour nationally or globally important birds and other biodiversity. The Ghana Wildlife Society (GWS), in collaboration with BirdLife International, has currently identified 36 IBAs-covering 11.494 km^2 (about 4.8% of the total land area of Ghana).

The CREMA concept was initiated by the Wildlife Division under its Protected Areas Development Programme (PADP) to encourage communities bordering protected areas to manage and sustainably utilize wildlife resources within a defined area through a Community Participatory Approach (Wildlife Division, 1998).

Unfortunately, there are administrative problems in managing *in-situ* conservation areas, arising from low government budgetary allocations, inadequate staffing, and lack of infrastructure and basic field equipment. One way to tackle the problems is to ensure that future protected area-driven biodiversity initiatives are collaborative efforts between the relevant government agencies, on the one hand, and all the major stakeholders, especially industry, NGOs, traditional authorities and local communities, on the other.

1.9 Key Interventions Aimed at Improving Biodiversity Conservation

With the inception of the Economic Recovery Programme (ERP) in the mid-1980s in Ghana, and improving economic growth, the negative impacts on the environment were recognized and with the support of different development partners new investments were made in the environment and natural resource sector of the economy. These interventions were usually large programmes aimed to reform the institutions responsible for environment and natural resources management.

However, after 2003 considerable changes took place in the architecture of development assistance to support national priorities. Ghana prepared the GPRS II to guide Ghana's development priorities and approaches, which were supported by development partners (DPs) through the Ghana Partnership Strategy agreed in 2005. A Joint Assistance Strategy was developed by major development partners to map out how they could best support these priorities. There was therefore a shift toward budgetary support and sector-wide programs to align with country priorities, strengthen country systems, and reduce the transaction costs of dealing with multiple partners and projects. This shift had implications for addressing environmental issues that are integral to many different sectors. GPRS II itself noted that consideration of the environment in public policy processes has been inconsistent. Historically, projects addressed environmental issues. In light of this new approach, the Government of Ghana and development partners now needed to consider how best to address environmental issues and for that came up with a broad budget support programme – called Natural Resource and Environmental Governance Programme (NREG), which is the framework for sector budget support in the ENR sector.

A number of the interventions in the environment and natural resource sector with impact on biodiversity conservation are described in the next section.

1.9.1 Forestry and Wildlife Interventions

A major intervention in the forest and wildlife sector was the Forest Resource Management Project (FRMP) funded jointly by the World Bank (IDA), (DANIDA) and the Overseas Development Administration of the United Kingdom (ODA). FRMP started in Nov.1989 and

expired in June 1997. The main focus of the FRMP was the institutional strengthening of forest sector agencies, including infrastructure and training, and development of policy planning, monitoring and evaluation capability. At the same time, management planning of protected areas was introduced to systematize development and management of wildlife resources. Some expectations at the end of the project were as follows:

- Conduct a review MLNR& FC Develop integrated land use plan;
- Ensure regulators and policy makers develop appropriate policy plans backed by appropriate monitoring and evaluation systems;
- FC include unreserved forests under forest management system;
- FC revise resource management standards - Review fees to reflect true stumpage and product values;
- MLNR& FC Implement National Parks & Protected Areas System Plan;
- Promote dialogue with private sector Examples included:
    - The project strengthened management capacity within MLNR leading to improvements in forest sector monitoring and regulation e.g. carried out a national forest inventory and setting of Annual Allowable Cut (AAC) of 1million m^3;
    - Log export ban enforced;
    - FC included off-reserve forest areas under forest management;
    - Improved timber royalty collection and disbursement to local traditional authorities/ stools;
    - Strengthened research and training capacity through support to FORIG and IRNR.

1.9.2 Forest Sector Development Project (FSDP-I and II)

FSDP-1 was launched in 1995 and expired in 1999. This was a DFID supported project to assist with the establishment of a forest service capable of effective and efficient implementation of forest policy and to transform the then Ghana Forestry Department (FD) into an autonomous self- financing Forest Service (FS). This was followed by a second phase FSDP-2 from April 2000 to 2006 which assisted GoG and other stakeholders in the creation of an institutional framework that increases the sector's contribution to poverty reduction and sustainable economic growth (incorporating income, well-being, and empowerment)

FSDP II in particular focused on institutional reform initiatives (changing the rules of the game, both de-jure and de-facto); and b) Organizational development initiatives (building the capacity of sector agents, especially the Forestry Commission, to play by the rules).

1.9.3 Natural Resources Management Programme (NRMP)

The NRMP, which was originally planned three-phase ten-year multi-donor (IDA of the World Bank, EU, AfDB, DFID, RNE, JICA, DANIDA, GTZ, WFP, GEF) investment programme launched in September, 1999, had five (5)components. Institutional framework and developing collaborative natural resource management systems

NRMP-I officially closed in June 2003. Phase 1 of NRMP (NRMP-I) aimed at assisting GoG to implement is policy of protecting, rehabilitating and sustainably managing national land, forest and wildlife resources by: (i) institutionalizing viable sustainable land, forest and wildlife management systems nationwide and (ii) establishing effective national policy and institutional framework and developing collaborative natural resource management systems Three key components of the NRMP were

- High Forest Resource Management (HRM) Component - which was further divided into six (6) subcomponents aimed to establish the policy, legal, administrative, financial and technical bases for sustainable forest management including biodiversity conservation, collaboration and efficient utilization of forest products by private and public sectors and local communities. Under this component the GEF supported the identification, documentation, demarcation, and legal establishment of protected forest reserve areas within the High Forest Zone that are of high importance for global biodiversity conservation (GSBAs).
- Savannah Resource Management (SRM) Component also further divided into seven (7) sub-components, to provide an enabling environment for poverty alleviation activities through local community participation in sustainable management of Savannah Zone natural resources, development and utilisation of woodland resources and improved land management created within the three northern Regions. Within this context the GEF provided further support for the Northern Savannah Biodiversity Conservation Project. Among other things the project developed a Northern Savannah Biodiversity Strategy and Action Plan (NSBSAP) has been developed. The purpose of the NSBSAP to provide a framework for conservation of biodiversity in the Northern Savannahs as a means of improving the context and policy frameworks within which biodiversity conservation nationally is managed. It is intended that this Strategy and Action Plan would become a key part of the revision of the National Biodiversity Strategy and Action Plan currently being reviewed.
- Wildlife Resource Management (WRM) component. The WRM component comprised seven sub components, with the objective to ensure policy, legal, administrative and technical framework for conservation and sustainable management of wildlife resources with the participation of rural communities established both within and outside of Protected Areas.

The 1990's initiated considerable activity in the development of projects and programmes in the wildlife sector. In particular attention was focused on community involvement in wildlife management:

- From 1990-1994 the Government of Ghana through an IDA supported Forest Resources Management Project (FRMP) undertook a systematic evaluation of its Forest and Wildlife resources and to assess the capacity of the sector departments to face the challenges of the time and those perceived for the future. The FRMP culminated in the formulation of a Forest and Wildlife Policy of 1994 that clearly recognised more strongly the role of local communities and indigenous knowledge in the conservation of Forest and Wildlife resources.
- A System Plan and Management Plans for eight Protected Areas that are under the management authority of the Wildlife Division were also formulated. Provision was made in the management plans for the involvement of the local people in management through the formation of Management Advisory Board(s) (MABs) e.g. Shai Hills Management Advisory Board and Community Resource Management Committees (CRMC).
- The management plans were however Protected Areas specific and lacked specific investment needs and broad strategic plans for wildlife management in general to provide the economic and institutional foundation for the sector' s long term prospects. Consequently the World Bank funded (1997-98) Protected Areas Management and Wildlife Conservation Project (PAMWCP) was implemented. The project did a strategic review of the wildlife sector as a whole and developed a comprehensive financing proposal (action Plan) for investment in the sector. One of the products of the PAMWCP was an action plan for community conservation of wildlife resources both within and without protected areas.
- A European Union funded (1997-2010) Protected Areas Development Programme (PADP I and II) for Bia and Ankasa protected areas, promoted the concept of Community Resource Management Areas (CREMA) through which communities are supported to undertake wildlife conservation in their own designed areas.

Additional projects and programmes in this sector are:

- Coastal Wetlands Management Project (1993-1999) supported by the World Bank in five designated RAMSAR sites along a section of the coast of Ghana.
- Community Outreach Programme (1989-1999) in selected communities around Kakum National Park, supported by Conservation International (CI) and USAID.
- UNESCO assisted programme (1996-1999) around Bia National Park under the Biosphere Reserves for Biodiversity Conservation and Sustainable Development in Anglophone Africa Programme (BRAAF).

Dutch Government funded Wildlife Sector Development Project which supported the improvement and development of the Mole National Park and with support from Netherlands Development Organisation (SNV) assisted Kyabobo Area Management Participatory Programme (KAMPP) at Kyabobo National Park.

Historically, the people of Ghana have had traditional laws that tended to conserve the environment and natural resources. Even in pre-colonial days when population was quite low, natural resources were "limitless", and hunting and farming equipment were so basic that no extensive damage was done to the environment, traditional laws and practices on conservation were established. These laws and practices, some of which persist to date, tended to protect the ecology in three main ways; a) by protecting specific ecosystems; b) by protecting particular plant/animal species; and c) by regulating the exploitation of plant and animal resources.

The most important of some conservation practices that have persisted to date are the sacred groves, which dot the whole country. The principles of protected area system are therefore not alien to the Ghanaian society. Such protected areas were governed by local mores and were linked with the ethical, mythical and spiritual beliefs of the people. Unlike the state system specific no institutions were established for enforcement but wildlife protection was the duty of all citizens. However, there is a general weakening of traditional values and the statist system has also undermined their operation.

Sacred groves serve important ecological and socio-cultural functions by preserving virgin forests, being important refuges for rare and useful local biodiversity, and being sources of herbs for medicinal, social and religious purposes (Dorm-Adzobu et al., 1991; Decher, 1997). There are an estimated 2,000 -3,200 sacred sites in Ghana, about 80 per cent of which occur in the southern half of the country (Gordon, 1992).

1.10 Procedures used in Revising National Biodiversity Strategic Action Plan

In response to an obligation arising from signing and ratifying the Convention on Biological Diversity, Ghana formulated a national biodiversity strategy for Ghana. However, contrary to Article 6 of the Convention - *General Measures for Conservation and Sustainable Use*, which calls for the development of national strategies, plans or programmes and the integration of conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies, the Ghana biodiversity strategy document did not specifically adopt an action plan. A number of actions were recommended for further development into an action plan, but this did not happen.

The 2000 National Biodiversity Strategy which did not adequately respond to the AICHI targets of the global strategic plan for biodiversity is now out-dated and need review to reflect current national efforts in fulfilling the objectives of the Convention. This was part of the countdown to the close of the 2011-2020 Strategic Plan for Biodiversity, corresponding to the UN decade on Biodiversity 2011-2020, and national reflections by Parties on the achievability of the 20 Aichi Targets associated with the global strategic plan for biodiversity.

The updating and reformulation of the 2016 National Biodiversity Strategy and Action Plan for Ghana was mainly participatory involving all the stakeholders in the environment sector. The revision was led by the National Biodiversity Committee with the strategic guidance of the Ministry of Environment Science, Technology and Innovation (MESTI). Series of workshops and task force meeting were held to collate national views. The inputs came from diverse sources including the Ministry of Lands and Natural Resources and its Agencies (Forestry Commission), Ministry of Food and Agriculture and its Agencies, Ministry of Fisheries and Aquaculture Development, Fisheries Commission, the Council for Scientific Industrial Research (CSIR), the Universities as well as the Civil Society Organizations (NGOs Traditional Authorities and Faith based groups). The draft document was discussed extensively at both regional and national stakeholder consultative workshops in 2012 and further interrogated and validated in 2016. A national Task Force was constituted to finalize the document by aligning the targets and the action plans to the national priorities and stakeholder's expectations.

1.11 Overview of the National Biodiversity Strategy and Action Plan (NBSAP) Chapters

The updated NBSAP, which reviews the status of biodiversity in the country from 2000 to date, and set the strategy and actions up to 2020 is divided into five (5) chapters relating to the five (5) biodiversity strategic goals and their related 20 Aichi Targets. The national strategies with corresponding national targets and actions have been tagged to each Aichi Target, to provide a basis for the necessary actions as verifiable indicators to make reporting on achievements easy. In this way, the various Ghanaian sectorial interests, including the Ministries, Departments and Agencies of Government (MMDAs), Civil Society Organizations (CSOs), Academia, local communities, Traditional Authorities and other relevant stakeholders are able to identify their roles and respond accordingly.

For each chapter, there is an introduction and a matrix planned actions. The introduction brings into view the relevant international biodiversity strategic goal and the related Aichi targets which form the basis for the chapter. The matrix which has columns indicating national strategies, national targets, indicators, description of indicators, actors and frequency of reporting provides a bird's eye-view of the national strategic plan. Within the Actor column, the list of Actors is indicative of the various Ghanaian stakeholder profiles that are required to address the target mentioned. It is expected that these strategies will inform the actions required to achieve the targets by the actors.

Chapter one (1) is the general introduction to the NBSAP. It gives the background to the revision of the document. Chapter two (2) discusses the underlying cause of biodiversity loss in Ghana and outlines a number of strategies to address the underlying causes. A number of underlying causes, both direct and indirect, were identified and for which special national strategies have been suggested. The fundamental issues of implementation of the Convention on Biological Diversity and other biodiversity-related conventions, general communication and education on biodiversity especially the traditional knowledge on biodiversity, a deliberate study of the Ghanaian biodiversity at all levels, have come up with the appropriate national strategies and targets assigned.

Chapter three (3) considers the strategy to reduce the direct pressures on biodiversity in order to promote sustainable use. Governance issues relating to the complementing roles of government institutions and compliance by the other stakeholders including the general public have been implicated here. An enhanced role of the MMDAs with cooperation from the communities has been considered vital and the need for effective capacity building schemes indicated. In this regard, such national strategies as improving public education and awareness on agricultural biodiversity with special regard to the effective management of invasive alien species are promoted.

Chapter four (4) has the strategy to improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity. A reflection of national plans on REDD+, Food and agriculture sector development plan, Forestry development master plan, sustainable land water management project, biodiversity offsets and the biosafety implementation programme etc. have been indicated to support the national actions here. In addition, the idea of maintaining and improving the dedicated sites for *in situ* conservation of land and marine resources remain a national strategy, together with special attention to *ex situ* efforts.

Chapter five (5) considers strategies to enhance benefits to all from biodiversity and ecosystem services. While it touches on the number of programmes and policies of government to enhance equity in benefits from biodiversity and ecosystem services, a number of key national strategies and targets have been assembled. For example there is a call to incorporate the provisions of the biodiversity conventions into the national agricultural policy, and to assess and promote the economic benefits of biodiversity at all levels. Biodiversity and business, especially in the area of offset development has been highlighted to attract private sector investment to benefit all.

The chapter five also considers strategies to enhance the implementation through participatory planning, knowledge management and capacity building. There is a recall on the roles of the institutions that constitute the political economic stakeholders in the country, and the need for a strengthened coordinating national biodiversity planning entity, i.e. the National Biodiversity Committee to promote leadership. In this way the roles of stakeholders are identified and streamlined.

In the consideration of the above chapters, there is the end view of conservation and sustainable use respectively, where the use of natural environment is paramount for example from revenue benefit potential in ecotourism, and in the green business (green buildings) and agricultural biodiversity models. The concluding chapter has discussed the overall result framework which serves as monitoring tools to coordinate the implementation of the actions proposed.

1.12 NBSAP Linkages to Relevant National and International Initiatives

The existence of linkages between biodiversity attributes and ecosystem services, wildlife, agriculture and global climate change mitigation are recognized in the NBSAP. Therefore, there is an increasing trend to integrate services derived from biodiversity within management plans. This brings to mind several national and international stakeholder institutions in the country with the primary mission of protecting the environment or biodiversity. These initiatives are

recognized as linkages to the NBSAP. Some relevant linkage institutions have been cited for implementation of each action of the NBSAP.

The initiatives linked to the NBSAP are:

- Sustainable Development Goals (SDGs),
- Ghana: 40-year National Development Plan,
- Biosafety,
- Intergovernmental Panel on Climate Change (IPCC),
- Gulf of Guinea Current Large Marine Ecosystem (GCLME) initiative,
- The Abidjan Convention,
- Africa Agenda 2063,
- USAID/Ghana Sustainable Fisheries Management Programme (SFMP),
- Biodiversity Spatial Planning,
- Sustainable Tourism Programmes,
- Monitoring of Environment and Security of Africa (MESA) ECOWAS Coastal and Marine Resources Management Programme,
- New Partnership for African Development (NEPAD),
- FAO Code of Conduct for Responsible Fisheries (CCRF),
- Collaborative Adaptive Research Initiative in Africa and Asia (CARIAA),
- Monitoring of Environment and Security of Africa, ECOWAS Coastal and Marine Resources Management Programme,
- Safe Sea Access Strategy Development,
- West African Regional Fisheries Programme (WARFP),
- Interim Guinea Current Commission (IGCC),
- Fisheries Co-management Policy of Ghana
- Global Environmental Change (GEC) research activities and capacity in Africa,
- Global Ocean Observing System (GOOS), and
- USAID/Ghana Fisheries and Coastal Management Capacity Building Support Project.

1.13 The Policy Context of the NBSAP

Ghana signed and ratified the Convention Biological Diversity during the Earth summit in June 1992 and 1994 respectively. Article 6 of the Convention provides for countries to develop national strategies for the conservation and sustainable use of their biological diversity. In fulfilment of this provision in the Convention, the Ministry of Environment and Science in collaboration with relevant stakeholders developed the first National Biodiversity Strategy in 2002 as the principal instrument for implementing the Convention at the national level.

The National Biodiversity Strategy has been revised (with Action Plans) to effectively guide the sustainable utilization of the country's biological resources and the integration of biodiversity issues into national development planning programmes. The new National Biodiversity Strategy and Action Plans (NBSAP) recognize the current threats to the physical and non-physical environment due to Ghana's socio-economic development and growth agenda.

There are a number of relevant policies and legislations governing management, development and conservation of natural resources in Ghana. Additionally, Ghana's ratification of International conventions and agreements form an important backdrop to the issues surrounding biodiversity and they are a significant pressure driving the development of a strong case for biodiversity conservation. Between 1902 and 2015 (over 100 years) there are records that indicate the presence of biodiversity related policies in Ghana (see the list below). This NBSAP, therefore, draws its legitimacy from the succeeding national policies, legislations and ratified conventions for its implementation.

The relevant policies cited in the NBSAP are:

- Forest Ordinance, 1902
- Forest Ordinance, 1927 (cap 157)
- Town and Country Planning Ordinance 1945 (cap 84)
- Trees and Timber Ordinance, 1949
- Land Planning and Soil Conservation Act, 1957
- Trees and Timber Regulation, 1961
- Wild Animals Preservation Act, 1961 (Acts 43)
- The Volta River Development Acts 1961
- Section 1 and 16 of the Concessions Act, 1962 (Acts 124)
- Oil in Navigable Waters Act, 1964
- The Ghana Water and Sewerage Act 1965
- Wildlife Conservation Regulations, 1971 (LI 685)
- Wildlife Reserves Regulations, 1971 (LI 710), 1983
- Fisheries Decree (1972)
- Forest Protection Degree, 1974 (NRCD 243)
- Trees and Timber Degree, 1974 (NRCD 273)
- The Fisheries (Amended) Regulations (1977)
- Economic Plant Protection Decree, 1979 (AFRCD47)
- Forest Fees Regulations, 1979 (LI 1098)
- The Fisheries (Amended) Regulations (1984)
- Forest Protection (Amendment) Law, 1986 (PNDCL 142)
- Mineral and Mining Law 1986 (PNDC153)
- Prevention and Control of Bushfires Laws (1990)
- Local Government Act 462 (1993)
- National Environmental Policy (1995)
- Forestry Development Master Plan (2016 -2036)
- Timber Resource Management Act, 1997 (Acts 547)
- Environmental Assessment Regulation, LI 1652 (1999)
- National Land Policy (June 1999)
- Minerals and Mining Act (2006)
- National Water Policy (2007)
- Ghana National Climate Change Adaptation Strategy (2010)
- Riparian Buffer Zone Policy (2011)
- Biosafety Act (2011)
- Ghana Forest and Wildlife Policy (2012)

- National Climate Change Policy (2013)
- National Environment Policy (2014)
- Ghana's iNDC (2015), and
- River, Lakes and Beach Law (under review).

International Conventions

- Convention on the Africa Migratory Locust: 25th May 1962
- International Convention for the Prevention of Pollution of the Sea by Oil: 21st October 1962
- Treaty banning Nuclear Weapon Test in the Atmosphere, in Outer Space and Under Water: 5th August 1963
- International Convention for the Conservation of Atlantic Tunas: 4th May 1966
- Africa Convention on the Conservation of Nature and Natural Resource: 15th September 1968
- International Convention on Civil Liability for Oil Pollution Damage: 29th November 1969
- International Convention Relating to Intervention on the high seas in Cases of Oil Pollution Causalities
- Treaty on the Prohibition of the Emplacement of Nuclear Weapons of Mass Destruction on the Seabed and the Ocean Floor and in the Subsoil Thereof: 11th January 1971
- Convention on Wet Lands of International Importance, especially Waterfowl Habitant: 2nd February 1971
- International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage: 18th December 1971
- Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxic Weapons and on their Destruction: 10th April 1972
- Convention Concerning the Protection of the World Cultural Natural Heritage: 16th November 1972
- Convention on International Trade in Endangered Species of Wild Fauna and Flora: 3rd March 1973
- Convention Concerning Prevention and Control of Occupational Hazards Caused by Carcinogenic Substances and Agents: 26th June 1974
- Convention on Military or any other Hostile use of the Environment Modification Techniques: 10th December 1976.
- Convention Concerning the Protection of Workers against Occupational Hazards in the Working Environments due to Air Pollution, Noise and Vibration: 20th June 1977
- Convention on the Conservation of Migratory Species of Wild Animals: 23rd June 1979
- United Nations Convention on the Law of the Sea: 10th December 1982
- International Tropical Timber Agreement: 18th November 1983
- Montreal Protocol on Substances that Deplete Ozone Layer: 16th September 1987
- Vienna Convention for the Protection of the Ozone Layer: 24th July 1989
- Convention on Biological Diversity: June 1992
- Convention to Combat Drought and Desertification: October 1994, and
- Framework Convention on Climate Change: June 1992.

The threat to global ecosystems by human activities and the recognition that the solution to environmental problems require international collaboration has led Ghana to be Party to a number of international conventions and agreements related to biodiversity and environment. There are currently about 216 such conventions globally but Ghana is signatory to 35 of them including all the major conventions on biodiversity The ratification of these conventions has enjoined Ghana to initiate certain prescribed activities at the national level. Some of the conventions that have shaped and influenced conservation activities in Ghana in very significant ways include:

- the African Convention on the Conservation of Nature and Natural Resources;
- Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention);
- Convention on the Conservation of Migratory Species of Wild Animals (CMS);
- Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Convent ion on Biological Diversity (CBD)

<u>African Convention on the Conservation of Nature and Natural Resources</u>

This Convention was signed in Algiers on 15 September 1968 and came into force on 7 March 1969. Ghana became party to the Convention in 1968, and established categories of conservation areas based on definitions set out in the Convention It has enabled the country to: (i) adopt measures necessary to ensure the conservation, utilization and development of soil, water, floral and faunal resources in accordance with scientific principles, and with due regard to the best interest of the people; (ii) accord special protection to animals and plant species threatened with extinction, or which may become so, and the habitat necessary for their survival, (iii) establish conservation areas.

<u>Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention)</u>

The Ramsar Convention was adopted on 2 February 1971 at Ramsar in Iran and came into force on 21 December 1975. Ghana became party to the Conventions in 1988. The adoption of the Convention has provided the framework for international cooperation for conservation and wise use of wetlands and required the contracting parties leading to (i) designation of suitable wetlands of International Importance (Ramsar Sites) including Keta, Songor, Sakumo, Densu, Muni-Pomadze and Owabi (inland); (ii) formulation and implementation of plans to promote the conservation of wetlands listed, and, as far as possible, wise use of the wetlands within their territory (iii) promoting the conservation of the wetlands by establishing nature reserves on wetlands (included or not) and provide adequately for their wardening.

<u>Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES)</u>

Adopted on 6 March 1973, in Washing DC, USA, the Convention came into force on 1 November, 1975. Ghana signed the Agreement on 16 December 1975 and ratified it on 14 November 1976. The major objective of this Convention is the protection of threatened species from detrimental effects of international trade through the regulation in specific plants and

animals to prevent their excessive exploitation. CITES listings include some 30,000 plants and 2,500 animal species grouped in three Appendices. Appendix I are species that are threatened with extinction and therefore cannot be traded in, Appendix II species are not yet threatened but might soon be, so the levels of trade in them are limited. Appendix III species are nationally threatened, and are protected within the borders the individual countries with international support. Ghana is one of only 21 (out of the 154 Contracting Parties) to have listed Appendix III species on CITES. Indeed Ghana has the most listed Appendix III species (Source: UNEP-WCMC trade database)

Convention on the Conservation of Migratory Species (Bonn Convention)

The main objective of this Convention was to protect migratory species, especially those threatened, within the migratory range and was adopted in Bonn, Germany on 23 June 1979. Ghana became Party to the Convention in 1988 and has since fulfilled its obligation by placing all terns (Sturnidae) on the country's list of wholly-protected species.

Convention on Biological Diversity (CBD)

The CBD, which was unveiled at the Rio Summit in Brazil in June 1992, has become the major guiding Convention for the conservation of biodiversity in the world, there are country more than 180 signatory Parties to the Convention. It came into force in December 1993 with Ghana ratifying on 29 August 1994. The principal objectives of the Convention are the (i) conservation of biodiversity, (ii) sustainable use of its components (iii) fair and equitable sharing of benefits arising from the utilization of genetic resources.

One requirement on each signatory Party to the Convention was the need to develop national strategies for the conservation and sustainable use of their biological diversity. In pursuance of this, Ghana has updated her first National Biodiversity Strategy developed in 2002 to reflect current thinking and the demands of the Convention.

CHAPTER TWO: THE UNDERLYING CAUSES OF BIODIVERSITY LOSS IN GHANA

(AICHI STRATEGIC GOAL A)

2.1 Nature of Biodiversity Loss in Ghana

Ghana's land cover profile has been changing rapidly as indicated in figure 6**.** Forest, grassland, and crop cover account for 38, 34 and 21 percent while wetlands and built-up settlements cover less than 4 and 2 percent of the total territory. During the last two decades, grasslands have decreased while the other types have increased. Grasslands fell by about 34,000 km^2, or 32 percent; forests gained 6,000 km^2 or 6 percent, crop cover gained 22,000 km^2 or 66 percent; settlements gained 2,400 km^2 or about 170 percent; and wetlands gained 2,000 km^2 or 13 percent. The loss of grassland nationally and the gains in forests, cropland and wetlands may be regarded as positive changes at the national level, although these changes must be examined at the regional, district and local levels.

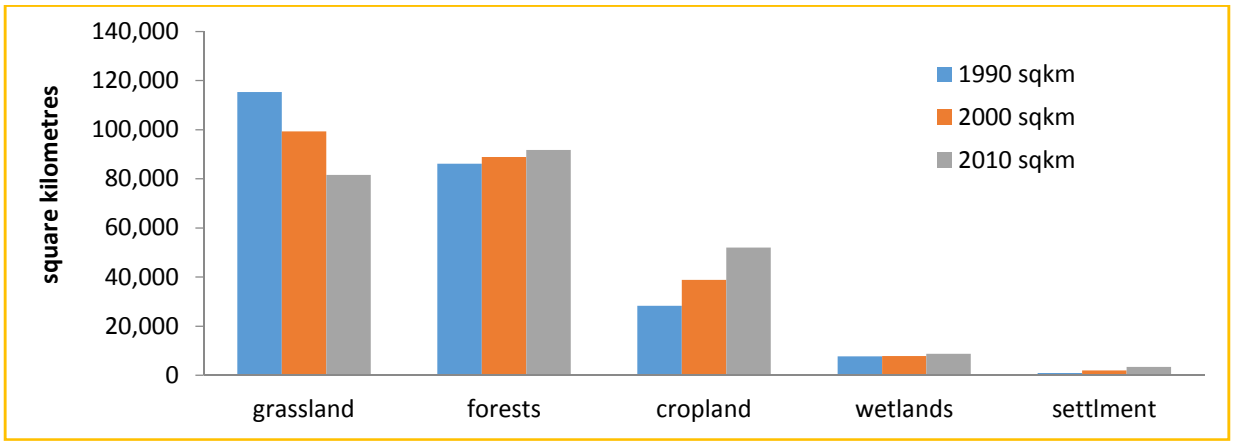

Figure 5 **Changes in Land Cover**

Ghana has 1,185 known species of amphibians, birds, mammals and reptiles according to figures from the World Conservation Monitoring Centre. Of these, 0.8% is endemic, and 3.0% are threatened. Ghana is home to at least 3725 species of vascular plants, of which 1.2% are endemic. 4.6% of Ghana is protected under IUCN categories I-V.

Apart from being rich in biological diversity with very high environmental value, Ghana's ecosystems support human livelihoods and economic sectors. The natural resources (e.g. soils, water, minerals, forests, wildlife) are essential for productive sectors of Ghana's economy. In addition, the environment performs at no cost several regulating functions (e.g. soil protection, pest control, forest production, water purification, etc.). Around 11 million of Ghana's population lives in forest areas, and around two-thirds of them are supported by forest-related activities (Forestry Development Master Plan, 2016).

In spite of the rich biological resources, Ghana suffers from rapid deforestation and destruction of biodiversity. Between 1900 and 1990 Ghana lost 80% of its forest cover (from 8 m ha – 1.6 m ha) due to logging which followed normally by slash and burn agriculture. Ghana has one of the highest deforestation rates in Africa at—two per cent annually (UN 2007). Timber harvesting and slash-and-burn agriculture are the greatest threats, but hunting, wildfires, mining, and rising demand for fuel wood are also important contributors. Official estimates suggest that logging is proceeding at about four million m^3 per year – 4 times the sustainable rate. Ghana is the first country to have lost a major primate species since the Convention on Biological Diversity came into force: the red colobus monkey has been extinct since 2003 because of destruction of its habitat.

While habitat loss is the key factor in loss of biodiversity in Ghana as with other West and Central African countries, hunting is responsible for the threat to specific wildlife species. The hunting tradition is very strong in Ghana as in the other Guinean forest countries, and bush meat consumption has historically represented a significant source of protein for the rural population. The most commonly hunted game species are the larger birds and medium-sized mammals such as forest antelopes (duikers) and diurnal monkeys. Bush meat hunting, through slash-and-burn agriculture, will not necessarily cause significant negative ecological impacts when practiced at subsistence levels in areas of low human population density. However, levels of bush meat hunting in Central and West Africa have soared in recent years, especially as a function of logging. New logging roads provide easier access to formerly remote areas and allow hunters to move deeper into the forests. In addition to animals killed to meet subsistence needs, hunters are now being paid to shoot significantly more game to feed the growing number of logging crews, and they are not discouraged from shooting even more animals for sale in city markets. In fact, the logging companies that subsidize hunting to provide meat for logging crews also transport large quantities of bush meat to major population centres. As a result, bush meat hunting has now reached epidemic levels in the Guinean Forest region and is rightly blamed for the "empty forest syndrome" (the absence of wild animals in otherwise intact forest).

This state of affairs has resulted largely from a fast increasing population, accelerated exploitation of timber that open up previously inaccessible areas for farming, and general deleterious farm practices. As rightly observed by Forestry Development master Plan (2016), agriculture and unplanned and uncontrolled logging operations reinforce each other in a vicious cycle in which the timber operators try to push ahead of farmers in their attempt to remove the economic trees before the area is farmed. As extraction routes open up the forest, more farmers invade the logged areas, keeping close to the heels of the timber operators.' Wild fires continue to sweep through the forests and grasslands annually leaving in their trail vast areas of degradation prone to further degradation through erosion and other factors. At the same time hunting equipment is becoming more powerful, efficient, and within the means of more and more people. Thus wild animal population is over-exploited.

2.1.1 Direct Causes of Biodiversity Loss

The direct causes are overexploitation of natural resources; invasive alien species; climate change effects; habitat changes; pollution; poor resource governance; infrastructural development and urbanization.

- **Over Exploitation of Natural Resources:** Over exploitation as a cause comes from various sources. These are unsustainable illegal logging practices known to threaten the forestry sector's contribution to the sustainable development of the country. In 2002, there was 3,700,000m^3 worth of logs extracted which represents about four times the annual allowable harvest. These contribute to irreversible changes to the forest ecosystem and which directly impacts on both fauna and flora. Bush meat is an important source of protein for Ghanaians and uncontrolled harvesting of wildlife for bush meat has reduced substantially the faunal diversity. Growing urban demand, sophisticated hunting methods and weak law enforcement on hunting have created a huge commercialized trading system for it both nationally and internationally. Numerous studies have indicated that the bush-meat trade in Ghana is enormous and estimates of its value ran as high as US$350 million per year (Ntiamoa-Baidu, 1998). Overfishing is one of the many factors that affect life in the sea. Fishing has caused the largest changes and is the major current agent of biodiversity disturbance in the Ghanaian coastal waters. For example, Ghana's small pelagic fishes notably the sardinellas (*Sardinella aurita* (round sardine) and *Sardinella maderensis* (flat sardine), anchovy (*Engraulis encrasicolus*) and chub mackerels (*Scomber japonicus*) are on the verge of collapse. The total landings of the small pelagics in Ghana have decreased from a high of 277,000 mt in 1996 to 92,000 mt in 2011 (USAID/Ghana ICFG Project, 2015). In addition, the number of active semi-industrial vessels has doubled since 1990s, and the number of canoes has increased by 50% since 1997. Weak governance, overcapacity and an open-access fishery that allows overfishing from an increasing number of boats and fishers have contributed to this change. By-catch also called by-kill is in reference to every fishery that catches unintended and or unwanted creatures. By-catch from Ghanaian coastal waters includes non-target and juvenile fishes, seabirds, marine mammals and any other creature that the fishers are not trying to catch. By-catch in Ghana, currently threatens several species of dolphins or cetaceans. There are reports that by-catch of dolphins are turning into targeted fishing particularly by Drift Gill Nets (DGN) (Ofori-Danson et al. 2003). There is a clear and longstanding need for fishery agencies and managers at all levels to incorporate by-catch monitoring and by-catch reduction measures into management regimes.

- **Invasive Alien Species:** The invasive alien species in Ghana have devastating impacts on native biota, causing extinctions and affecting terrestrial, natural and cultivated ecosystems. The most common invasive alien plant species in Ghana include *Calopogonium mucunoides, Broussonetia papyrifera* (Yorke), *Cedrella odorata, Chromolaena odorata, Leucaena leucocephala* and *Eichhornia crassipes* (water hyacinth). The proliferation of these invasive alien species has led to significant loss of native biodiversity resulting in the degradation of local ecosystems and decline in associated ecological services. For example the evaluation of the extent of coverage of fresh water weeds in the Lower Volta and Tano River is in excess of 5000 ha of water surface (EPA, 2010). The rate of spread on the Tano River is estimated at 12 ha per annum (EPA, 2000). It is noteworthy that water hyacinth which was until 2010 absent in the Lower Volta has currently occupied large areas of the water surface. The spread of invasive alien species, particularly plants, is one of the greatest threats to the ecological and economic well-being of Ghana. In the recent past, the rate and risk associated with

alien species introductions have increased significantly because human population growth and human activities altering the environment have escalated rapidly, combined with the higher likelihood of species being spread as a result of increased travel, trade, tourism and agriculture. For example, one of the ways in which our inland and coastal waters may be affected by invasive alien species introductions, is through importation of alien fish species for aquaculture and ballast water discharge in our ports and coastal waters. The presence of invasive alien species has affected the distribution and abundance of endemic species in Ghana. Recent surveys by EPA (2015) show that the beaches have been fouled by the floating *Sargassum spp* from the West to the East coast of Ghana. Additionally, the near shore waters of the Western Region of Ghana continue to experience a recurrent bloom of the algae, *Enteromorpha flexuosa*.

- **Climate Change**: Climate change can have significant negative impacts on the natural environment including the loss of biodiversity and changes in ecosystems. In Ghana, time series of temperature and precipitation data from 1960-2001 analysed for all six eco-climatic zones showed significant increase in mean annual daily temperatures (0.5^{o}C) and reduction in total annual rainfall (27.7%) (EPA, 2009). Forecasts for the ensuing 20 years (i.e. 2020) showed the increasing trend in air temperature and declining precipitation would continue. An earlier study over 30 year period (1961-1991) showed mean annual daily temperature rose by 0.9^{o}C and total precipitation declined by 20% (EPA, 2000).

  Climate change impacts such as rising temperatures and declining rainfall in combination with other stresses are gradually shifting the country's ecological zones, loss of flora and fauna and an overall reduction in ecological productivity. It is reported that about 295 species of indigenous crop varieties have become endangered or potentially nearing extinction as famers resort more and more to improved varieties as a way of adapting to the challenges imposed by changing climatic conditions (EPA, 2009).

- **Habitat Loss**: The problem of habitat loss and degradation has also become very serious issues for both the terrestrial and the marine ecosystems of Ghana. The practice of clearing the land for cultivation exposes the fields to soil erosion, loss of plant nutrients and habitats. Reports indicate that more than 80 per cent of agricultural expansion in Ghana between 1980 and 2000 came at the expense of forests (Butler, September 02, 2010). This is a reflection of how far agricultural encroachment has also posed great threat to biodiversity. The excessive use of agro-pesticides has contributed to the destruction of useful insects such as pollinators. The threat from agriculture was made worse by the increasing demand for food and raw materials thereby putting pressure on remaining forests and protected areas. Large and small-scale mining for minerals, surface mining in particular, have led to considerable loss or changes in habitats. Mined out areas have been turned into deep pits and tailing dumps which do not support the original biodiversity; The construction of the new Bui hydroelectric dam in 2009 has also led to a loss of habitat for the White collared mangabey (*Cercocebus torquatus torquatus)* prompting rescue operations for these and others.

- **Pollution**: The main sources of organic pollution of coastal wetlands in Ghana are domestic and industrial wastes, as well as those from agriculture. This increases the organic loading of the coastal waters and the Biochemical Oxygen Demand (BOD)

leading to inadequate oxygen supply to support plant and animal life. Increased absorbance of carbon dioxide from the atmosphere has led to the changing of the chemistry of the oceans leading to ocean acidification. The indirect causes are Population Growth, Resource Governance and Infrastructural Development. There is evidence to suggest that increased population growth through birth and internal migration has resulted among others on associated land use conflicts and

- **Poor Resource Governance:** Although biodiversity issues are captured in the National Development Agenda, the level of coordination within and among the various actors (public, private and civil society) is generally very poor. For, instance, the link between research and practice is fairly weak. Additionally, many of the institutions involved in biodiversity governance, at both the national and sub-national levels, have weak capacities.

- **Infrastructural Development**: The last decade has seen a huge increase in infrastructural development, especially within and around the cities and municipal areas. Developments at estuaries especially coastal protection infrastructure continue to affect marine organisms. For example, in recent studies, both fish and avifauna in the Keta lagoon have been reported to have declined mainly due to irrigated farming activities (Lamptey, 2014) over the past decade). Exploratory activities for Ghana's oil and gas are scheduled in the short-term, to be undertaken onshore in the Voltaian Basin, covering about 40% of the country's land mass and stretches from the south through the middle belt to the north. Albeit the impact of exploratory activities on biodiversity may be minimal, development of finds for production activities could impact significantly on biodiversity.

- **Urbanization:** The biodiversity of Ghana is under enormous threat due to the quest for socio-economic development, especially urbanisation, industrialization and tourism (e.g. provision of hotel facilities, influx of people on our beaches for recreation etc.). There is an urgent need to exploit our natural resources in a manner that may not cause irresponsible loss of biodiversity. A critical look at the impact of these development-oriented activities on the fragile ecosystem is required.

- **Wildfires:** Fire is a basic part of the ecology of semi-arid rangeland ecosystem, however the incidence of uncontrolled wildfires has been on the increase in the high forest zone and the savannah areas where many plant and animal species are not fire-resistant and are therefore highly susceptible to destruction when bushfires occur. The result is habitat degradation and serious loss of biodiversity.

- **Sedimentation:** The amount of suspended matter in flowing, due to natural and anthropogenic factors, clearly affects the velocity of the current in our rivers and streams. This has many repercussions both for the morphology of the rivers and the biodiversity therein. The amount of suspended matter also affects the penetration of light into the water and likely affect productivity. High sedimentation occurs during run-off from rainfall and at points of discharge from drains/sewers and other waste pipes. Fauna most affected are filter feeders or those with life-stages employing respiratory/feeding. Their

feeding organs get clogged. This action is detrimental to their survival. Other aquatic animals that rely on sight for feeding, migration or reproduction are also negatively affected.

- **Siltation**: Increases in silt load resulting from changes in land use (e.g. Agriculture and urbanisation) or water use, accelerate the natural evolutionary processes of river and stream ecosystems, but in doing so cause a number of problems. The deposition of fine particles of silt on substrates, suffocates bottom organisms and cut down availability of their food. Such choking of the substrate may also render it unsuitable for spawning by those species requiring swift, well-aerated flows and clear pebble or gravel bottoms. The silt provides anchorage for vegetation, blocking flow order of streams and even may divert them into new courses. Siltation of freshwater ecosystems leads to reduction in flow resulting in the progressive restriction of these water bodies to smaller bed within the original channel with a concomitant loss of habitats for fish and other aquatic organisms.

- **Flooding**: Flooding originates from overspill, river channels, local rainfall and tides. It may either introduce nutrients into an ecosystem or wash away both nutrients as well as vulnerable fauna especially' juvenile stages. This may lead to complete loss of an entire generation of a species.

- **Soil Erosion:** Soil erosion occurs when the rate of removal of soil by water and/or wind exceeds the rate of soil formation. It is important to differentiate between natural erosion and erosion which has been accelerated largely as a result of human activity .Land use is perhaps the most significant factor influencing soil erosion in the country. This is because many land-use practices and construction of infrastructure leave the soil devoid of a protective vegetation cover, or with only a partial cover, for significant periods of time. Also there is mechanical disturbance of the soil. Specific aspects of land use often associated with accelerated soil erosion include expansion and intensification of arable cultivation, overgrazing, deforestation, unhealthy forestry practices, increasing demand for fuel-wood, site clearance in preparation for urban and industrial construction. They lead to changes in the soil ecology and hence the diversity of species in soils. Coastal erosion destroys life in the inter-tidal area as well as disturbs life in near-shore coastal waters. For instance, essential sandy habitats for sea turtles may be lost. Extensive coastal erosion is also not only detrimental to the activities of artisanal fishermen for fish landing sites but also may in the long term degrade vital fish spawning sites.

- **Eutrophication:** This refers to nutrient enrichment of surface waters often resulting in the growth of algal blooms and reduced oxygen levels in water. This is a process that affects Ghana's lakes and other bodies of water. Studies undertaken in the Department of Oceanography and Fisheries, University of Ghana indicate harmful marine algae in Ghanaian waters, which have potential to bloom at high nutrient values. During eutrophication, the quality of the affected water deteriorates until ii becomes unfit for use by human beings. The lakes and rivers become foul smelling and can no longer support many fish and other aquatic species. Fish kills may result and biodiversity will decrease. Many waters in Ghana may undergo eutrophication as they continue to be polluted by

upsetting the nutrient balance. Much of the excess nutrient material that enters our bodies of water comes from sewage. In particular, the use of detergents that contain phosphate greatly increases the quantity of phosphates entering our rivers and lakes through sewage. Rain washes nitrate from fertilizers off farms and into ponds and streams. Nitrates from automobile exhaust enter the water in the rain, and industrial plants discharge nutrients in wastewater, livestock wastes and agricultural run-off. All these favour eutrophication and serve as threat to biodiversity in the country.

2.1.2 Indirect Causes of Biodiversity Loss

The indirect causes of biodiversity loss are varied but include the following:

- **Neglect of the role of traditional institutions in the management of natural resources**. It is apparent that the local institutions' role is subsumed within the community environmental committees. These committees are externally introduced organizations that do not command the same respect or have the same ability to mobilize as do the tested traditional organizations, such as the taboos and chieftaincy.

- **Duplication of roles and responsibilities without clear direction for biodiversity conservation**. Sometimes the mandates of these institutions conflict. For example, in one instance a farmer who had illegally cultivated parts of a wildlife reserve and was in a running tussle with the Wildlife Division of the Forestry Commission was awarded the title of best farmer for the district and the farm in question is used as a demonstration site by the Ministry of Food and Agriculture.

- **Weak coordination, especially at the national level.** Opportunities and forums for strategic dialogue among the Ministry of Environment and Science; Ministry of Natural Resourced and Ministry of Food and Agriculture are limited. Neither the EPA nor MESTI under which it falls seems to have the resources or the political weight to play a coordinator role in the environment and natural resource management sector. There is a provision that each line ministry establish an "environmental desk," which would enhance cross-sectoral coordination; however, the Ministry of Food and Agriculture is the only ministry that at the moment has established such desk. An inter-ministerial technical committee was established, but a lack of resources prevents it from functioning. Under the Environment and Natural Resource Governance Programme a high level coordinating committee headed by the Vice President – the Environment and Natural Resource Advisory Council (ENRAC) has been established to provide overall coordination to all the issues related to environment and natural resources including climate change issues.

- **Tree tenure and benefit sharing arrangement** does not take into account the trade-offs between long-term versus short-term benefits. In many instances, exploitation of natural resource may have short-run poverty alleviation benefits, but these actions may entail long-run costs in terms of resource destruction/degradation, loss of biodiversity or accumulation greenhouse gasses.

- Other cross-cutting issues including the unsustainably high rate of human population growth and consumption; economic systems that fail to value the environment and its resources; inequity in the ownership, management and flow of benefits from both the use and conservation of biological resources; deficiencies in knowledge and its application; and legal and institutional systems that promote unsustainable exploitation.

2.2 Policy Implications of Biodiversity Loss

There exists a direct relationship between economic growth and biodiversity loss on the one hand, and how the former impacts poverty reduction on the other. Ignoring the environmental soundness of growth (even if this leads to short-run economic gains) can undermine long-run growth and its effectiveness in reducing poverty. Anecdotal evidence establishes a direct connection between the quality of the biodiversity and vulnerability and poverty. The strength of this link lies in the high economic dependence of the country on natural resources but equally important, is its role as the main source of livelihoods for, especially, rural communities.

There is a strong relationship between the perceptions of the poor of their well-being and the environment in terms of their livelihoods, health and vulnerability as follows:

- **Livelihoods** – poor people tend to be most dependent upon the environment and the direct use of natural resources, and therefore they are the most severely affected when the environment is degraded or their access to natural resources is limited or denied;
- **Health** – poor people suffer most when water, land and the air are polluted and are vulnerable as alternative livelihoods are very limited or non-existent. They are most vulnerable to water borne diseases (cholera, typhoid, etc.) , malaria, infectious diseases, poisoning, dehydration, bacterial infections, intestinal parasites, etc.; and
- **Vulnerability** – the poor are most often exposed to environmental hazards and environment-related conflict, and are least capable of coping when they occur.

The nature and dynamics of poverty-environment linkages are context-specific, reflecting both geographic location and economic, social and cultural characteristics of individuals, households and social groups. Different social groups have different priorities for biodiversity issues. In the rural areas, for example, poor people are particularly concerned with their access to and the quality of natural resources, especially water, crop and grazing land, forest products and biomass for fuel. For the urban poor, water, energy, sanitation and waste removal are key concerns. Poor women regard safe and physically close access to potable water, sanitation facilities and abundant energy supplies as crucial aspects of well-being, reflecting their primary role in managing the household.

2.3 Key Issues and Opportunities for biodiversity conservation in Ghana

2.3.1 Lessons Learnt from the Review of the Earlier National Biodiversity Strategy

A sectoral review carried out in 2014 revealed that the key problem confronting current biodiversity conservation initiatives in Ghana was the rapid loss of biodiversity. There was a strong link between poverty and environmental degradation. Poverty forces the poor rural communities to adopt practices and use technologies that destroy the environment that results in

biodiversity loss. However the drivers of poverty are usually beyond the domain of the biological resources. Policy actions by government to reduce poverty and improve economic conditions of its people particularly the most vulnerable groups are important. However, poverty reduction efforts in Ghana are usually carried out with negative effects on the environment, as such programmes most often involves use of technologies that are not environmentally friendly.

The key issues confronting the sustainable management of biodiversity in Ghana are:

2.3.1.1 Policy Failures

In the forestry sector the Act establishing Forest Plantation Development Fund, Act 623 of 2002 (Amendment), was designed to enable financial assistance for the development of forest plantations, however the Act did not specify issues such as the restrictions and obligations of grantees to the Fund. The Act sought to establish timber species to meet the demand of the growing timber industry and did not consider biodiversity conservation in the country. The results have been planting of exotic (mostly teak) within the Forest Reserves. There is also no enabling legislation restricting the planting of exotic timber species in degraded forest reserves. The irony is that there is no legislative provision for voluntary establishment of dedicated forests off-reserve. Community dedicated forests including Sacred Groves are only guided by indigenous knowledge and traditional norms.

In the mining sector, whereas Act (Act 703) covers both large and small scale operations, it appears to favour large scale mining operations more than small scale mining, and promotes illegal activities. For example, the licensing process and access to geological information is more favourable to large scale operators than small scale operators. Moreover, the current environment where illegal small scale miners can sell gold without recourse to their legal status is a disincentive for formalisation of their operations. This has perpetuated illegal gold mining rather than managing their operations.

In the fisheries sector, poor enforcement of pair trawling and the use of prescribed nets for artisanal fishing has been a challenge to biodiversity conservation. There are about 230 trawl vessels currently operating in Ghana. These vessels are multipurpose and are used for both purse seining and bottom trawling. They operate as purse seiners during upwelling periods and switch to trawling for the rest of the year. The trawl fishery targets shrimp, seabream, barracuda and cuttlefish for export. The majority of trawl fishing occurs within 50 miles of Ghana's 200 mile Exclusive Economic Zone (EEZ), which has led to conflicts between the artisanal canoe fleet and trawlers due to lost and damaged gear to the artisanal fishers. Furthermore, there is a high proportion of by-catch fish in the trawl catch (FAO, 2004; Nunoo et al., 2009), one species of which is *Sardinella aurita*. In fact, a 1997 report suggests that as little as 4% of shrimp trawler catch is actually shrimp (Nunoo and Evans, 1997). The Ghanaian fish markets are dominated by small pelagic fish, such as sardines, anchovy and mackerel, which are caught by the canoe and the semi-industrial fleets. This leads to overfishing of the pelagic fish in Ghana.

2.3.1.2 Weak Institutional Capacities

The Forestry Commission has not been able to fully develop its organisation and as a result continues to draw its salaries from the consolidated funds. When it was under the Civil Service, morale was low due to unattractive remuneration. Coupled with the inability to attract and retain technically qualified staff, weak capacity is observed in areas such as technical skills, financial management and procurement. However, with the reconstituted Forestry Commission there has been major improvement in retention of technically qualified staff. Political interference remains the main obstacle to the Commission carrying out their mandate effectively. This is manifested in illegal logging, inability to convert concessions into Timber Utilization Contracts (TUCs) mining in forest reserves and "galamsey".

- There are indication of role overlap and lack of clarity of roles in terms of policy formulation (MLFM) and implementation for the other agencies. This arises from some ambiguities which, among other factors, led to the signing of a tripartite memorandum of understanding. Related to this is poor coordination which is a major challenge in the forest and wildlife sector as the responsibilities of most areas of natural resource management remain in a vacuum and/or are poorly coordinated. For example, the Forestry Commission is responsible for off-reserve forest resource management, while other bodies such as District and Area Council Environmental Committees, coordinated by the Regional level EPA, and District Fire Volunteers coordinated by the Fire Service are responsible for natural resource issues.

- The Forestry Commission (and its Divisions) is not decentralised based on "deconcentration" of planning activities to regional and district offices. This does not promote local community participation in planning.

- The Environmental Assessment Regulation 1999, LI 1652 and Environmental Assessment (Amendment) Regulation 2002, LI 1703 empowers the EPA to approve environmental impact assessment in every development activity in the environment. However, the EPA involvement in approving EIAs in the forestry sector has been non-existent. Although it is appreciated that forestry has strict environmental regulations concerning forest management, external environmental auditing by the EPA will strengthen the process.

- Poor implementation and enforcement of policy is a major challenge in the sector. When the 1994 forest and wildlife policy was adopted with its accompanying programmes, a number of policy reforms, new legislation, design of new processes, major institutional reform (i.e., the creation of the new Forestry Commission), and tackling issues such as mining in forest areas were simultaneously embarked upon. Most of these have not been implemented to support these reforms. The forest sector division attempts to control small scale logging for use by communities by introducing small scale permits – TUPs – for timber destined for community use. Yet in 2006, large logging companies publicly admitted that up to 25% of their logs were sourced from TUPs. Also, the Wildlife Division trade in bush meat through issuance of licences has been sporadic and has never worked properly. Endangered wildlife species are boldly sold along the major highways

without licenses, arrests or prosecution. Lack of interest, limited capacity (to formulate, implement and monitor policy) and lack of resources are major contributory factors. The enforcement of illegal logging and associated activities along the entire value chain has been weak and ineffective.

- Role of Traditional Authorities in natural resource management is not formalized - Though Traditional Authorities play a crucial role in natural resource management, their roles are not formalised. Commercial tree 'ownership' is vested in the state on behalf of the chiefs – resulting in their receiving royalties from logging. The current situation does not promote the interest of, and incentivise, the chieftaincy system in commercial trees.

2.3.1.3 Poor Corporate Governance

Power play, patronage and vested interests create problems of governance. The absence of mechanisms for process monitoring that reduce discretions and exercise of power on critical matters such as delays in the payment of royalties creates incentive to influence legislators and policymakers at all levels. Anecdotal evidence suggests that vested interests account for the ineffectiveness of enforcement and curtailment of the illegal operations in the forest and wildlife sector.

2.3.1.4 Low knowledge and Awareness on the Importance of Biodiversity is not Widespread

The supply of information on forestry policies, laws and legislation has been scanty and skewed with little emphasis on the state of forests, and loss of forest and biodiversity. Coupled with this, civil society has been relatively weak in the forest and wildlife sector resulting in limited awareness and advocacy to demand; improved performance from the FC. The general absence of transparency and accountability to key stakeholders has resulted in mistrust by community constituents

2.3.1.5 Poor Sustainable Use of Biodiversity

The CBD recognises the need for countries to use their indigenous biological resources for socio-economic development. Key sectors of the economy of Ghana (such as agriculture, fisheries, and forestry) are dependent on the use of biological resources. While recognising the need to use resources, the CBD requires parties to ensure that the use of biological resources does not deplete the country's biological diversity. The sustainable use of the components of biological diversity is specifically established in Article 10 of the Convention, which inter alia requires parties to integrate consideration of the conservation and sustainable use of biological resources into national decision making and to adopt measures relating to the use of biological resource to avoid or minimise adverse impacts on biological diversity. Mainstreaming biodiversity conservation into local level development has been pursued vigorously.

2.3.1.6 Ex-Situ Conservation Research has not been Applied Extensively to Conserve Cultivated and Domesticated Agro-Biodiversity

Ex-situ conservation has employed techniques such as seed banks, field gene banks, in vitro storage, and captive breeding measures. These measures provide excellent opportunities for researchers to study plants, animals, and microorganisms in controlled conditions, and to improve collection, storage and regeneration techniques. Ex-situ facilities are also used for germplasm evaluation, as centres for documentation and information systems and for providing information on genetic resources on a commercial basis. In Ghana there have not been vigorous attempts to promote ex-situ conservation research to cover threatened species, wild relatives of cultivated plants and domesticated animals; medicinal plants; plant crops of local and regional importance; pasture and forage species; ornamental plant species; tree species; and micro-organisms. Ex-situ conservation is complementary to the rehabilitation and restoration of degraded ecosystems, and the recovery of threatened species.

2.3.1.7 In-Situ Conservation has not Struck the Balance Between Conservation Measures within Protected Areas

The Convention on Biological Diversity recognises in-situ conservation as the primary approach to biodiversity conservation (Article 8). Of particular importance is the balance to be struck between conservation measures within Protected Areas (PAs) and measures for sustainable use of natural areas outside of PAs in the wider countryside. It is generally recognised that activities, which occur in areas adjacent to PAs, may be critical to the viability of the PAs themselves. There is an urgent need to assess the strengths and weaknesses of the existing protected area network and to develop appropriate strategies/plans for improving the effectiveness of its coverage and of its management. The assessment should include a gap analysis to identify gaps in the coverage of Ghana's ecosystems

2.3.1.8 Technology Transfer for Biodiversity Monitoring and Technical Support has been very Low

Most technologies which are available and being used in Ghana like biotechnology (which is used here to include the conservation of biological diversity) are increasingly being recognised as a new source of economic revival. However, biotechnology is one of the most controversial areas of technology innovation. This is partly because biotechnology poses both opportunities and risk at different levels of its introduction into economic and ecological systems. In this respect, policy related issues have become major concerns in the development of biotechnology. The task of making informed choices about biotechnology requires the development of indigenous policy-making capacity.

2.3.1.9 Low Revenue and Economic Returns

Revenue collection from the forest and wildlife sector is low. Article 20 of the CBD requires each Party to provide financial support, in accordance with its capabilities, for the national activities, which will be undertaken to implement the Convention. Article 20 also commits the

developed nations to provide “new and additional financial resources” to assist developing countries with their biodiversity conservation and management programmes.

2.3.1.10 Poor Natural Capital Accounting

Biodiversity and national ecosystem-based accounting system is non-existence in the country. Natural resource accounting is currently not integrated in the national accounting of the country resulting in limited attention to the sector in terms of capital budget allocation.

2.3.1.11 Poor Incentive Measures Towards Biodiversity conservation

Article 11 of the Convention on Biological Diversity requires that incentives be adopted to promote conservation and sustainable use of biological diversity. The Convention further stress that these incentives should be economically and socially sound. Incentives measures that promote desired practices and behaviour may be direct (e.g., the provision of grants or subsidies) or indirect (e.g. tax exemptions). Disincentives, such as fines or pollution charges, are used to discourage practices, which deplete biodiversity or lead to unsustainable use. “Perverse” incentives are measures which have been taken to promote other social objectives, but which have a negative impact on biodiversity

2.3.1.12 Low Capacity Building in Biodiversity Research and Training

Article 12 of CBD focuses on the need for research and training, recognising the special needs of developing countries in this regard. Much is yet to be learned about biodiversity conservation and sustainable use. The study and management of the interactions between people and biological resources requires training in both the social and biological science. Ghana lacks adequate manpower and resources to manage existing protected areas and to enforce legislation, as well as the inadequate or lack of co-ordination of conservation initiatives among the various sectoral agencies.

2.3.2 Opportunities

The recognition of the biodiversity conservation agencies of the need for general participation by the citizenly, in conservation efforts is an important step in ensuring sustainable resource use. It is interesting to note that in the various projects undertaken in the last two decades, the role of local people and other collaborators have been recognized and written into the project documents and pursued during implementation.

The prospects of Ghana’s biodiversity conservation initiatives are further enhanced with several environmental NGOs and other stakeholders assisting in government’s efforts at biodiversity conservation. Such collaborative efforts involving local communities, traditional authorities, NGOs, and government institutions are in the right direction. For such efforts to succeed, however, future conservation policies would have to deviate from the past individualistic and rather stereotyped approaches to more flexible multidisciplinary and holistic approaches. For example, the Ramsar and IBA concepts, which focus on the preservation of bird habitats in selected protected areas, have the ultimate goals of general biodiversity conservation in all

manner of habitats. The current collaboration of academic departments of the universities, research institutions, government departments and NGOs in biodiversity conservation initiatives should also be encouraged.

It is generally accepted that without funding, the most elaborate biodiversity conservation initiative will not achieve the desired results. There is the potential for generation of funding for conservation projects both locally and globally through (i) protected area fees, ((ii) institution of a Biodiversity Trust Fund, (iii) the private sector and local NGOs, and (iv) international sources like the Global Environmental Facility (GEF) of the World Bank, Convention of Biological Diversity (CBD), Multilateral/Bilateral financial institutions, donor countries and international NGOs.

CHAPTER THREE: NATIONAL BIODIVERSITY STRATEGY: VISION, PRINCIPLES, GOALS, PRIORITIES AND TARGETS

3.1 National Vision and Mission towards Biodiversity Conservation

Within the framework national development agenda, Sustainable Development Goals, National Climate Change Action Plan, Forestry Development Master Plan and the international conventions that Ghana has signed, the national biodiversity conservation **vision** is that:

> *By 2030, effective systems would be in place to ensure that biodiversity in Ghana is valued, conserved, restored and wisely used to maintain ecosystem services, and sustain life support services for a healthy planet whiles ensuring continuous and equitable sharing of the costs and benefits arising therefrom, to the well-being, prosperity and security of all Ghanaians*.

Following from this vision our **mission** is

> *To take effective and urgent actions to minimise the loss of biodiversity in order to ensure that by 2030 ecosystems in Ghana are resilient and continue to provide essential services, thereby securing the country's variety of life, and contribute to human well-being, and poverty eradication*.

The vision and mission statements recall the international biodiversity strategy which is universal for all biodiversity issues, cutting across all the biodiversity-related multilateral agreements, many of which Ghana has signed. The NBSAP for Ghana has identified 23 national strategies and 51 national targets. Some of these targets extend up to and beyond 40 years as envisaged in the Ghana 40 year Development Plan, FDMP and the National Climate Change Action Plan. These national strategies and national targets have been aligned with the AICHI Biodiversity Strategic Goals and Targets as medium terms measures to achieve the vision.

The national goal for the conservation and sustainable use of biodiversity is related to the specific problems affecting biodiversity in the country and the needs of the people who depend on them. It seeks to moderate the attitude and behaviours of the people and realign the activities to the maintenance of biodiversity. However this was done within some guiding principles which were agreed upon by the stakeholders in the environment sector.

3.1.1 Guiding Principles for Conservation and Management of Biodiversity

Ghana's biodiversity is globally significant and important to the national economy as well as the socio-cultural beliefs of the people's livelihoods at locality levels. The general principles underlying Ghana's approach to conserving and managing the biodiversity therefore includes the following:

- Every form of life is unique and warrants respect from humanity and the conservation ethic, including the inherent right to existence of all living forms, is deeply rooted in the tradition and cultural values of all Ghanaians;

- Biological diversity is a national heritage and it must be sustainably managed and wisely utilized today and conserved for future generations;
- Biological resources are natural capital and their conservation is an investment that will yield benefits locally, nationally and globally for the present and future;
- The benefits from sustainable management of biological diversity will accrue, directly or indirectly, to every sector of society;
- The sustainable management of biological diversity is the responsibility of all sectors of society;
- It is the duty of Government to formulate and implement the policy framework for sustainable management and utilisation of biological diversity in close cooperation with scientists, the business community and the public;
- The role of local communities in the conservation, management and utilisation of biological diversity must be recognized and their rightful share of benefits should be ensured;
- Public awareness and education is essential for ensuring the conservation of biological diversity and the sustainable utilisation of its components;
- In the utilisation of biological diversity, including the development of biotechnology, the principles and practice of biosafety should be adhered to.
- Biodiversity management actions must be based on sound ecological principles, scientifically valid information and local knowledge.
- Representative samples of viable size should be conserved of each of Ghana's ecosystems/ habitats;
- The costs and benefits of biodiversity conservation should be shared equitably;
- Effective public/private/civil society partnerships should be developed for biodiversity conservation – both for protected areas management and for sustainable use systems;
- The government must recognise the interests and rights of the local communities, while the communities must recognise that such management is part of a larger political and environmental framework.

3.2 Goal and Objectives

As a signatory to the international convention on biodiversity, Ghana is obliged to conserve and manage the terrestrial and aquatic biodiversity for sustainable and equitable benefits to all people globally, now and in the future. In keep with this obligation, the goal of the NBSAP is

> *To pursue effective policies, regulations, and programmes that would ensure that biodiversity is valued, conserved, restored and wisely used to maintain ecosystem services, sustain life support services and promote continuous and equitable flow of benefits to all Ghanaians.*

The key strategic objectives supporting this goal are:

- to address the underlying causes of biodiversity loss by mainstreaming biodiversity into all sectors of government and society programmes;
- to improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity;

- to enhance the benefits of biodiversity to all sectors of the economy;
- to enhance implementation of national biodiversity action plan through participatory planning, knowledge management and capacity building.

3.2.1 National priorities and planning horizon

As part of her obligations under the CBD, Ghana is committed to the sustainable use of its biological resources. The Forest Reserves, national parks and other wildlife reserves including various traditional forms of conservation would continue to be high on national development agenda to ensure biological conservation. The strategy document recognizes that there is a lack of information on biological resources in Ghana and there is a need to address these data gaps. It is further recognized that sustainable development requires the need to integrate biodiversity issues into national development planning programmes.

In pursuant of this broad the national priority strategic goals and targets are indicated in Table 5. The planning horizon for the implementation of the strategy is a continuum set of activities within three phases as follows:

Short Term Action Planning Phase (2016-2020)

The period seeks to consolidate on-going interventions in the environment sector to achieve the AICHI Goals and targets by 2020. This will be done by strengthening the internal weaknesses of institutions to minimize external threats. It will require that MESTI will continue to monitor current programmes and reforms and to consolidate the gains. It will ensure improved governance programme to contain illegalities within the environment sector whiles intensifying stakeholder participation including the private sector. The short term planning phase will require modest increase in funding within the constraints of the national budget supported by international donor funding.

Medium Term Planning Phase (2021 – 2030)

Within the context of the national climate change action plan, forestry development master plan, national strategic environmental assessment, national spatial development plan, current challenges facing the environment sector, the on-going sector interventions and the limited access to credit for investment in production and innovation, it is not possible for Ghana to achieve the objectives under the first phase. Taking cognizance of the future planned interventions, the carbon sequestration potentials and the changing scenes in the global economy, the environment sector will develop a comprehensive programme that will encompass all sub-sectors of the economy. Under a ten year programme, Ghana will develop a medium term plan that will mainstream biodiversity into national development agenda. Based on the outcome of the short term interventions, the medium term plan incorporate biodiversity considerations into policies governing sectoral activities, ensure biodiversity accounting within national budget, and promote sustainable use of biodiversity. The medium term scenario will be set against the background that biodiversity is the bedrock of social, political and economic transformation of

the nation. This will be done within the context of the new forest and wildlife policy, Ghana Shared Growth and Development Agenda, the proposed 40-year blue print for national development, and Ghana's obligations under various multilateral environmental conventions and international treaties.

Long Term Planning Phase (2031 – 2040).

The long term objective will consolidate all the gains to be achieved under the short and medium term objectives. It will ensure that all systems and technologies put in place to mainstream biodiversity in national development are backed by the requisite laws.

The national strategic goals and strategies are set out in Table 5.

Table 5: ***National Strategic Goals and Targets***

Strategic Goal	Priority National Strategy	Planning Horizon
Address the Underlying Causes of Biodiversity Loss by Mainstreaming Biodiversity across Government and Society	Create public awareness of the values of biodiversity to promote conservation, restoration and sustainable usage.	Short term (2016-2020)
	Integrate and mainstream biodiversity values into national accounts and local development and poverty reduction strategies and planning processes with reporting systems.	Short to Medium term (2016- 2030)
	Eliminate/phased out/reformed incentives, including subsidies, harmful to biodiversity, in order to minimize or avoid negative impacts, and promote positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions by 2020.	Short term (2016-2020)
	Governments, business and stakeholders at all levels take steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	Short to Medium term (2016- 2030)
	All fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	Short to Medium term (2016- 2030)

Strategic Goal	Priority National Strategy	Planning Horizon
	Areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	Medium to Long term (2016-2040)
	Pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	Short to Medium term (2016- 2030)
	Invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	Short term (2016-2020)
	The multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning	Medium to Long term (2016-2040)
To Improve the Status of Biodiversity by Safeguarding Ecosystems, Species and Genetic Diversity	At least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	Short to Medium term (2016- 2030)
	The extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	Medium to Long term (2016-2040)
	The genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity	Short term (2016-2020)
Enhance the Benefits to All from Biodiversity and Ecosystem Services	The ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and	Short to Medium term (2016- 2030)

Strategic Goal	Priority National Strategy	Planning Horizon
	vulnerable.	
	The ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	Short to Medium term (2016- 2030)
	The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	Short term (2016-2020)
Enhance Implementation of NBSAP through Participatory Planning, Knowledge Management and Capacity Building.	Ghana develops, adopt policy instrument, and commence implementing an effective, participatory and updated national biodiversity strategy and action plan.	Short to Medium term (2016- 2030)
	The traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	Short to Medium term (2016- 2030)
	Knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	Short to Medium term (2016- 2030)
	At the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties	Short to Medium term (2016- 2030)

CHAPTER FOUR: BIODIVERSITY STRATEGY AND ACTION PLAN

4.1 National Biodiversity Actions Plan

The effective management of biodiversity to meet the national development objectives on biodiversity will be guided by the four strategic objectives. These strategic objectives have been formulated into short term programmes and actions plans to be implemented between now and 2020 by various sector ministries. The activities identified fit into the on-going national development agenda with funding from national annual budget. Guided by the Aichi objectives, the implementation of the each target has been summarised into action plans to indicate the main planned activities, target and indicators that will provide the enabling conditions and incentives necessary to achieve the goals or priority areas and targets of the NBSAP. The Action Plan determines what is to be done, who does what, where, when, and how. For easy monitoring each plan has been presented in tabular form.

The plans are discussed within programme component which is the strategic objective and planned actions.

COMPONENT 1: ADDRESS THE UNDERLYING CAUSES OF BIODIVERSITY LOSS BY MAINSTREAMING BIODIVERSITY ACROSS GOVERNMENT AND SOCIETY

Background

Ghana suffers from rapid deforestation and destruction of biodiversity. Between 1900 and 1990 Ghana lost 80% of its forest cover (from 8m/ha to 1.6m/ha). This was due to excessive logging beyond the annual allowable cut and slashes and burn agriculture. Ghana has one of the highest deforestation rates in Africa at—two per cent annually (UN 2007). Ghana was the first country to have lost a major primate species since the Convention on Biological Diversity came into force: the red colobus monkey has been extinct since 2003 because of destruction of its habitat. Timber harvesting and slash-and-burn agriculture are the greatest threats, but hunting, wildfires, mining, and rising demand for fuel wood are also important contributors. Official estimates suggest that logging is proceeding at about four million m^3 per year – four times the sustainable rate.

The **strategic objectives** to be pursued under this programme are to:

- Create public awareness of the values of biodiversity to promote conservation, restoration and sustainably usage.
- Integrate and mainstream biodiversity values into national accounts and local development and poverty reduction strategies and planning processes with reporting systems.
- Eliminate/phased out/reformed incentives, including subsidies, harmful to biodiversity, in order to minimize or avoid negative impacts, and promote positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

- Governments, business and stakeholders at all levels take steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.
- All fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.
- Areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.
- Pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.
- Invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.
- The multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning

Action Plan 1: Create public awareness of the values of biodiversity to promote conservation, restoration and sustainably usage (Aichi Target 1)

National Strategy	National Target	Indicator	Description of Indicator	Actor(s)	Frequency of Monitoring
Implement the CBD and related biodiversity conventions	Complete the NBSAP to implement the objectives, articles and programmes of work of biodiversity convention.	NBSAP approved and become operational by December 2016	A national framework for implementing CBD available.	MESTI	Monthly
	Implement Regulations for the Biosafety Act 831.	Biosafety Regulations published and distributed by mid-2017	Biosafety Regulations available, known and used by relevant stakeholders	National Biosafety Authority (NBA)	Quarterly
	Initiate discussions on biodiversity on the electronic and print media	At least 200 environmental journalists trained to report and generate public discussions on biodiversity issues by Mid-2018	Weekly radio discussion on Biodiversity issues. Bi-weekly feature articles on biodiversity issues Weekly reporting on environmental abuses in print and electronic	MESTI Media Houses	Weekly/Monthly

National Strategy	National Target	Indicator	Description of Indicator	Actor(s)	Frequency of Monitoring
			media.		

Action Plan 2: Integrate and mainstream biodiversity values into national accounts and local development and poverty reduction strategies and planning processes with reporting systems (Aichi Target 2)

National strategy	National target	Indicator	Description of indicator	Actors	Frequency of Monitoring
Incorporate Biodiversity considerations sustainable use and equitable sharing of benefits arising from the use of genetic resources into policies governing sectoral activities	Integrate-biodiversity conservation strategies into national development policies and plans	Strategic plans of MoFA, MoFAD, and COCOBOD achieve gains in biodiversity by ending 2018.	Agro-biodiversity conservation practices are integrated into strategic plans of MoFA, MoFAD, COCOBOD	MoFA, FC, MLNR, MoFAD, MESTI COCOBOD Water Resources Commission	Annually
	Develop tools and guidance that facilitate the implementation of the Cartagena Protocol's provisions on transit, contained use, environmental release and unintentional transboundary movements and emergency measures	Developed tools and guidelines by December 2017.	Tools and guidelines to facilitate the Cartagena Protocol implementation available.	MoFA, Forestry Commission, MLNR, MoFAD, MESTI COCOBOD	Annually
	Set up a National Biodiversity Commission (NBC) to oversee the mainstreaming of biodiversity into sectoral policies and programmes	National Biodiversity Commission established and made functional by 2018.	The legislation setting up the NBC passed and secretariat in place	MESTI/EPA	Quarterly reporting

Action Plan 3: Incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed (Aichi Target 3)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring
Accelerate the process of the removal of incentives harmful to biodiversity	Identify incentives within initiatives that drive biodiversity loss or degradation	Harmful incentives identified by December 2017	Catalogue of incentives harmful to biodiversity conservation	MESTI, MoTI, MoFA, MoFAD, Research Institutions, Universities, NGOs	Half Yearly reporting
	Develop mechanism for phasing out incentives harmful to biodiversity	Disincentives to biodiversity phased out incentives by December 2020	A number of harmful incentives to biodiversity expunged from national plans and policies	MESTI, MoTI, MoFAD, MoFA, MoF, FC, CEPS, MoJ&AG's Dep't	Periodically

Action Plan 4: Governments, business and stakeholders develop plans for sustainable production and consumption and keep the impacts on resource use within safe ecological limits. (Aichi Target 4)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring
Enhance the preservation and conservation of Ghana's biological heritage including non-native species.	Public awareness, understanding, appreciation and support for preservation and conservation of Ghana's biological heritage are developed.	A biodiversity communication and public awareness strategy on the preservation and conservation of Ghana's biological heritage developed and implemented in place by June 2017.	A strategy document outlining the message and communication channels for the various stakeholders available	MESTI, MLNR, National Commission for Civic Education (NCCE), Media, Civil Society, EPA, Ministry of Education.	Annually
Enhance the sustainable production and consumption of biological resources.	Businesses and other stakeholders develop plans and programmes to sustainably utilize natural resources in schemes that benefit biodiversity and ecosystems	Biodiversity offset schemes are in place and benefitting society and the environment by December 2018.	Functional biodiversity offset scheme	EPA, Private Sector (businesses including realty, actuarial, investment houses etc.), NGOs, Research institutions, Universities	Annually
	Strengthen the National	An updated National BCH by	Updated and functional	NBA and CSIR,	Periodically

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring
	Biosafety Clearing House (BCH) as a public awareness and information exchange mechanisms	December 2017	national BCH available		
Communicate, educate and make the public aware of Traditional Knowledge issues	Traditional knowledge systems on biodiversity documented for the present and future generations	A compilation of traditional knowledge systems on biodiversity completed by December2019	A document cataloguing biodiversity-related traditional knowledge systems of the various ethnic groups in Ghana available.	Universities, Research Institutions, Traditional Authorities, MoFA, Forestry Commission, MoFAD, NGOs	3-5 years
	The recognition, integration and promotion of traditional biodiversity conservation knowledge of local communities by state institutions enhanced	Traditional biodiversity conservation knowledge of local communities is used in state institutional activities and reports by mid-2020	Reference to the use in state institutional activities and reports available in major institutions.	Universities, Research institutions, traditional authorities, MoFA, Forestry Commission, MoFAD, NGOs	Periodically
	Biosafety risk assessment reports incorporating socio-economic considerations are shared in a timely manner through the Biosafety Clearing House (BCH) mechanism	Records on socio-economic issues regarding Biosafety Applications in place by December 2018.	Compilation of reports of risk assessment undertaken and their socio-economic impacts available	NBA, CSIR, GAEC,	Quarterly
Manage effectively Invasive Alien Species (IAS) in Ghana	Systems to enhance IAS management developed or strengthened.	A national IAS management system developed by December 2017.	A geo-referenced database system together with a reporting, control and management protocols and guidelines are available.	EPA MESTI, CSIR FC MoFA, MoFAD Universities & Research Institutions	Annually
	Develop the capacity of the	Guidelines on IAS with special	Guidelines on IAS and those	NBA, EPA, CSIR,	Reviewed as and when

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring
	Biosafety Technical Advisory Committee to review applications regarding GMOs which may become IAS	reference to GMOs in place by mid-2018	from GMOs available		necessary
Increase awareness and build communication about the taxonomy of biodiversity	A directory of taxonomists and their expertise created	A directory of taxonomists available by December 2018	A database of taxonomists available	Universities and Research institutions in Ghana	Annually
	Implementation of policy needs identified in Global Taxonomy Initiative (GTI)	Relevant policy needs formulated by December 2019	Relevant policy needs identified within GTI applied	Research institutions, universities	Periodically
	A communication strategy between different sectors on general taxonomy developed	Knowledge about taxonomy of biodiversity in place by 2019.	Indication of collaboration among taxonomists based on reports, workshop proceedings, publications, research findings.	Research institutions, universities	Periodically
Build capacity of young scientists to improve taxonomic information delivery.	Provide training resources for taxonomy to educational establishments	At least 30 young scientists trained in taxonomy by December 2020	The number of young scientists trained in taxonomy available in the directory	Universities, Research institutions	Annually
Develop national GMO repository directories in the BCH	Create hyperlinks to GMO repository directories in the BCH and other digital libraries	Hyperlinks in place by mid-2018	Hyperlinks available for use	NBA and collaborating institutions	Quarterly

Action Plan 5: Reducing the rate of loss of all natural habitats, including forests, to at least half and where feasible brought close to zero, and degradation and fragmentation significantly reduced. (*Aichi Target 5*)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Provide incentives to communities	Institute a Payment for Ecosystem Scheme for communities	Modalities for payment of ecosystem services approved legislated by December 2017	Forest fringe communities are aware and can apply for	FC MESTI MLNR CSOs	Quarterly
Involve local communities in the conservation and restoration of biodiversity	Establishment of CREMA, national plantation development programme	Legislations on CREAM and Plantation development establishment in place by Mid 2018	Modalities for community involvement on biodiversity conservation are in place and being applied	WD, CSOs, FC MLNR	Half-yearly
To maintain and Enhance programmes that support the preservation of natural habitats	Establish marine protected areas	Guidelines for the establishment of Marine protected areas in place by December 2018	Guideline on marine protected areas management system is being used	Fisheries	Quarterly
	Protect important wetlands	Management Plans for important wetlands developed and approved by Mid-2018	Availability of management plans	WD, CSOs, FC MLNR	Yearly
	Ensure the effective management of biosphere reserves and other biodiversity hotspots	Important biosphere reserved identified and gazetted by 2019	Database of Biosphere reserves in place	EPA MESTI	Yearly
	Establish biological corridors to link national parks	A legal framework to support the creation of the corridor in place by 2019	Availability of legal framework	FC MLNR	Yearly

Action Plan 6: All stocks managed and harvested sustainably, so that overfishing is avoided (Aichi Target 6)

National Strategy	National Target	Indicator	Description of Indicator	Actors	Frequency of Monitoring/ Reporting
Incorporate Biodiversity Conservation, sustainable use and equitable sharing of benefits arising from the use of genetic resources into National Fishery Policy	Sustainable culture and capture fishing practices and programs that enhance biodiversity conservation and ecosystem services promoted	Sustainable marine fisheries management plans in place by ending 2018	Fisheries management plan is available	MMDAs MOFA MDAs Research Inst. Judiciary Fisheries Assoc.	Bi-annually Annually
	Enhance registration/certification as a tool for sustainable fishing management.	Improvement in the Registrations process and certificates issued or renewed by December 2019	Frame survey conducted	Fisheries Commission	Annually
	Support the implementation of the guidance on risk assessment and risk management including guidance on new developments in agricultural modern biotechnology	National Biosafety Risk Assessment guidelines	A document guiding the NBA in the conduct of risk assessment on agricultural biotechnology applications	NBA/TAC	Annually

Action Plan 7: Areas under agriculture, aquaculture and forestry managed sustainably, to ensure conservation of biodiversity (*Aichi Target 7)*

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Strengthen management of biodiversity in all habitats	Encourage correct use of agro-chemicals	Standards and best practices guidelines in place by	Standards and best practices guidelines available	EPA MOFA MMDAs MOT	Bi-annually

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
		December 2017. Enforce compliance to the guidelines on safe use of agrochemicals by 2018	Guidelines on safe use of agrochemicals	GSA FBOs COCOBOD NGOs MoFAD Research Inst. FC Universities	
Strengthen the management of existing protected areas and off reserve areas	Develop a GIS-based map of sacred groves	Best management practices for protected areas and off-reserved areas developed by December 2019	Best practices available GIS maps available	EPA, MOFA MMDAs MOTI, GSA COCOBOD NGOs MoFAD FORIG , FC Universities	Bi-annually
	Support the implementation of global significant biodiversity areas	Development of a national register of community conserved areas in place by mid-2019	National register of community conserved areas available in digital form and in print.	FC MLNR MESTI EPA Traditional Authorities	Annual
		Capacity building for managers of protected areas developed by mid-2020	Register of community protected area managers	FC MLNR MESTI EPA Traditional Authorities	Annual
	Guidance on risk assessment and risk management including guidance on new developments in agricultural modern biotechnology developed	National Biosafety Risk Assessment guidelines in place by December 2019	A document guiding the NBA in the conduct of risk assessment on agricultural biotechnology applications	NBA/TAC	Periodically
Strengthen risk management in handling and use of agricultural modern biotechnology	Develop Strategies and guidance to identify, assess, and monitor GMOs	Document on identification and monitoring of GMOs developed by ending 2018	Document on identification and monitoring of GMOs available	NBA/IBC/TAC Local Communities Regulatory Agencies EPA, MoFAD, FC, Marine Police, MDAs	Half Yearly
	Implement the Sections of the Biosafety Act, 2011 regarding	GMOs issues within District plans by mid-	District plans reflecting GMOs	NBA, MLGRD, MESTI, NDPC	Half Yearly

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
	GMOs	2019			

Action Plan 8: Minimizing pollution, including excess nutrients, to levels that are not detrimental to ecosystem function and biodiversity (Aichi Target 8)

National Strategy	National Target	Indicator	Description of Indicator	Actors	Frequency Of Monitoring/ Report
Strengthen compliance with and enforce relevant laws on pollution control	Create awareness on pollution reduction measures	Community participating and adopting pollution reducing measures by ending 2018	Number of communities/ individuals adopting pollution reducing measures	NBA EPA WRC MOFA COCOBOB FC, GSA Research institutions MMDAs.	Bi- annual or annual
	Standards, guidelines and regulations developed and adopted	Standards, guidelines and regulations in place by December 2019	Standards, guidelines and regulations operational	MESTI EPA GSA GMA	Annually
	Environmental information management system improved	BCH website created by December 2018	Harmonized system of environmental data storage and retrieval available	MESTI; EPA MOFA-PPRSD FC GMA Research inst. NADMO Navy; MDAs	Annually

Action Plan 9: Ensuring that invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment. (Aichi Target 9)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Develop an early warning system for	Develop and implement communication protocols for	Communication protocol completed by December 2018	Communication protocol available	MESTI EPA MOFA-PPRSD FC	Periodically

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
detection of IAS	early warning detection			Research institutions NADMO Navy MDAs GIS	
Promote Integrated management of IAS in all habitats	Invasive alien species policy and strategy developed and implemented	Requisite documents in place by December 2018	Policy and strategy document available	NBA/IBC, Regulatory Agencies EPA, MoFAD, FC, Marine Police, MDAs	Periodically
	Implement projects and programmes on IAS in all habitats	Projects and programmes in place to prevent, control and manage IAS by mid-2019	No. of projects being implemented	NBA/IBC, Regulatory Agencies EPA, MoFAD, FC, Marine Police, MDA and CSOs	Periodically
	Implement the Sections of the Biosafety Act, 2011 regarding IAS and GMOs	IAS and GMOs issues within District plans by mid-2020	District plans reflecting IAS and GMOs	NBA, MLGRD, MESTI, NDPC,	Periodically

Action Plan 10: Minimizing the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification, so as to maintain their integrity and functioning. (Aichi Target 10)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Strengthen the legal and regulatory framework for the protection of coral reefs, mangrove ecosystems, estuaries, and community protected areas	Develop regulations to protect coral reefs	Regulation on the protection of coral reefs by December 2018	Regulation available	MoFAD, EPA, GMA,	Periodically
	Develop and enforce relevant regulations protecting mangrove ecosystems and estuaries	Guideline on ecological health of mangroves and estuaries in place by December 2017	Ecological health of mangroves and estuaries improving	MoFAD, EPA, GMA, FC, NGOs, CSOs, MMDAs, Universities, Traditional Authorities, Fishermen Associations (NAFAC)	Periodically

Plan Linkages to Relevant National and International Initiatives

The implementation of the action plans under component one would be implemented within the following on-going programmes: Sustainable Development Goals (SDGs); national Biosafety programme; Biodiversity conservation programmes under the Forestry Development Master Plan; National Spatial development framework; Sustainable Tourism Programmes; the Guinea Current Large Marine Ecosystem (GCLME) initiative; Monitoring of Environment and Security of Africa (MESA), and ECOWAS Coastal and Marine Resources Management Programme.

COMPONENT 2: IMPROVE THE STATUS OF BIODIVERSITY BY SAFEGUARDING ECOSYSTEMS, SPECIES AND GENETIC DIVERSITY

Background

Ghana is implementing a lot of programmes aimed at improving the status of biodiversity conservation in the country. Among the programmes currently on-going and at varying levels of implementation are:

Reduced Emissions from Deforestation and Forest Degradation (REDD+)

The global response to deforestation and forest degradation is the REDD+ Initiative. Ghana's REDD+ Readiness Proposal (2010) identified the principal drivers of deforestation and degradation broadly as: (1) Agricultural expansion (50%); (2) Wood harvesting (35%); (3) Urban sprawl and infrastructure development (10%); and (4) Mining and mineral exploitation (5%). It also highlights especially the importance of cocoa in the national economy and the rapid expansion of the cultivated area, especially in the forested Western Region, including shifting from traditional shaded to open cultivation, which has resulted in loss of forest cover and decline in carbon stocks in the agricultural landscape.

To address this, Ghana is implementing the Forest Investment Plan (FIP) with the aim of providing upfront investment to support the implementation of the REDD+ strategy. It is expected that the implementation of the investment plan, would address the underlying drivers of deforestation and reduction of greenhouse emissions from deforestation and forest degradation, while reducing poverty and conserving biodiversity.

Voluntary Partnership Agreement (VPA)

This a trade agreement between the European Community and the Republic of Ghana on Forest Law Enforcement, Governance and Trade (FLEGT) in Timber Products into the Community. The objective of this Agreement is to provide a legal framework aimed at ensuring that all imports into the European Community from Ghana of timber products covered by this Agreement have been legally produced and in doing so to promote trade in timber products. In addition, this Agreement provides a basis for dialogue and cooperation between the Parties (the European Community and the Republic of Ghana) to facilitate and promote the full implementation of this Agreement and enhance forest law enforcement and governance.

Though focused on ensuring that only legal timber enters the European market, Ghana in the agreement has decided to apply the standards to its domestic market as well. Thus successful

implementation of the Agreement will to a large extent contribute to sustainable forest management.

Cocoa Farming and Biodiversity in Ghana Project

The application of the sustainable cocoa farming concept, which allows the use of agricultural methods that integrate sound ecological and economic farm practices, could have low impact on the forest environment, while also increasing the farmer's standard of living through the introduction of new revenue generation streams. This project investigated the feasibility and potential of cocoa production in a biologically diverse environment and established a cocoa farm tourism initiative in the project community. The project is expected to conserve and increase biodiversity on selected farms through the management of a sustainable cocoa ecosystem, and improve farmer's incomes through increased productivity and farm tourism. An important long term output of the project will be increased awareness and understanding amongst project participants and stakeholders of key issues surrounding sustainable cocoa production and farm livelihoods in the cocoa sector of Ghana.

Climate Change Initiatives

The country is vulnerable to climate change, as a majority of its society still depends on small-scale agriculture and other key economic assets threatened by climate change, such as the coastal zone and water resources. The Government of Ghana is committed to mainstreaming climate change into key planning processes on the national, regional and local level (MEST, 2010). To support this process and a further harmonization of climate change related activities in Ghana, the Ghana Ministry of Finance and Economic Planning (MOFEP) and Ministry of Environment, Science and Technology (MEST) expressed demand for a mapping of the most important past and current climate change related activities in the country, and of international climate change related funding opportunities. The outcomes of the study can help to identify overlaps and gaps and provide guidance for future needs.

Food and Agriculture Sector Development Policy

The implementation of the Food and Agriculture Sector Development Policy (FASDEP II) is aimed at mainstreaming biodiversity into the food and agriculture sector through sustainable land and management practices. The policy is thus serving as the entry point in addressing the interaction between agriculture climate change and biodiversity loss.

Forestry Development Master Plan

The development of a new Forestry Development Master Plan and the publication of a new Forest and Wildlife Policy will enable a comprehensive approach to biodiversity conservation.

Sustainable Land and Water Management Project

Ghana is also implementing a Sustainable Land and Water Management Project to demonstrate improved sustainable land and water management practices aimed at reducing land degradation and enhancing maintenance of biodiversity in selected micro-watersheds in the Northern Savannah region of Ghana.

Biodiversity Offset Schemes

Businesses impact ecosystems through consumption, pollution, land conversion, and other related activities. Therefore biodiversity offsetting are conservation activities that are designed to give biodiversity benefits to compensate for losses by ensuring that when a developmental activity damages nature (and this damage cannot be avoided) new, bigger or better nature sites will be created. Biodiversity offsetting and payments for ecosystem services guide society in mainstreaming considerations of biodiversity into economic decision-making, through governments' planning processes, licenses and permits and financial institutions' lending and investment decisions. In this regard, Ghana is developing a biodiversity offset scheme in response to biodiversity loss and the decline in ecosystem services requires changes in economic incentives and markets.

Biosafety Implementation Programme

Ghana was part of the negotiations that led to the adoption of the Cartagena Protocol on Biosafety (CPB) and ratified the Protocol on 30th May, 2003. This was in line with Article 19 (3) of the Convention on Biological Diversity (CBD), which stipulates that Parties shall consider the need for and modalities of a protocol, setting out appropriate procedures, including, in particular, advance informed agreement, in the field of the safe transfer, handling and use of any living modified organism resulting from biotechnology that may have adverse effect on the conservation and sustainable use of biological diversity.

Ghana has since prepared a framework for biosafety, which is a blue print for biosafety in Ghana. As part of the Framework, the Biosafety Act, 2011 (Act 831) has been passed. The Act established the National Biosafety Authority (NBA) to lead the regulatory mechanism with regards to the use, handling, transports and identification of Genetically Modified Organisms (GMOs) in Ghana. The Act also established a Technical Advisory Committee (TAC) which conducts scientific risk assessment on applications that are submitted to the NBA. Two Institutional Biosafety Committees have been certified by the NBA to monitor and supervise activities under the Act in their respective institutions and report to the NBA. Seven Regulatory Agencies have been identified by the Biosafety Act to support the NBA in regulating Genetically Modified Organism in Ghana. They are Ghana Standards Authority, Food and Drugs Authority, Environmental Protection Agency, Customs Division of Ghana Revenue Authority, Plant Protection and Regulatory Services Directorate, Veterinary Services Directorate, Ministry of Local Government and Rural Development.

In addition to the Cartagena Protocol on Biosafety, the Conference of Parties to the CBD directed its attention to an emerging issue, i.e. synthetic biology at its tenth meeting in 2010. It was agreed that Parties, other Government and relevant organizations were to apply the precautionary approach to the field release of synthetic life, cell or genome into the environment. Consideration of synthetic biology as a substantive issue was subsequently placed on the agenda of the Subsidiary Body on Scientific, Technical and Technological advice at its sixteenth meeting in 2013 and since then it has been debated intensively.

Synthetic biology methodologies and techniques share various degrees of overlap with those of 'modern biotechnology'. In particular the application of in vitro nucleic acid techniques that overcome natural, physical reproductive or recombinant barriers and that are not techniques used

in traditional breeding and selections as defined in the Cartagena Protocol on Biosafety. This makes the subject important to Ghana which is a Party to the Convention and the Protocol. There is therefore the need to consider the potential positive and negative impacts of components, organisms and products resulting from synthetic biology techniques on the conservation and sustainable use of biodiversity and associated social economic and cultural considerations and to consider the possible gaps and overlaps with the applicable provisions of the Convention, its protocols and other relevant agreements related to components, organisms and products resulting from synthetic biology techniques. This is an important issue, in considering the way forward.

National Action Plan

In support of these on-going activities, the NBSAP will put in place the following programmes and actions:

Action Plan 11: Ensuring that at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas are conserved through systems of Protected Areas (Aichi Target 11)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Enhance the preservation and conservation of Ghana's biological heritage through systems of protected areas	Update and revise existing management plan measures for the ex-situ conservation of Ghana's Biological heritage including non-native species are adopted	Rehabilitated or upgraded conservation centres by December 2018 Management Plans of ex-situ conservation updated by mid-2018	Numbers of conservation centres functioning Updated management plans	WRC, FC, Research Institutions, Universities EPA, CSOs, NGOs MoE, MoTCCA, Traditional Authorities, MoJ&AG's Dept.	Annually
	Enforce existing management plans for protected areas	Updated management plans implemented by December 2020	Manuals for the implementation of management plans in place	FC MLNR	Annually
	Revise the regulations on wetland management	Wetland regulation revised by December 2017	Wetland regulation available at all levels	FC MLNR	Annually
	Facilities and plans for in-situ conservation including research on plants, animals and micro-organisms are established, maintained and	An inventory of materials considered for in-situ and ex-situ conservation completed by mid-2018	An in-situ and ex-situ inventory is available	MoJ&AG's Dept. Minerals Commission, GMA, Media, Traditional Authorities, MLGRD, Fisheries Commission	Periodically

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
	improved			FC (WD)	

Action Plan 12: Preventing the extinction of known threatened species and their conservation status, particularly of those most in decline, and improving and sustaining their status (Aichi Target 12)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Protect threatened species in all habitats	Create an inventory of threatened, vulnerable and endangered species using the RED list category of IUCN	Database on threatened species for all habitats in place by mid-2018	Details of the status of threatened species available	FC, WC, MoFAD, Universities, Research Institutes, NGOs, CSOs, Traditional Authorities	Periodically
	Develop regulations to protect endangered species	Regulations to protect endangered species enacted by December 2019	Regulation available and implemented	FC, WC, MoFAD, Universities, Research Institutes, NGOs, CSOs, Traditional Authorities	Annually

Action Plan 13: Maintaining the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives (Aichi Target 13)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Support the preservation and conservation of genetic biodiversity of cultivated plants, farmed and domesticated animals and their wild	Promote and enhance research on Genetically Modified Organisms (GMOs)	Permits granted for research on GMOs per year	Details of research available	GAEC, CSIR, Universities, CRIG	Annually
	Support collection and conservation of genetic diversity of cultivated plants, farmed and	Inventory of the gene bank developed for cultivated plants, farmed and domesticated	Inventory of the gene bank available	Research and Academia Farmer groups, CSOs Fishermen/ Fish farmers	Periodically

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
relatives	domesticated animals and their wild relatives	animals and their wild relatives by December 2019		Traditional Authorities, Local Communities	
	Strengthen National Biosafety Authority (NBA) including its inspection and monitoring outfits	At least 50% of required staff and appropriate infrastructure developed by mid-2020	Staff strength and logistics improved	NBA/ MESTI/ Regulatory Agencies	Periodically

Linkages to Relevant National and International Initiatives

The implementation of component two within the short to medium term will be done through the following national and international initiatives: New Partnership for African Development (NEPAD); FAO Code of Conduct for Responsible Fisheries (CCRF); Collaborative Adaptive Research Initiative in Africa and Asia (CARIAA; Monitoring of Environment and Security of Africa; ECOWAS Coastal and Marine Resources Management Programme; Safe Sea Access Strategy Development; West African Regional Fisheries Programme (WARFP).

COMPONENT 3: ENHANCE THE BENEFITS TO ALL FROM BIODIVERSITY AND ECOSYSTEM SERVICES

Background

Biodiversity are the living organisms that are assembled in an ecosystem like a forest, a river, a mangrove or a swamp. The interactions among these biodiversity components and their surroundings produce services which are beneficial. Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling. These maintain the conditions for life on earth. People seek many services from ecosystems and thus perceive the condition of an ecosystem in relation to its ability to provide desired services.

The functioning of the ecosystems to provide services for human life is closely linked to the presence of the components of the ecosystems themselves. This is the biodiversity which gives life and is universally cherished. The availability of clean air, incessant and continuous provision of water and fertile soils for agriculture and plantations are all dependent on the availability and the presence of right conditions of the ecosystems and their biodiversity components. An appreciation of these benefits to all, including humankind, from biodiversity and ecosystem services is key to ensuring that these are valued and protected**.** Every effort must therefore be made to ensure that the benefits are enhanced and equitably shared. The Ghanaian public must

therefore be made to appreciate the uniqueness of biodiversity and its ecosystem services bequeathed to the nation. It is good to understand that most people do not appreciate what they have until they lose it, which could be too late to consider or contemplate. Rather it is better for people to know what they benefit from having the continual presence of these biodiversity and ecosystem services when they understand that their life support systems are closely linked to them

National Action Plans

Action Plan 14: Restoring and safeguarding ecosystems that provide essential services, including ecosystem services (Aichi Target 14)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Incorporate Biodiversity Conservation, sustainable use and equitable sharing of benefits arising from the use of genetic resources, into development plans and programmes	Mainstream watershed protection, land use and spatial planning Environmental, Biosecurity and Natural resource policies into sector and district development plans and programmes to	Guideline to mainstream watershed protection into district level planning developed by December 2017 Ecosystem health indices identified and published by Mid-2018	Monitoring of the ecosystem health	MMDAs, Local communities, CSOs, Research Institutions, Universities, NGOs	Annually
Protection of watersheds, wetlands that provide essential services	Degraded ecosystems restored through community efforts.	Community-based watershed restoration plan developed by the end of 2018 At least 15 % of degraded ecosystems restored by mid-2019	Degraded land restoration programme on-going	FC Water Resources Commission MMDAs	Annually
	Develop and implement PES	Guidelines for PES in watershed restoration in place by December 2017	Implementation of PES	FC Water Resources Commission MMDAs	Annually

Action Plan 15: Enhancing ecosystem resilience and restoration to promote the contribution of biodiversity conservation to carbon stocks and ensure restoration of at least 15 per cent of degraded ecosystems restoration. (Aichi Target 15)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Enhance ecosystem resilience through conservation and restoration programmes	Restore degraded ecosystems in the forests, wetlands and aquatic ecosystems	At least 15% of degraded ecosystem restored by December 2019	Ecosystem resilience indices	Research Institutions, Universities, CSOs, NGOs, FC, WC, MoFAD, MLNR, MLGRD, MoJ& AG's Dept.	Annually
	Develop and implement community-based incentive reward system for Ecosystem Services	Guidelines for community-based incentive system for ecosystem services developed by mid-2018	Implementation of incentive system for ecosystem services	CSOs, NGOs, FC, WC, MoFAD, MLNR, MLGRD, MoJ& AG's Dept.	Annually

Action Plan 16: Operationalising the Nagoya Protocol on access and benefits sharing (Aichi Target 16)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Ratify and domesticate the Nagoya Protocol on Access and Benefit Sharing (ABS)	Relevant legal instrument and guidelines for ABS developed and implemented	Relevant legislations enacted by ending 2017.	Approved legal instrument for accession to the protocols available and deposited at the UN in New York	NBA, MESTI, MoJ & AG's Dep't, Parliament, MFARI, CSOs	Urgent
Ratify and domesticate the Nagoya Kuala Lumpur Supplementary Protocol on Redress and Liability	Relevant legal instrument and guidelines for Nagoya Kuala Lumpur Supplementary Protocol on Liability and Redress developed and implemented	Nagoya Protocol ratified by December 2017. Guidelines for Nagoya Kuala Lumpur Supplementary Protocol in place by mid-2019.	Implementation of Nagoya Kuala Lumpur Supplementary Protocol.	NBA, MESTI, MoJ & AG's Dep't, Parliament, MFARI, CSOs	Annually

Linkages to relevant national and international initiatives

The implementation of component three programmes would be linked to the following national and international initiatives: Sustainable Development Goals (SDGs); implementation of Biosafety ACT, Biodiversity component of National Climate-Smart Agriculture and Food Security Action Plan and the national spatial development framework.

COMPONENT 4: ENHANCE STRATEGY IMPLEMENTATION THROUGH PARTICIPATORY PLANNING, KNOWLEDGE MANAGEMENT AND CAPACITY BUILDING

Background

Article 12 of CBD focuses on the need for research and training, recognising the special needs of developing countries in this regard. Ghana has not developed much research and literature about biodiversity conservation and sustainable use. The study and management of the interactions between people and biological resources requires training in both the social and biological sciences and forms the basis for the multidisciplinary field of conservation biology. The current opportunities in the country for capacity building i.e. in training professionals in the area of conservation biology are very limited. There are institutions offering strong programmes in forestry and agriculture, but there are no degree programmes and/or adequate curricula in wildlife management, biosystematics, biodiversity conservation or community-based conservation of natural resources. A shortage of funding and lack of trained staff have also limited the amount of research on the identification, conservation, and sustainable use of biological diversity in Ghana.

There is little integration of research among institutions and disciplines, and very limited use of traditional knowledge in defining management programs. There are several state and government institutions as well as private and non-government institutions in Ghana which have roles in implementation of all the programmes and actions needed for the achievement of the Aichi Biodiversity targets. A coordinating national planning entity National Biodiversity Committee within MESTI formally established and charged to act as the link and to provide technical backstopping to all the identified actors for the purposes of planning, management of knowledge and capacity building in areas of biodiversity conservation, sustainable use and ecosystem services.

It is envisaged that as Ghana moves towards higher economic growth, the challenges to biodiversity conservation are going to be more daunting. The effort to provide an even higher quality of life for Ghanaians would place even more stress on the environment if nothing is done to ensure that the economic development of the country went hand-in-hand with environmental conservation efforts. In this regard, the objectives of this component:

- To ensure that strict precautionary and remedial measures aimed at ensuring that the nation proceeds on its current developmental path mindful of both the potential and real threats to the environment be established. In particular strict enforcement of the regulations on SEA and EIA should be pursued, especially with the oil and gas industry.
- To ensure that the national population management programmes, should be strengthened to slow down population growth. Support for any population management programme, even though may seem remote, and has to be counted among biodiversity conservation efforts.

- To initiate massive environmental awareness campaigns, especially targeting rural and peri-urban communities and the youth, to sensitize such communities to the idea of biodiversity conservation as a tool for national survival and the formation of nationwide wildlife club.
- To promote closer collaboration between Ghana and the her neighbours and the international community at large should be forged in the quest for the conservation and sustainable utilization of the country's natural resources to attract for mutual benefit, the needed funding, technology, techniques and management especially of boundary resources.
- To promote better coordination and collaboration among the implementation agencies is required. Effective platforms for such collaboration need to be created and where they exit, strengthened. The establishment of the Environmental and Natural Resources Advisory Council (ENRAC) headed by the Vice President, as the highest body for vetting and approval of all policies on environmental and natural resources, with membership from government, civil society, academia and traditional authorities provides a real opportunity for coordinated effort at environmental management and biodiversity conservation.

National Action Plan

The commitment at governmental level is to implement the following action programmes:

Action Plan 17: Developing and adopting a policy instrument, for the implementation of an effective, participatory and updated NBSAP (Aichi Target 17)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Implement the NBSAP	Develop the M&E Plan to support the implementation of the NBSAP	NBSAP M&E Plan in place by end of 2017	NBSAP together with M&E Plan reflecting emerging issues	MESTI	Periodically

Action Plan 18: Ensuring that the traditional knowledge, innovations and practices of indigenous and local communities and their customary use, are respected (Aichi Target 18)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Compile and harmonise Traditional Knowledge issues on biodiversity	Traditional knowledge on sacred landscape compiled and processed	Traditional knowledge on sacred landscape compiled and processed by mid2018 Public	Number of workshops, media engagements, Publications	Traditional Authorities, Media NGOs, Research Institutions, Universities	Periodically

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
		engagements on traditional knowledge initiated by mid-2017			
Educate the public on traditional knowledge issues on biodiversity	Create awareness on traditional knowledge issues on biodiversity	Traditional knowledge awareness programme initiated by ending 2017	Programme on TK initiated	Traditional Authorities, Media NGOs, Research Institutions, Universities	Annual
Develop a legislation for local communities on the rights on genetic resources	Legislation on community rights on genetic resource developed.	Legislation on community rights on genetic resource in place by December 2018	Communities are aware of their rights in genetic resource	, MLNR, FC, MMDAs, MoJ&AG's Dept., NCCE, NGOs, Registrar General's Dep't	Annual
Operate *sui generis* (peculiar to local communities) system for the protection of Traditional and Indigenous Knowledge	A *sui generis (*peculiar to local communities) system for Traditional Knowledge is developed as part of Ghana's legislation	Guidelines for the enactment of community level Legislation on Traditional Knowledge fully operational by mid-2020	A Documentation outlining opportunities and proposed guidelines on traditional knowledge system available to all	Traditional Authorities, Land owners, MLNR, FC, MMDAs, MoJ&AG's Dep't, NCCE, NGOs, Registrar General's Dept.	Periodically
Integrate local and scientific knowledge on biodiversity into national development	Integrate Traditional Knowledge and Formal Science in biodiversity conservation	A document on existing biodiversity related traditional knowledge systems developed by December 2019	A document on existing biodiversity related traditional knowledge systems available	Traditional authorities, MESTI, MLGRD, MoTCCA (Ghana Museums and Monuments Board), Opinion Leaders, NGOs, Research institutions, Universities	Periodically
	Use national forestry and agricultural policies to sustain ethno-forestry and agro-silvo-pastoral arrangements at	Productivity of pilot schemes integrating traditional knowledge and basic science initiated by Mid-2017	Performance of pilot schemes compared with existing traditional practices in ethno-forestry and agro-silvo-pastoral	MESTI, MoFA, Research Institutions, Universities, NGOs, FC, MMDAs, Traditional Authorities	Periodically

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
	the local level		arrangements		

Action Plan 19: Knowledge, on the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied (Aichi Target 19)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Use science and technology for disseminating biostatistics for the effective management of biodiversity	Prepare and publish information on biodiversity	Biodiversity publications, websites, social media presence initiated by ending 2017	Improving biodiversity information dissemination through an integrated approach	Research Institutions, Universities Ministries CSIR, FC Cocoa Research Institute, Agric. Extension Services, NGOs, FORIG	Based on institution's reporting system.
	Disseminate biodiversity information nationally and internationally	Biodiversity information dissemination begins by mid-2017	Improving biodiversity information dissemination through an integrated approach	Research Institutions, Universities Ministries CSIR, FC Cocoa Research Institute, CSO FORIG	Annually.
Enhance Research and Development in Agricultural Biodiversity	Research gaps for improving agricultural biodiversity conservation identified and addressed	Research gaps identified and published by mid-2018	Closing research gaps in agricultural biodiversity	Research Institutions, Universities Ministries CSIR, FC Cocoa Research Institute, NGOs Agric. Extension Services	Based on institution's reporting system
	Research and extension linkages on agricultural biodiversity conservation and agricultural productivity	Personnel trained or engaged in programs in biodiversity and agriculture by December 2018	Improving the knowledge and skills of agricultural extension personnel engaged in biodiversity	Research Institutions, Universities Ministries CSIR, FC Cocoa Research Institute, NGOs Agric. Extension	Based on institution's reporting system

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
	promoted			Services	

Action Plan 20: Mobilizing increased financial resources for effectively implementing the strategic plan for biodiversity 2016- 2020 from all sources (Aichi target 20)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report
Build capacity of relevant institutions on resource mobilization	Potential funding sources and conditions for accessing funds determined	An inventory of potential donors completed by mid-2017	List of donors and their conditions for accessing available funds	MESTI	Periodically
	Train public servants in resource mobilization and financial re-engineering	At least training of 20 public servants on resource December 2017	Public servant capable of formulating projects to attract funding	MESTI, EPA, MLNR	Annually
Develop and Implement Resource Mobilization Strategies	Publish NBSAP and use it as reference material for MMDAs, CSOs and donors when preparing programmes and plans for donor/ Government funding	NBSAP formulation completed by December 2016.	Number of biodiversity related funded projects.	MoF, MESTI, DPs, NGOs.	Annually

Linkages to relevant national and international initiatives

The implementation of component four programmes would be linked to the following national and international initiatives: Sustainable Development Goals (SDGs); implementation of Biosafety ACT, National Climate-Smart Agriculture and Food Security Action Plan; Biodiversity component of National Climate-Smart Agriculture and Food Security Action Plan Sustainable Land management programme; Forest Improvement Programme; and the National Spatial Development Framework

CHAPTER FIVE: NBSAP IMPLEMENTATION AND COORDINATION

5.1 Introduction

The conservation of biodiversity in Ghana depends on ministries, departments and agencies outside the Ministry of Environment Science, Technology and Innovation. Therefore, the successful implementation of the NBSAP requires a concerted action on all levels of governance including the traditional authorities, the private sector, civil society organizations and the Government of Ghana as a whole. The key considerations in the implementation of NBSAP will be efficient allocation of resources, strengthening linkages between different stakeholders and coordinating their activities. MESTI will be the lead ministry in the implementation and, in most cases, lead in the coordination of the sector activities.

The tandem with its lead role, MESTI will strengthen its role and experience in coordinating cross-sectoral environmental programmes. At the policy implementation level, MESTI will in collaboration with the Ministries of Lands and Natural Resources, Food and Agriculture (MoFA), Finance and Economic Planning and the Local Government and Rural Development (District Assemblies) enactment of the relevant legislation to support biodiversity coordination.

5.2 Strategies for Effective Management and Coordination of Biological Diversity

The effective management and coordination of biological diversity activities to achieve the objectives of the NBSAP will require the MESTI to undertake the following activities immediately:

- Support CSIR and FC to improve the scientific knowledge base of biodiversity in Ghana. This will require completing the survey and documentation of the biological diversity in Ghana, and undertake studies to assess its direct and indirect values, and identify the potential threats to biological diversity loss, and how they may be countered.

- Enhance sustainable utilisation of the components of diversity by identifying and encouraging the optimum use of the components of biological diversity, ensuring fair distribution of benefits to the nation and to local communities.

- Support CSIR to develop a centre of excellence in industrial research in tropical biological diversity by establishing Ghana as a centre of excellence in industrial research in tropical biological diversity.

- Strengthen the institutional framework for biological diversity management by re-establishing the National Biodiversity Committee and empowering it as the mechanisms for planning, administration and management of biological diversity. Representation to the committee should include the private sector, the universities and traditional authorities.

- Strengthen and integrate conservation programmes of all on-going programme that impinges on biodiversity conservation

- Integrate biological diversity considerations into sectoral planning strategies by ensuring that all major sectoral planning and development activities incorporate considerations of biological diversity management.

- Enhance the skill, capabilities and competence of relevant staffs to ensure a cadre of trained, informed and committed manpower in the field of biological diversity.

- Encourage private sector participation in biological diversity conservation, exploration and sustainable utilisation.

- Review and update existing legislation to reflect biological diversity needs and introduce new legislation where appropriate.

- Take mitigating measures to reduce the adverse effects of human activities on biological diversity.

- Promote international cooperation and collaboration in order to enhance national efforts in biological diversity conservation and management.

- Promote and encourage the exchange of information on biological diversity at local and international levels

- Identify and establish appropriate funding mechanisms for biological diversity conservation and management.

5.3 Roles and Responsibilities of Stakeholders in the Implementation of NBSAP

5.3.1 Ministry of Environment, Science, Technology and Innovation (MESTI)

The MESTI will be the lead ministry with the responsibility of promoting sustainable biodiversity conservation by putting in place effective systems and policies that would ensure that biodiversity in Ghana is valued, conserved, restored and wisely used to maintain ecosystem services, sustain life support services for a healthy planet whiles ensuring equitable sharing of the costs and benefits arising therefrom. In general MESTI would be responsible for

- Policy analysis and formulation.
- Monitoring and evaluation of policy implementation.
- Enacting the relevant laws and regulation required to regulate the environmental sector to protect all stakeholders and the environment.
- Coordination and harmonisation of policies and sector activities with other MDAs.
- Facilitate public-private dialogue and partnerships for sustainable utilization of biodiversity.
- Advocacy of sector interests locally and in international agreements.
- Facilitate capacity building of the sector's human resources.
- Facilitate research and technology development.
- Facilitate the integration of cross-cutting issues such as gender equality into the management of biodiversity.

- Facilitate international trade and domestic marketing of biodiversity products.
- Coordinate the enforcement of regulations governing biodiversity conservation.
- Coordinate Development Partners' development policies and activities with the sector policies and activities.

5.3.2 Ministry of Lands and Natural Resources (MLNR)

The Ministry of Lands and Natural Resources (MLNR) is the sector ministry responsible for formulating forest and wildlife policy and has over-all responsibility for sector planning and policy direction, as well as monitoring and evaluation of development policies and programmes. The Ministry will ensure that an enabling environment and adequate capacity and infrastructure are provided for both private entities and public agencies to perform at their best in conservation and management of biodiversity in Ghana.

Operating through its sector agency the Forestry Commission (FC) of Ghana, they will be responsible for the regulation of utilization of forest and wildlife resources, the conservation, and management of biodiversity and the coordination of policies related to them. Under the NBSAP, the FC will provide a range of technical services, and market intelligence to inform both Government and industry on pricing, trade, and product trends. The Wildlife Division (WD) of FC will implement the Government of Ghana (GoG) policy on safeguarding the integrity of the nation's wildlife through management and sustainable development of wildlife and their habitats for their perpetual optimization of contribution to national socio-economic development.

Towards this broader goal, the WD under the NBSAP implementing will continue to:

- Manage nations protected areas and regulate the utilization of wildlife resources,
- Promote public awareness, education, communication and support for wildlife conservation,
- Promote eco-tourism development in protected areas,
- Develop wildlife management capacity at the national, district and community levels and facilitate research to support wildlife development.
- Identify and describe actions that are being taken/proposed by government of Ghana that might have an effect on the conservation of biodiversity and the tropical forests.
- Identify and describe issues which require urgent attention if the country is to comply with regional and international obligations/agreements and possible solutions in addressing these issues.
- Identify and describe approaches and interventions by institutions (e.g., government of Ghana, donors, CSOs, private sector) and results (if any) under given enabling conditions including the effectiveness of the existing legal and regulatory environment to enable effective biodiversity conservation efforts.

- Identify government of Ghana priorities in biodiversity conservation and tropical forest.

5.3.3 Ministry of Food and Agriculture (MOFA)

Under the implementation of the plan, the MOFA would be expected to undertake:

- Policy analysis and formulation.
- Monitoring and evaluation of policy implementation.
- Advising Cabinet on laws required to regulate agricultural activities in order to protect all stakeholders and the environment.
- Coordination and harmonisation of policies and sector activities with other MDAs.
- Facilitation of public-private dialogue and partnerships.
- Advocacy of sector interests locally and in international agreements.
- Facilitation of capacity building of the sector's human resources.
- Facilitation of research and technology development.

5.3.4 Private Sector and Civil Society Organisations

During the implementation of the NBSAP, private sector and CSOs would be expected to

- Participate in policy dialogue to ensure that their interests are reflected.
- Invest in productive activities in the sector.
- Ensure that commercialisation is balanced with social responsibility and environmental sustainability.
- Support training and skills improvement of the sector's manpower.
- Participate in research and utilise results.
- Disseminate good agricultural and land management practices.
- Comply with laws and regulations governing the environment.
- Develop sustainable forest and wildlife enterprises

5.3.6 Development Partners

The Development Partners have played significant roles in assisting Ghana to conserve its biodiversity. Under the implementation of NBSAP, the DPs would be expected to play the following significant roles

- Contribute financial and technical resources to support the achievement of sector objectives within the parameters of the prevailing policy framework.
- Continue to seek new opportunities to harmonise and align their assistance according to the Government's Harmonisation Action Plan.
- Engage constructively in on-going policy dialogue on all policies relevant to biodiversity conservation and the related sectors.
- Participate in and support sector monitoring and evaluation efforts.
- Facilitate government management of financial and technical assistance.
- Participate in and support sector monitoring and evaluation efforts.

5.3.7 Role of other MDAs

All the other relevant MDAs (COCOBOD, Universities and Research Institutions and the District Assemblies) are expected to ensure that their policies and programmes are consistent with NBSAP. The MDAs would be expected to partner with MESTI in sector development through:

- Participation in environmental sector policy development, planning and review.
- Research.
- Human resource development.
- Implementation of cross-sectoral activities.
- Monitoring and evaluating relevant development indicators and providing information to MESTI.

5.4 Framework for Engagement and Coordination

MESTI will require maximum cooperation and favourable response from all MDAs, as well as the other stakeholders (Traditional Authorities CSO), in the implementation of NBSAP. MESTI will engage partners through a platform on which all parties specify:

- Shared objectives.
- Common prioritisation of objectives and, where necessary, joint planning.
- Roles to leverage skills and build on synergies of parties. (Agreed roles and responsibilities will determine funding responsibilities of respective partners).
- Mechanisms to assess success and make adjustments.

This platform will be applied at the national level for inter-ministerial coordination, through to the National Biodiversity Committee. At the national level, the National Development Planning Commission (NDPC) shall play an oversight role, with MESTI playing a strong advocacy and monitoring role. The NBSAP results framework shall be the main tool for monitoring the activities of the MDAs and other stakeholders.

5.5 Monitoring and Evaluation Plan

The monitoring of the NBSAP will be the responsibility of MESTI. In order for progress to be monitored and for easier means to aggregate and compare outcomes from individual Ministries and projects, the following attributes will be measured at least three times during the lifespan of the project:

- changes in land use and forest cover, which can be measured on two key attributes: greenness (use of NDVI for land cover changes) as a proxy indicator of biodiversity richness;

- improved livelihoods of the forest fringe communities, measured through child nutrition surveys (QBS) as proxy indicator for better livelihoods at household levels that can be attributable to improved land productivity; and
- investments in the forestry and fishery sectors as indicated by amounts of co-financing that come into the sectors through other sources.

Broadly, the socio-ecological productive landscapes (agricultural, rangelands and forests) with a vegetative cover greater than 10 per cent of the land area is considered acceptable. This would be supported by increasing/expanding vegetation under effective landscape management practices which can be measured through the number of natural regeneration areas established, hectares under CREMA that aims at improved forest cover and biodiversity conservation. To help keep track of the changes in the biodiversity status of the country, an overall framework for the plan has been prepared to be used by MESTI to monitor changes.

The National Biodiversity Commission (NBC) secretariat will the responsible for the coordination of all projects and activities under the NBSAP and will monitor the implementation through regular reporting by sector agencies, field visits, and peer review workshops. Each sector agency will supervise its own work plan, monitor performance, whether by project inputs and outputs or policy measures, and will report on progress and problems at quarterly bases during project coordination meetings either on-line or during project visits. The reporting format would be developed by NBC for the sector agencies. The NBC will analyse and consolidate the reports as a routine function and feedback to the sector agencies and partners annually.

5.5.1 Overall Results Framework

In order to ensure effective monitoring and reporting on the NBSAP, the overall results framework has been developed. The framework gives a clear guidance on the indicators, which can be used to monitor the programme implementation and to review the plan. The general results framework for the plan is summarized in Table 6.

Table 6*: NBSAP Overall Results Framework*

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
Implement the CBD and related biodiversity conventions	Complete the NBSAP to implement the objectives, articles and programmes of work of biodiversity	NBSAP approved and operational by December 2016	Draft NBSAP endorsed by stakeholders	Validated Ghana NBSAP	A national framework for implementing CBD available	MESTI

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
	convention					
	Implement Regulations for the Biosafety Act 831	Biosafety Regulations published and distributed by mid-2017	Biosafety Act (831) passed by parliament but nor fully implemented	Implementation plan for Biosafety developed and implementation of planned activities initiated	Biosafety implementation plan	National Biosafety Authority (NBA) MESTI
	Initiate discussions on biodiversity in the electronic and print media	At least 200 environmental journalists trained to report and generate public discussions on biodiversity issues by Mid-2018	No register of trained environmental journalist exist	A complete register of trained name and address of certified environmental journalist	Weekly radio broadcast on Biodiversity issues. Bi-weekly feature articles on biodiversity issues Weekly reporting on environmental abuses	MESTI Media Houses
Incorporate Biodiversity considerations sustainable use and equitable sharing of benefits arising from the use of genetic resources into policies governing sectoral activities	Integrate-biodiversity conservation strategies into national development policies and plans.	Strategic plans of MoFA, MoFAD, and COCOBOD achieve gains in biodiversity by ending 2018.	Cocoa biodiversity programme being implemented under PIF in Brong-Ahafo and Western regions	A comprehensive agro-biodiversity strategic plan to mainstream biodiversity in agricultural activities validated by all stakeholders	Agro-biodiversity conservation practices strategic plans of MoFA, MoFAD, COCOBOD	MoFA, COCOBOD
	Develop tools and guidance that facilitate the implementation of the Cartagena Protocol's provisions on transit, contained use, environmental release and unintentional transboundary movements and	Developed tools and guidelines by December 2017.	No guidance to implement Cartagena Protocols available	Tools and guidance to facilitate the implementation of the Cartagena Protocol's.	Approved tools and guidelines to facilitate the Cartagena Protocol implementation available.	MoFA, Forestry Commission, MLNR, MoFAD, MESTI COCOBOD

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
	emergency measures					
	Set up a National Biodiversity Commission (NBC) to oversee the mainstreaming of biodiversity into sectoral policies and programmes	National Biodiversity Commission established and made functional by 2018.	Non-functional National Biodiversity Committee	A National Biodiversity Commission (NBC) established with a secretariat	Legislation on NBC set up NBC secretariat	MESTI EPA
Accelerate the process of the removal of incentives harmful to biodiversity	Identify incentives within initiatives that drive biodiversity loss or degradation	Harmful incentives identified by December 2017	Conflicting systems driving biodiversity loss/degradation	A Catalogue of incentives promoting biodiversity conservation	Biodiversity incentive catalogue	MESTI, MoTI, MoFA, , NGOs
	Develop mechanism for phasing out incentives harmful to biodiversity	Disincentives to biodiversity phased out incentives by December 2020	No mechanism to phase out harmful incentives to biodiversity	A catalogue of disincentives to biodiversity conservation.	Biodiversity disincentive catalogue	MESTI, MoTI, MoFA, MoF, FC, CEPS, MoJ&AG's
Enhance the preservation and conservation of Ghana's biological heritage including non-native species	Public awareness, understanding, appreciation and support for preservation and conservation of Ghana's biological heritage is developed	A biodiversity communication and public awareness strategy on the preservation and conservation of Ghana's biological heritage developed and implemented in place by June 2017	No communication and public awareness of biodiversity exist	A communication and public awareness strategy on biodiversity conservation developed and implementation initiated	A strategic document outlining the message and communication channels for the various stakeholders available	MESTI, MLNR, National Commission for Civic Education (NCCE), Media, Civil Society, EPA, Ministry of Education
Enhance the sustainable production and	Businesses and other stakeholders develop plans	Biodiversity offset schemes are in place and	No biodiversity offset schemes in place	Functional biodiversity offset scheme in place	Plans on biodiversity off-set schemes	EPA, Private Sector.), NGOs, Research

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
consumption of biological resources.	and programme to sustainably utilize natural resources in schemes that benefit biodiversity and ecosystems	benefitting society and the environment by December 2018				institutions, Universities
	Strengthen the National Biosafety Clearing House (BCH) as a public awareness and information exchange mechanisms	An updated National BCH by December 2019	Out-dated national biosafety clearing house	Updated and functional national BCH available	Workshop reports	NBA and CSIR
Communicate, educate and make the public aware of Traditional Knowledge issues	Traditional knowledge systems on biodiversity documented for the present and future generations	A compilation of traditional knowledge systems on biodiversity completed by December 2019	No comprehensive data on traditional knowledge on biodiversity	A document cataloguing biodiversity-related traditional knowledge systems of the various ethnic groups in Ghana available	Consultant's/workshop reports on traditional knowledge	Universities, Research Institutions, Traditional Authorities, MoFA, Forestry Commission, MoFAD, NGOs
	The recognition, integration and promotion of traditional biodiversity conservation knowledge of local communities by state institutions enhanced	Traditional biodiversity conservation knowledge of local communities is used in state institutional activities and reports by mid- 2020	Sacred Groves are recognized at community protected areas	Guidelines on how to integrate traditional biodiversity conservation practices in national biodiversity conservation strategies	Reference documents and reports available in major institutions.	Universities, Research institutions, traditional authorities, MoFA, Forestry Commission, MoFAD, NGOs

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
	Biosafety risk assessment reports incorporating socio-economic considerations are shared in a timely manner through the Biosafety Clearing House (BCH) mechanism	Records on socio-economic issues regarding Biosafety Applications in place by December 2018	No biosafety risks assessed.	Biosafety risk assessment reports through the BCH mechanism	Compilation of reports of risk assessment undertaken and their socio-economic impacts available	NBA, CSIR, GAEC,
Manage effectively Invasive Alien Species (IAS) in Ghana	Systems to enhance IAS management developed or strengthened	A national IAS management system developed by December 2017.	No geo-reference database exist	A geo-referenced database system together with a reporting, control and management protocols and guidelines produced	Reports	EPA MESTI, CSIR FC MoFA, MoFAD Universities & Research Institutions
	Develop the capacity of the Biosafety Technical Advisory Committee to review applications regarding GMOs which may become IAS	Guidelines on IAS with special reference to GMOs in place by mid-2018	No guidelines to reference GMOs	Guidelines on IAS and those from GMOs available	Reports on IAS	NBA, EPA, CSIR
Increase awareness and build communicatio n about the taxonomy of biodiversity	A directory of taxonomists and their expertise created	A directory of taxonomists available by December 2018	No directory on taxonomist.	A database of taxonomists available	Taxonomist reports Taxonomy Need assessment report	Universities and Research institutions in Ghana
	Implementation of policy needs identified in Global Taxonomy Initiative (GTI)	Relevant policy needs formulated by December 2019	No policy on Global Taxonomy	Relevant policy needs identified within GTI applied		Research institutions, universities

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
	A communication strategy between different sectors on general taxonomy developed	Knowledge about taxonomy of biodiversity in place by 2019.	No data in place	Indication of collaboration among taxonomists.		Research institutions, universities
Build capacity of young scientists to improve taxonomic information delivery	Provide training resources for taxonomy to educational establishments	At least 30 young scientists trained in taxonomy by December 2020	No data on scientists trained as taxonomist	The number of young scientists trained in taxonomy available in the directory	Training reports	Universities, Research institutions
Develop national GMO repository directories in the BCH	Create hyperlinks to GMO repository directories in the BCH and other digital libraries	Hyperlinks in place by mid-2018	No hyperlinks exist on GMO	Hyperlinks to GMO repository directories in the BCH and other digital libraries developed	Hyperlinks available for use.	NBA and collaborating institutions
Provide incentives to communities	Institute a Payment for Ecosystem Scheme for communities	Modalities for payment of ecosystem services approved legislated by December 2017	No PES on biodiversity conservation exist	Incentive to communities in biodiversity conservation through PES in place	Forest fringe communities are aware and can apply for	FC MESTI MLNR CSOs
Involve local communities in the conservation and restoration of biodiversity	Establishment of CREMA, national plantation development programme	Legislations on CREAM and Plantation development establishment in place by Mid 2018	Bill on CREMA before Parliament. National Plantation Development Plan launched	Modalities for community involvement on biodiversity conservation and plantation development is backed by law are in place and being applied	LI on CREMA Plantation development plan	WD, CSOs, FC MLNR
To maintain and Enhance programmes that support the preservation of natural habitats	Establish marine protected areas	Guidelines for the establishment of Marine protected areas in place by December 2018	No marines protected areas	Guidelines on marine protected areas management system is being used	Workshop reports Available guidelines	Ministry of Fisheries

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
	Protect important wetlands	Management Plans for important wetlands developed and approved by Mid-2019	Out-dated wetland management plans exist for the 5 Ramsar Sites	Updated management plan on all RAMSAR sites and Important Bird Area	Availability of management plans	WD, CSOs, FC MLNR
	Ensure the effective management of biosphere reserves and other biodiversity hotspots	Important biosphere reserved identified and gazetted by 2019	One biosphere reserve approved.	Management Plans for all approved and potential Biosphere reserves approved	Management plans Workshop reports	EPA FC MESTI
	Establish biological corridors to link national parks	A legal framework to support the creation of the corridor in place by 2019	No legal framework exist to support creation of biological corridors	A legal framework to support the creation of the corridor developed and approved	Workshop reports	FC MLNR
Incorporate Biodiversity Conservation, sustainable use and equitable sharing of benefits arising from the use of genetic resources into National Fishery Policy	Sustainable culture and capture fishing practices and programs that enhance biodiversity conservation and ecosystem services promoted	Sustainable marine fisheries management plans in place by ending 2018	Sustainable culture and capture fishing initiated by Ministry of Fisheries	Sustainable culture and capture fishing practices and programs that enhance biodiversity conservation and ecosystem services in place	Workshop reports	MMDAs MOFA MDAs Research Inst. Judiciary Fisheries Assoc.
	Enhance registration/certification as a tool for sustainable fishing management.	Improvement in the Registrations process and certificates issued or renewed by December 2019	No certification tool exist	Tools for registration and certification for sustainable fishing management developed	Certification modalities Meeting reports	Fisheries Commission
	Support the implementation of the guidance on risk	National Biosafety Risk Assessment guidelines	No risk assessment	A document guiding the NBA in the conduct of risk	Meeting reports	NBA/TAC

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
	assessment and risk management including guidance on new developments in agricultural modern biotechnology			assessment on agricultural biotechnology applications		
Strengthen management of biodiversity in all habitats	Encourage correct use of agro-chemicals	Enforce compliance to the guidelines on safe use of agrochemicals by 2018	Standards and best practices guidelines in place since 2015	Standards and best practices guidelines available Guidelines on safe use of agrochemicals	Annual Reports	MOFA
Strengthen the management of existing protected areas and off reserve areas	Develop a GIS-based map of sacred groves	Best management practices for protected areas and off-reserved areas developed by December 2019	No GIS on sacred groves exist except for BA	GIS Maps covering the whole country.	GIS maps available	FC MEST EPA
	Support the implementation of global significant biodiversity areas	Development of a national register of community conserved areas in place by mid-2019	There is no national comprehensive register on sacred groves	National register of community conserved areas available in digital form and in print	Annual Report	FC MEST EPA
		Capacity building for managers of protected areas developed by mid-2020	No data on managers of scared groves	A register of community protected area managers available	Register Annual Reports	MOFA EPA
	Guidance on risk assessment and risk management including guidance on new developments in	National Biosafety Risk Assessment guidelines in place by December 2019	No risk assessment and risk management on agricultural modern biotechnology	A document guiding the NBA in the conduct of risk assessment on agricultural biotechnology applications	Annual Report	MOFA EPA

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
	agricultural modern biotechnology developed					
Strengthen risk management in handling and use of agricultural modern biotechnology	Develop Strategies and guidance to identify, assess, and monitor GMOs	Document on identification and monitoring of GMOs developed by ending 2018	No strategy and guidance to monitor GMO	Document on identification and monitoring of GMOs available	Annual Report	MOFA EPA
	Implement the Sections of the Biosafety Act, 2011 regarding GMOs	GMOs issues within District plans by mid-2019	GMO in Biosafety not being implemented	Guidelines to mainstream sections of the Biosafety Act, 2011 regarding GMOs in District level plans available	District plans reflecting GMOs	MOFA MLGRD EPA
Strengthen compliance with and enforce relevant laws on pollution control	Create awareness on pollution reduction measures	Community participating and adopting pollution reducing measures by ending 2018	Low level of awareness on pollution	More communities/ individuals adopting pollution reducing measures	Annual Reports	MOFA MLGRD EPA
	Standards, guidelines and regulations developed and adopted	Standards, guidelines and regulations in place by December 2019	No standards, guidelines and regulations developed	Standards, guidelines and regulations available	Annual Reports	MOFA MLGRD EPA
	Environmental information management system improved	BCH website created by December 2018	No website exist	Harmonized system of environmental data storage and retrieval available on line	Annual Report Website hosting	EPA MESTI
Develop an early warning system for detection of IAS	Develop and implement communication protocols for early warning detection.	Communication protocol completed by December 2018	No early warning system for detection of IAS available	Communication protocol for detection of IAS available	Annual Reports	EPA MOFA
Promote Integrated management	Invasive alien species policy and strategy	Requisite documents in place by	No Integrated management of IAS in all	Policy and strategy document	Workshop Reports Annual Reports	EPA

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
of IAS in all habitats	developed and implemented	December 2018	habitats exist	available for integrated management of IAS in all habitats		
	Implement projects and programmes on IAS in all habitats	Projects and programmes in place to prevent, control and manage IAS by mid-2019	No projects in place for IAS habitats	At least one project being implemented on Integrated management of IAS in all habitats	Project Document Annual Report	EPA
	Implement the Sections of the Biosafety Act, 2011 regarding IAS and GMOs	IAS and GMOs issues within District plans by mid-2020	Sections of the Biosafety Act, 2011 regarding IAS and GMOs not being implemented	District plans reflecting IAS and GMOs	Annual Report	EPA
Strengthen the legal and regulatory framework for the protection of coral reefs, mangrove ecosystems, estuaries, and community protected areas	Develop regulations to protect coral reefs	Regulation on the protection of coral reefs by December 2018	No regulations to protect coral reefs	Regulation regulations to protect coral reefs available	Annual report	EPA MESTI
	Develop and enforce relevant regulations protecting mangrove ecosystems and estuaries	Guideline on ecological health of mangroves and estuaries in place by December 2017	Weak enforcement of relevant regulations protecting mangrove ecosystems and estuaries	Enforcement of relevant regulations protecting mangrove ecosystems and estuaries	Ecological health of mangroves and estuaries improving	EPA FC (WD) MESTI
Enhance the preservation and conservation of Ghana's biological heritage through systems of protected areas	Update and revise existing management plan measures for the ex-situ conservation of Ghana's Biological heritage including non-native species	Rehabilitated or upgraded conservation centres by December 2018 Management Plans of ex-situ conservation updated by mid-2018	Out-dated management plan measures for the ex-situ conservation of Biological heritage	Updated and revised existing management plan measures for the ex-situ conservation of Ghana's Biological heritage including non-native species	Annual reports	FC FORIG MESTI Universities

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
	are adopted					
	Enforce existing management plans for protected areas	Updated management plans implemented by December 2020	Out-dated management plans	Manuals for the implementation of management plans in place.	Annual reports Management plans	FC
	Revise the regulations on wetland management	Wetland regulation revised by December 2017	Out-dated wetland management plans	Wetland regulation available at all levels	Annual Report	WRC, FC, Research Institutions, EPA, CSOs
	Facilities and plans for in-situ conservation including research on plants, animals and micro-organisms are established, maintained and improved	An inventory of materials considered for in-situ and ex-situ conservation completed by mid-2018	Out-dated inventory data on ex-situ and in-situ conservation	An in-situ and ex-situ inventory is available	Annual Reports	FC MLNR
Protect threatened species in all habitats	Create an inventory of threatened, vulnerable and endangered species using the RED list category of IUCN	Database on threatened species for all habitats in place by mid-2018	No Details of the status of threatened species available	An inventory of threatened, vulnerable and endangered species using the RED list category of IUCN created	Inventory records Annual Reports	FC MESTI
	Develop regulations to protect endangered species	Regulations to protect endangered species enacted by December 2019	No regulation available and implemented	Regulations to protect endangered species Developed	Annual Reports	FC MESTI
Support the preservation and conservation of genetic biodiversity of cultivated	Promote and)	Permits granted for research on GMOs per year	No details of research available	Guidelines to enhance research on Genetically Modified Organisms (GMOs) put in place	Annual Report	GAEC, CSIR, Universities, CRIG
	Support	Inventory of	No inventory	Guidelines for	Guidelines	Research and

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
plants, farmed and domesticated animals and their wild relatives	collection and conservation of genetic diversity of cultivated plants, farmed and domesticated animals and their wild relatives	the gene bank developed for cultivated plants, farmed and domesticated animals and their wild relatives by December 2019	of the gene bank available	the collection and conservation of genetic diversity of cultivated plants, farmed and domesticated animals and their wild relatives	Annual Report	Academia Farmer groups, CSOs Fishermen/ Fish farmers Traditional Authorities, Local Communities
	Strengthen National Biosafety Authority (NBA) including its inspection and monitoring outfits	At least 50% of required staff and appropriate infrastructure developed by mid-2020	Staff strength and logistics improved	At least 50% of required staff and appropriate infrastructure	Annual Report	NBA/ MESTI/ Regulatory Periodically
Incorporate Biodiversity Conservation, sustainable use and equitable sharing of benefits arising from the use of genetic resources, into development plans and programmes	Mainstream watershed protection, land use and spatial planning Environmental, Biosecurity and Natural resource policies into sector and district development plans and programmes to	Guideline to mainstream watershed protection into district level planning developed by December 2017 Ecosystem health indices identified and published by Mid-2018	No monitoring of the ecosystem health	Guidelines to mainstream watershed protection, land use and spatial planning Environmental, Biosecurity and Natural resource policies into sector and district development plans and programmes developed and approved	Annual Report	MMDAs, Local communities, CSOs, Research Institutions, Universities, NGOs Annually
Protection of watersheds, wetlands that provide essential services	Degraded ecosystems restored through community efforts.	At least 15 % of degraded ecosystems restored by mid-2019	Limited Degraded land restoration programme on-going	Community-based watershed restoration plan developed	Project report	FC Water Resources Commission MMDAs
	Develop and implement PES	Guidelines for PES in watershed restoration in	No Implementation of PES	Guidelines for PES in watershed restoration in	Annual Report	FC Water Resources Commission

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
		place by December 2017		place		MMDAs Annually
Enhance ecosystem resilience through conservation and restoration programmes	Restore degraded ecosystems in the forests, wetlands and aquatic ecosystems	At least 15% of degraded ecosystem restored by December 2019	No Ecosystem resilience indices	Degraded ecosystems in the forests, wetlands and aquatic ecosystems restored	Annual Report	WC, MoFAD, MLNR, MLGRD,
	Develop and implement community-based incentive reward system for Ecosystem Services	Guidelines for community-based incentive system for ecosystem services developed by mid-2018	Implementation of incentive system for ecosystem services	Guidelines for community-based incentive system for ecosystem services developed	Annual Report	CSOs, NGOs, FC, WC, MoFAD, MLNR, MLGRD, MoJ&AG's Dept.
Ratify and domesticate the Nagoya Protocol on Access and Benefit Sharing (ABS)	Relevant legal instrument and guidelines for ABS developed and implemented	Relevant legislations enacted by ending 2017	No legislation available	Approved legal instrument for accession to the protocols available and deposited at the UN in New York	Annual report	NBA, MESTI, MoJ &AG's Dep't, Parliament, MFARI, CSOs Urgent
Ratify and domesticate the Nagoya Kuala Lumpur Supplementary Protocol on Redress and Liability	Relevant legal instrument and guidelines for Nagoya Kuala Lumpur Supplementary Protocol on Liability and Redress developed and implemented	Nagoya Protocol ratified by December 2017. Guidelines for Nagoya Kuala Lumpur Supplementary Protocol in place by mid-2019.	No guidelines for protocol implementation	Implementation of Nagoya Kuala Lumpur Supplementary Protocol	Annual Report	NBA, MESTI, MoJ &AG's Dep't, Parliament, MFARI, CSOs Annually
Implement the NBSAP	Develop the M&E Plan to support the implementation of the NBSAP	NBSAP M&E Plan in place by end of 2017	No M&E plan available	NBSAP together with M&E Plan reflecting emerging issues	Annual Report	MESTI
Compile and harmonise Traditional	Traditional knowledge on sacred landscape compiled and	Traditional knowledge on sacred landscape	No data	Traditional knowledge on sacred landscape	Number of workshops, media engagements,	Traditional Authorities, Media NGOs,

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
Knowledge issues on biodiversity	processed	compiled and processed by mid2018 Public engagements on traditional knowledge initiated by mid-2017		compiled and processed	Publications	Research Institutions, Universities
Educate the public on traditional knowledge issues on biodiversity	Create awareness on traditional knowledge issues on biodiversity	Traditional knowledge awareness programme initiated by ending 2017	No data	Programme on TK initiated	Annual report	Traditional Authorities, Media NGOs, Research Institutions, Universities
Develop a legislation for local communities on the rights on genetic resources	Legislation on community rights on genetic resource developed.	Legislation on community rights on genetic resource in place by December 2018	No legislation	Communities become aware of their rights in genetic resource. There are laws backing community rights on genetic resource	Annual Report	MLNR, FC, MMDAs, MoJ&AG's Dep't, NCCE, NGOs, Registrar General's Dep't
Operate *sui generis* (peculiar to local communities) system for the protection of Traditional and Indigenous Knowledge	A *sui generis* (peculiar to local communities) system for Traditional Knowledge is developed as part of Ghana's legislation	Guidelines for the enactment of community level Legislation on Traditional Knowledge fully operational by mid-2020	No guidelines available	A Documentation outlining opportunities and proposed guidelines on traditional knowledge system available to all	Annual Report	Traditional Authorities, Land owners, MLNR, FC, MMDAs, MoJ&AG's Dep't, NCCE, NGOs, Registrar General's Dept.
Integrate local and scientific knowledge on biodiversity into national development	Integrate Traditional Knowledge and Formal Science in biodiversity conservation	A document on existing biodiversity related traditional knowledge systems developed by December 2019	No current data	A document on existing biodiversity related traditional knowledge systems available	Annual Report	Traditional authorities, MESTI, MLGRD, MoTCCA (Ghana Museums and Monuments

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
						Board), Opinion Leaders, NGOs, Research institutions, Universities
	Use national forestry and agricultural policies to sustain ethno-forestry and agro-silvo-pastoral arrangements at the local level	Productivity of pilot schemes integrating traditional knowledge and basic science initiated by Mid-2017	No data	Performance of pilot schemes compared with existing traditional practices in ethno-forestry and agro-silvo-pastoral arrangements	Annual Report	MESTI, MoFA, Research Institutions, Universities, NGOs, FC, MMDAs
Use science and technology for disseminating biostatistics for the effective management of biodiversity	Prepare and publish information on biodiversity	Biodiversity publications, websites, social media presence initiated by ending 2017	No Website	Website to improve biodiversity information dissemination through an integrated approach	Annual Report Website address	Research Institutions, Universities Ministries CSIR, FC Cocoa Research Institute, Agric. Extension Services, NGOs, FORIG
	Disseminate biodiversity information nationally and internationally	Biodiversity information dissemination begins by mid-2017	No dissemination of biodiversity	Improving biodiversity information dissemination through an integrated approach	Annual Report	Research Institutions, Universities Ministries; CSIR, FC; Cocoa Research Institute; CSO FORIG
Enhance Research and Development in Agricultural Biodiversity	Research gaps for improving agricultural biodiversity conservation identified and addressed	Research gaps identified and published by mid-2018	No research gaps in agricultural biodiversity	Research gaps for improving agricultural biodiversity conservation identified and addressed	Annual Report	Research Institutions, Universities; Ministries CSIR, FC Cocoa Research Institute, NGOs Agric.

National Programme Strategy	Planned Action Programme	Key Result Indicator	Baseline Conditions (October 2016	End of Programme Condition (December 2020)	Means of Verification	Responsible Organization
						Extension Services
	Research and extension linkages on agricultural biodiversity conservation and agricultural productivity promoted	Personnel trained or engaged in programs in biodiversity and agriculture by December 2018	No research extension officers engaged in biodiversity and agriculture.	Improving the knowledge and skills of agricultural extension personnel engaged in biodiversity	Training report Annual Reports	Research Institutions, Universities Ministries CSIR, FC Cocoa Research Institute, NGOs

5.6 Communication and Outreach Strategy for the NBSAP

5.6.1 Promoting Social Inclusion

Recognising gender equality as an important goal and priority for the country, the MESTI will monitor the mainstreaming of gender issues in all biodiversity projects to advance the global environmental benefits as well as contributing to the national goal of gender equality and equity, and social inclusion. Special attention would be given to projects that will a) empower vulnerable groups through gender sensitive livelihood that strengthen the adaptive capacities of women to climate change; b) create awareness and build capacities for mainstreaming gender and develop strategies and mechanisms for mainstreaming gender including financial, economic and policy aspects, c) promote gender responsiveness in the management of natural resources under changing climatic conditions; d) enhance the economic empowerment of women.

The NBC and MESTI will formulate guidelines and strategies for mainstreaming gender in community level biodiversity conservation projects. Within every landscape, the respective sector agencies will develop policy, coordinate, execute and monitor projects and activities that relate to the wellbeing of women and children. The overall NBSAP monitoring plan will have specific indicators that ensure mainstreaming of gender equality in all interventions. The human resource capacities of the sector agencies would be developed to facilitate the integration of women issues into the project activities. As part of the capacity building training for grantees, integrated and specific gender initiatives would be promoted to enhance the livelihood condition of women in the project area.

5.6.2 Knowledge Management Plan

The key strategies to develop knowledge management for biodiversity conservation activities in country are to:

- develop a web platform that allows better knowledge capture and sharing, monitoring and evaluation the use of new media;
- systematize processes and create templates that facilitate data collection from all relevant sectors for publication;
- build capacity for knowledge management at the national and local level through training and learning;
- contribute to relevant knowledge bases and fora by increasingly forming a constituency of CSOs with capacity, motivation and systematic information flow;
- establish information exchange links with the national policy making bodies especially with MESTI;
- establish partnerships to upscale and replicate successful biodiversity conservation projects and best practices;
- capture and disseminate the results, lessons learned and best practice from the SGP portfolio via different media by streamlining and strengthening the database, intranet and website to allow for knowledge exchange and sharing;
- provide guidance to the sector agencies/CSOs on how to capture and disseminate knowledge and conduct knowledge exchange at the local level to be aggregated at global level.

The knowledge management tools to be applied are:

- **Knowledge need assessment, mapping and audits**: MESTI will conduct a needs assessment to understand what information is the most valuable, how to capture it and how to disseminate it.

- **Best Practices**- the NBC will capture best practices at the local and national levels, conduct case studies, and undertake publications and share with the media key achievements.

- **Peer-to-peer learning-**the NBC will facilitate peer-to-peer learning between programmes/projects and local communities as an effective method to share knowledge, help communities learn from each other and as a tool for replication and up scaling of best practices.

- **Centres of knowledge**- MESTI will support the setting up technology and systems demonstration sites or centres of knowledge for biodiversity conservation knowledge systems and demonstrated technologies. These centres of knowledge will become places where other communities, government officials, and development practitioners can learn in the biodiversity conservation practices.

- **Communities of Practice (CoPs) -** Communities of practice allows the organization to pool the collective ideas and knowledge of its staff to help build and institutionalize

corporate memory. MESTI will encourage successful community-based biodiversity conservation to practice CoPs.

5.6.3 Communications Strategy

The main objectives for communication during the implementation of NBSAP are to ensure that all the lessons learned from the implementation of the projects are captured, analysed and shared with key stakeholders to promote learning within and across communities and countries. It is also to help replicate and scale up its impact, as well as to inform policy. The communication strategies to be applied in the management of NBSAP are to:

- publish quarter e-magazines on the project activities and circulate them widely;
- initiate weekly radio programmes on topical issues on the environment;
- Publish annual case studies of best practices
- promote national science and technology fairs on biodiversity conservation practices

5.7 NBSAP Implementation Cost (2016-2020)

The indicative cost of implementing the NBSAP for the first five years (short term) is GH₵ 534.5 million. The cost of individual programmes and strategies is shown in Table 7. Most of the costs are covered by on-going donor funded projects. The remaining would be covered under the Ghana Government annual budget.

Table 7: Indicative cost of implementing NBSAP (2016-2020)

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
Addressing the underlying causes of biodiversity loss.	To create public awareness of the values of biodiversity to promote conservation, restoration and sustainable usage Implement the CBD and related biodiversity conventions.	Complete the NBSAP to implement the objectives, articles and programmes of work of biodiversity convention	0.25
		Implement Regulations for the Biosafety Act 831	02.5
		Initiate discussions on biodiversity on the electronic and print media	0.25
	To integrate and mainstream biodiversity values into national accounts and local development and poverty reduction strategies and planning processes with	Integrate-biodiversity conservation strategies into national development policies and plans.	0.74
		Mainstream biodiversity offsetting and payments for ecosystem services into economic decision-making, through governments' planning processes, licenses and permits and financial institutions' lending and investment decisions	0.98

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
	reporting systems.	Develop tools and guidance that facilitate the implementation of the Cartagena Protocol's provisions on transit, contained use, environmental release and unintentional transboundary movements and emergency measures	2.45
		Set up a National Biodiversity Commission (NBC) to oversee the mainstreaming of biodiversity into sectoral policies and programmes	3.92
	To eliminate/phased out/reformed incentives, (including subsidies), harmful to biodiversity conservation taking into account national socio economic conditions.	Accelerate the process of the removal of incentives harmful to biodiversity	0.25
		Identify incentives within initiatives that drive biodiversity loss or degradation	0.25
		Develop mechanism for phasing out incentives harmful to biodiversity	0.74
	To support stakeholders to implemented plans for sustainable production and consumption all levels of governance within safe ecological limits.	Public awareness, understanding, appreciation and support for preservation and conservation of Ghana's biological heritage is developed	7.60
		Enhance the preservation and conservation of Ghana's biological heritage including non-native species through public awareness, understanding, appreciation and support for preservation and conservation of Ghana's biological heritage.	9.80
		Enhance the sustainable production and consumption of biological resources by encouraging Businesses and other stakeholders to develop plans and programmes to sustainably utilize natural resources in schemes that benefit biodiversity and ecosystems.	2.45
		Strengthen the National Biosafety Clearing House (BCH) as a public awareness and information exchange mechanism.	7.35
		Communicate, educate and make the public aware of Traditional Knowledge issues through the documentation of traditional knowledge systems on biodiversity, recognition, integration and promotion of traditional biodiversity conservation knowledge of local communities by state institutions enhanced;	4.41
		Conduct biosafety risk assessment by incorporating socio-economic considerations through the Biosafety Clearing House (BCH) mechanism	2.45
		Manage effectively Invasive Alien Species (IAS) in Ghana by developing systems to enhance IAS management.	7.35
		Develop the capacity of the Biosafety Technical Advisory Committee to review applications regarding GMOs which may become IAS.	4.41
		Increase awareness and build communication	2.45

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
		about the taxonomy of biodiversity by maintaining a directory of taxonomists and their expertise and implementation of policy needs identified in Global Taxonomy Initiative (GTI)	
		Develop a communication strategy between different sectors on general taxonomy.	0.74
		Build capacity of young scientists to improve taxonomic information delivery and provide training resources for taxonomy to educational establishments.	2.45
		Develop national GMO repository directories in the BCH by creating hyperlinks to GMO repository directories in the BCH and other digital libraries.	0.98
	To reduce the rate of loss of all natural habitats, including forests, to at least half and where feasible brought close to zero, and degradation and fragmentation significantly reduced.	Provide incentives to local communities to conserve biodiversity by instituting Payment for Ecosystem Schemes	14.7
		Involve local communities in the conservation and restoration of biodiversity through support for the establishment of community resource management areas (CREMA), woodlot establishment and plantation development programme	10.78
		Maintain and enhance programmes that support the preservation of natural habitats including the establishment of marine protected areas and protection of important wetlands	2.45
		Ensure the effective management of biosphere reserves and other biodiversity hotspots through the establishment of biological corridors to link national parks	2.45
	To promote sustainable management of all fish and invertebrate stocks as well as aquatic plants to avoid overfishing.	Incorporate biodiversity conservation, sustainable use and equitable sharing of benefits arising from the use of genetic resources into national fishery policy.	5.88
		Introduce sustainable culture and capture fishing practices and programs that enhance biodiversity conservation and ecosystem services	0.25
		Enhance registration/certification as a tool for sustainable fishing management.	1.23
		Support the implementation of the guidance on risk assessment and risk management including guidance on new developments in agricultural modern biotechnology.	0.25
	To promote the sustainable management of areas under agriculture, aquaculture and forestry, to ensure conservation of biodiversity.	Strengthen the management of biodiversity in all habitats through the correct use of agro-chemicals	2.45
		Strengthen the management of existing protected areas and off reserve areas including sacred landscapes and significant biodiversity areas	7.35
		Develop guidance on risk assessment and risk management including guidance on new	0.74

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
		developments in agricultural modern biotechnology developed	
		Strengthen risk management in handling and use of agricultural modern biotechnology and monitors for GMOs	0.25
		Support the implementation of the Sections of the Biosafety Act, 2011 regarding GMOs	1.23
	To minimize pollution, including excess nutrients, to levels that are not detrimental to ecosystem function and biodiversity	Strengthen compliance with and enforce relevant laws on pollution control by creating awareness on pollution reduction measures and developing standards, guidelines and regulations.	0.98
		Improve on environmental information management systems	1.23
	To ensure that invasive alien species and pathways are identified prioritized, and controlled or eradicated, to manage pathways to prevent their introduction and establishment	Develop an early warning system for detection of Invasive alien species IAS and promote Integrated management of IAS in all habitats	0.74
		Formulate Invasive alien species (IAS) policy and strategy and monitor its implementation	0.25
		Implement projects and programmes on IAS in all habitats including portions of the Biosafety Act, 2011 and GMOs	4.90
	To minimize the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification, so as to maintain their integrity and functioning	Strengthen the legal and regulatory framework for the protection of coral reefs, mangrove ecosystems, estuaries, and community protected areas.	2.45
		Develop and enforce relevant regulations to protect mangrove ecosystems and estuaries	7.35
Improving the status of biodiversity by safeguarding ecosystems, species and genetic diversity	To ensure that at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas are conserved through systems of Protected Areas	Enhance the preservation and conservation of Ghana's biological heritage through systems of protected areas	8.55
		Update and revise existing management plan and develop measures for the ex-situ conservation of Ghana's Biological heritage including non-native species	0.86
		Revise the regulations on wetland management.	14.25
		Establish, maintain and improve facilities and plans for in-situ conservation including research on plants, animals and micro-organisms	8.55
	To prevent the extinction of known threatened species and their conservation status, particularly of those most in decline, and improve and sustain their status	Create an inventory of threatened, vulnerable and endangered species using the RED list category of IUCN	0.86
		Develop regulations to protect endangered species.	0.86
	To maintain the genetic diversity of cultivated plants and farmed and	Support the preservation and conservation of genetic biodiversity of cultivated plants, farmed and domesticated animals and their wild relatives	2.85

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
	domesticated animals and of wild relatives	Promote and enhance research on Genetically Modified Organisms (GMOs).	4.56
		Support collection and conservation of genetic diversity of cultivated plants, farmed and domesticated animals and their wild relatives.	2.85
		Strengthen National Biosafety Authority (NBA) including its inspection and monitoring outfits.	2.85
Enhancing the benefits to all from biodiversity and ecosystem services	To restore and safeguard ecosystems that provide essential services, including ecosystem services	Ensure the effective management of biosphere reserves and other biodiversity hotspots.	8.28
	To enhance ecosystem resilience and restoration to promote the contribution of biodiversity conservation to carbon stocks and ensure restoration of at least 15 per cent of degraded ecosystems	Incorporate Biodiversity Conservation, sustainable use and equitable sharing of benefits arising from the use of genetic resources, into development plans and programmes	1.93
		Mainstream watershed protection, land use and spatial planning environmental, biosecurity and natural resource policies into sector and district development plans and programmes to protect watersheds, and wetlands that provide essential services.	0.55
	To operationalize the Nagoya Protocol on access and benefits sharing	Ratify and domesticate the Nagoya Kuala Lumpur Supplementary Protocol on Redress and Liability	0.28
		Develop and implement relevant legal instrument and guidelines for Nagoya Kuala Lumpur Supplementary Protocol on Liability and Redress.	0.28
Enhancing strategy implementation through participatory planning, knowledge management and capacity building	To develop and adopt a policy instrument, for the implementation of an effective, participatory and updated national biodiversity strategy and action plan	Develop the monitoring and evaluation plans to support the implementation of the NBSAP.	0.57
	To ensure that the traditional knowledge, innovations and practices of indigenous and local communities and their customary use, are respected	Compile and harmonise Traditional Knowledge issues on biodiversity including sacred landscapes	8.49
		Educate the public on traditional knowledge issues on biodiversity.	19.81
		Develop a legislation for local communities on the rights on genetic resources	2.83
		Operate sui generis (peculiar to local communities) system for the protection of Traditional and Indigenous Knowledge	6.79
		Integrate local and scientific knowledge on biodiversity into national development	2.83
		Use national forestry and agricultural policies to sustain ethno-forestry and agro-silvo-pastoral	1.42

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
		arrangements at the local level Encourage correct use of agro-chemicals	
	To improve widely share transfer and apply knowledge, on the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss	Use science and technology for disseminating biostatistics for the effective management of biodiversity	1.13
		Prepare and publish information on biodiversity	5.94
		Enhance Research and Development in Agricultural Biodiversity	8.49
		Research gaps for improving agricultural biodiversity conservation identified and addressed	6.79
		Research and extension linkages on agricultural biodiversity conservation and agricultural productivity promoted	2.83
	To mobilize increased financial resources for effectively implementing the strategic plan for biodiversity	Build capacity of relevant institutions (state and non-state) on resource mobilization and financial re-engineering.	14.15
		Develop and implement resource mobilization strategies	0.28
		Publish NBSAP and use it as reference material for MMDAs, CSOs and donors when preparing programmes and plans for donor/ Government funding	2.83
TOTAL INDICATIVE COST (GHS)			**297.43**

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (GH₵' million)
Addressing the underlying causes of biodiversity loss.	To create public awareness of the values of biodiversity to promote conservation, restoration and sustainable usage Implement the CBD and related biodiversity conventions.	Complete the NBSAP to implement the objectives, articles and programmes of work of biodiversity convention	0.5
		Implement Regulations for the Biosafety Act 831	0.5
		Initiate discussions on biodiversity on the electronic and print media	0.50
	To integrate and mainstream biodiversity values into national accounts and local development and poverty reduction strategies and planning processes with reporting systems.	Integrate-biodiversity conservation strategies into national development policies and plans.	1.50
		Mainstream biodiversity offsetting and payments for ecosystem services into economic decision-making, through governments' planning processes, licenses and permits and financial institutions' lending and investment decisions	2.00
		Develop tools and guidance that facilitate the implementation of the Cartagena Protocol's provisions on transit, contained use, environmental release and unintentional transboundary movements and emergency measures	5.00
		Set up a National Biodiversity Commission (NBC)	8.00

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
		to oversee the mainstreaming of biodiversity into sectoral policies and programmes	
	To eliminate/phased out/reformed incentives, (including subsidies), harmful to biodiversity conservation taking into account national socio economic conditions.	Accelerate the process of the removal of incentives harmful to biodiversity	0.50
		Identify incentives within initiatives that drive biodiversity loss or degradation	0.50
		Develop mechanism for phasing out incentives harmful to biodiversity	1.50
	To support stakeholders to implemented plans for sustainable production and consumption all levels of governance within safe ecological limits.	Public awareness, understanding, appreciation and support for preservation and conservation of Ghana's biological heritage is developed	15.50
		Enhance the preservation and conservation of Ghana's biological heritage including non-native species through public awareness, understanding, appreciation and support for preservation and conservation of Ghana's biological heritage.	20.00
		Enhance the sustainable production and consumption of biological resources by encouraging Businesses and other stakeholders to develop plans and programmes to sustainably utilize natural resources in schemes that benefit biodiversity and ecosystems.	5.00
		Strengthen the National Biosafety Clearing House (BCH) as a public awareness and information exchange mechanism.	10.00
		Communicate, educate and make the public aware of Traditional Knowledge issues through the documentation of traditional knowledge systems on biodiversity, recognition, integration and promotion of traditional biodiversity conservation knowledge of local communities by state institutions enhanced;	20.00
		Conduct biosafety risk assessment by incorporating socio-economic considerations through the Biosafety Clearing House (BCH) mechanism	5.00
		Manage effectively Invasive Alien Species (IAS) in Ghana by developing systems to enhance IAS management.	15.00
		Develop the capacity of the Biosafety Technical Advisory Committee to review applications regarding GMOs which may become IAS.	9.00
		Increase awareness and build communication about the taxonomy of biodiversity by maintaining a directory of taxonomists and their	5.00

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
		expertise and implementation of policy needs identified in Global Taxonomy Initiative (GTI)	
		Develop a communication strategy between different sectors on general taxonomy.	1.50
		Build capacity of young scientists to improve taxonomic information delivery and provide training resources for taxonomy to educational establishments.	5.00
		Develop national GMO repository directories in the BCH by creating hyperlinks to GMO repository directories in the BCH and other digital libraries.	2.00
	To reduce the rate of loss of all natural habitats, including forests, to at least half and where feasible brought close to zero, and degradation and fragmentation significantly reduced.	Provide incentives to local communities to conserve biodiversity by instituting Payment for Ecosystem Schemes	35.00
		Involve local communities in the conservation and restoration of biodiversity through support for the establishment of community resource management areas (CREMA), woodlot establishment and plantation development programme	25.00
		Maintain and enhance programmes that support the preservation of natural habitats including the establishment of marine protected areas and protection of important wetlands	1.00
		Ensure the effective management of biosphere reserves and other biodiversity hotspots through the establishment of biological corridors to link national parks	5.00
	To promote sustainable management of all fish and invertebrate stocks as well as aquatic plants to avoid overfishing.	Incorporate biodiversity conservation, sustainable use and equitable sharing of benefits arising from the use of genetic resources into national fishery policy.	12.00
		Introduce sustainable culture and capture fishing practices and programs that enhance biodiversity conservation and ecosystem services	0.50
		Enhance registration/certification as a tool for sustainable fishing management.	2.50
		Support the implementation of the guidance on risk assessment and risk management including guidance on new developments in agricultural modern biotechnology.	0.50
	To promote the sustainable management of areas under agriculture, aquaculture and forestry, to ensure conservation of biodiversity.	Strengthen the management of biodiversity in all habitats through the correct use of agro-chemicals	5.00
		Strengthen the management of existing protected areas and off reserve areas including sacred landscapes and significant biodiversity	15.00

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
		areas	
		Develop guidance on risk assessment and risk management including guidance on new developments in agricultural modern biotechnology developed	1.50
		Strengthen risk management in handling and use of agricultural modern biotechnology and monitors for GMOs	0.50
		Support the implementation of the Sections of the Biosafety Act, 2011 regarding GMOs	2.50
	To minimize pollution, including excess nutrients, to levels that are not detrimental to ecosystem function and biodiversity	Strengthen compliance with and enforce relevant laws on pollution control by creating awareness on pollution reduction measures and developing standards, guidelines and regulations.	2.00
		Improve on environmental information management systems	2.50
	To ensure that invasive alien species and pathways are identified prioritized, and controlled or eradicated, to manage pathways to prevent their introduction and establishment	Develop an early warning system for detection of Invasive alien species IAS and promote Integrated management of IAS in all habitats	1.50
		Formulate Invasive alien species (IAS) policy and strategy and monitor its implementation	0.50
		Implement projects and programmes on IAS in all habitats including portions of the Biosafety Act, 2011 and GMOs	10.00
	To minimize the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification, so as to maintain their integrity and functioning	Strengthen the legal and regulatory framework for the protection of coral reefs, mangrove ecosystems, estuaries, and community protected areas.	5.00
		Develop and enforce relevant regulations to protect mangrove ecosystems and estuaries	20.00
Improving the status of biodiversity by safeguarding ecosystems, species and genetic diversity	To ensure that at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas are conserved through systems of Protected Areas	Enhance the preservation and conservation of Ghana's biological heritage through systems of protected areas	15.00
		Update and revise existing management plan and develop measures for the ex-situ conservation of Ghana's Biological heritage including non-native species	1.50
		Revise the regulations on wetland management.	25.00
		Establish, maintain and improve facilities and plans for in-situ conservation including research on plants, animals and micro-organisms	15.00
	To prevent the extinction of known threatened species and their	Create an inventory of threatened, vulnerable and endangered species using the RED list category of IUCN	1.50

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
	conservation status, particularly of those most in decline, and improve and sustain their status	Develop regulations to protect endangered species.	1.50
	To maintain the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives	Support the preservation and conservation of genetic biodiversity of cultivated plants, farmed and domesticated animals and their wild relatives	5.00
		Promote and enhance research on Genetically Modified Organisms (GMOs).	8.00
		Support collection and conservation of genetic diversity of cultivated plants, farmed and domesticated animals and their wild relatives.	5.00
		Strengthen National Biosafety Authority (NBA) including its inspection and monitoring outfits.	5.00
Enhancing the benefits to all from biodiversity and ecosystem services	To restore and safeguard ecosystems that provide essential services, including ecosystem services	Ensure the effective management of biosphere reserves and other biodiversity hotspots.	15.00
	To enhance ecosystem resilience and restoration to promote the contribution of biodiversity conservation to carbon stocks and ensure restoration of at least 15 per cent of degraded ecosystems	Incorporate Biodiversity Conservation, sustainable use and equitable sharing of benefits arising from the use of genetic resources, into development plans and programmes	3.50
		Mainstream watershed protection, land use and spatial planning environmental, biosecurity and natural resource policies into sector and district development plans and programmes to protect watersheds, and wetlands that provide essential services.	1.00
	To operationalize the Nagoya Protocol on access and benefits sharing	Ratify and domesticate the Nagoya Kuala Lumpur Supplementary Protocol on Redress and Liability	0.50
		Develop and implement relevant legal instrument and guidelines for Nagoya Kuala Lumpur Supplementary Protocol on Liability and Redress.	0.50
Enhancing strategy implementation through participatory planning, knowledge management and capacity building	To develop and adopt a policy instrument, for the implementation of an effective, participatory and updated national biodiversity strategy and action plan	Develop the monitoring and evaluation plans to support the implementation of the NBSAP.	1.00
	To ensure that the traditional knowledge, innovations and practices of indigenous and local communities and their customary use, are	Compile and harmonise Traditional Knowledge issues on biodiversity including sacred landscapes	15.00
		Educate the public on traditional knowledge issues on biodiversity.	35.00

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
	respected	Develop a legislation for local communities on the rights on genetic resources	5.00
		Operate sui generis (peculiar to local communities) system for the protection of Traditional and Indigenous Knowledge	12.00
		Integrate local and scientific knowledge on biodiversity into national development	5.00
		Use national forestry and agricultural policies to sustain ethno-forestry and agro-silvo-pastoral arrangements at the local level Encourage correct use of agro-chemicals	2.50
	To improve widely share transfer and apply knowledge, on the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss	Use science and technology for disseminating biostatistics for the effective management of biodiversity	2.00
		Prepare and publish information on biodiversity	10.50
		Enhance Research and Development in Agricultural Biodiversity	15.00
		Research gaps for improving agricultural biodiversity conservation identified and addressed	12.00
		Research and extension linkages on agricultural biodiversity conservation and agricultural productivity promoted	5.00
	To mobilize increased financial resources for effectively implementing the strategic plan for biodiversity	Build capacity of relevant institutions (state and non-state) on resource mobilization and financial re-engineering.	25.00
		Develop and implement resource mobilization strategies	0.50
		Publish NBSAP and use it as reference material for MMDAs, CSOs and donors when preparing programmes and plans for donor/ Government funding	5.00
TOTAL INDICATIVE COST (GHS)			**534.5**

5.8 Plan for Resource Mobilization for NBSAP Implementation

Article 20 of the CBD requires each Party to provide financial support, in accordance with its capabilities, for the national activities, which will be undertaken to implement the Convention. Article 20 also commits the developed nations to provide "new and additional financial resources" to assist developing countries with their biodiversity conservation and management programmes. Some of these funds are currently being channelled through the GEF. The successful implementation of Ghana's Biodiversity Strategy and Action Plan will require a significant financial investment. It is important to emphasise, however, that many of the

recommendations contained within the Plan can be implemented through policy and legal changes.

The strategy is to use the existing funding sources, on-going development activities and make existing government programmes become more sensitive to biodiversity concerns. The plan will not wait for the arrival of new funding but will develop innovative funding mechanisms to implement most of the programme outlined in the programme. The plan will also seeks for bilateral/multilateral aid for stand-alone, biodiversity projects an undertake debt-for-nature swaps. It will develop partnerships with the private sector, NGOs and other civil society institutions.

6: Conclusion

Over the last two decades, 55 percent of cropland changed to another cover type of which 34 percent was to grassland and 18 percent to forests. Only 3 percent of cropland was lost to settlements and wetlands, proving that urban expansion is not a key cause of cropland loss. Some 14 percent of forests were lost to cropland (perhaps a preventable loss had farmers pursued other options for increasing production, such as increasing crop yield or converting grass land). Another seven percent of forests were lost to grassland, a result, perhaps, of degradation. Less than two percent of forests were lost to settlements and wetlands, showing that urban expansion are the main cause of forest loss. Cropland loss which has altered the biodiversity composition may be attributed to several factors. These include land degradation, desertification and soil erosion and to a lower extent settlements. The change dynamics in the land cover change process is a concern for biodiversity conservation in Ghana

The NBSAP seeks to put in place systems, technologies and legislative instruments that will mainstream biodiversity into national development agenda. The plan will be most mostly implemented by local institutions whose capacities and capabilities would be enhanced under the programme. One important component of the plan is public education and awareness creation. The purpose is to help the populace to understanding the dynamics in biodiversity loss and its implications on livelihood nationally and to seek their support in improving the management of land and maintain a stable biodiversity.

The NBSAP implementation will be financed by the Ghana Government Budget with support from the development partners. MESTI will maintain a strong leadership role and report regularly on the status of biodiversity in the country.

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Glossary of Terms

Biodiversity offset	A biodiversity offset is a way to demonstrate that an infrastructure project can be implemented in a manner that results in no net loss or a net gain of biodiversity. It is a measurable conservation outcomes of actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken (Forest Trends, 2016).
Invasive Alien Species (IAS)	These are species whose introduction and/or spread outside their natural past or present distribution threaten biological diversity (CBD, 2010).
CREMA	CREMA constitute a key wildlife management system in areas outside of Protected Areas. The concept is based on the establishment of areas where wildlife management is incorporated into existing land use.
FASDEP	The first Food and Agriculture Sector Development Policy (FASDEP) was developed in 2002 as a framework for the implementation of strategies to modernize the agricultural sector. The strategies in that policy were based on the Accelerated Agricultural Growth and Development Strategy (prepared in 1996), and were designed to forge linkages in the value chain. This revised policy (FASDEP II) emphasizes the sustainable utilization of all resources and commercialization of activities in the sector with market-driven growth in mind.
NREG	It's a five year programme of policy, institutional reforms and capacity building to improve natural resource and environmental governance in Ghana. It aims at addressing governance issues regarding natural resources and the environment with the overall objective of ensuring sustainable economic growth, poverty reduction, increasing revenues from the mining and forestry sectors and improving environmental protection.
Strict Nature Reserve:	Generally, relative small areas containing fragile habitats, outstanding ecosystems or natural features in and/or Natural features in a relatively undisturbed state and which are prime representatives of the scientific study, monitoring, education or conservation of biological or cultural resources. Such areas are to be maintained in an evolutionary dynamic state and will require strict protection with minimal human disturbance, i.e. no management interventions will generally be permitted. Tourism, recreation and public access will be generally proscribed except

for educational, scientific and cultural reasons, when only non-mechanised access will be allowed.

National Park: Generally, large and relatively undisturbed areas of outstanding natural containing representative samples of major natural regions, features or scenery and containing one or several entire ecosystems and not materially altered by man (or reflecting long-standing cultural land management practices). The areas should be accessible to the public have high recreational, educational, inspirational and cultural potential of clear benefit to the local people, the region and the nation. The highest competent authority i.e. WD will administer and manage these areas so as to prevent or eliminate exploitation or intensive occupation in order that they might be maintained in perpetuity in national or near natural state.

Wildlife Sanctuary: Relatively small areas used to protect plant or animal species, either resident or migratory, of exceptional conservation interest, from any form of destruction. Such species will be protected from any form of exploitation which is inconsistent with their conservation status, except where that intervention is necessary to secure the continued survival of particular species. These areas are opened to public access for cultural, touristic, education, scientific, spiritual or inspiration reasons. Forms of traditional land use which are compatible with and will contribute to the conservation objectives will be encouraged. Some of the traditional sacred formally gazetted or registered; central government's legal support would thereby be extended to local and traditional institutions to ensure the continued protection of such sites. These areas would be administered through a variety of mechanisms ranging from the Wildlife Department, other level of government, to establish or delegate community of private institutions.

Resource Reserve: Area of variable size in which are managed of guarantee condition essential to the well-being of selected species for the sustained production of wildlife products (meat, timber, pasture, fruit, honey and other Non-Timber Forest Products (NTFPs) for cultural practices, tourism and trophy hunting. The conservation priorities will involve the manipulative management of species and their habitats to ensure the protection and propagation of the target species, including introduced indigenous or exotic species. Management will be conducted in such a way as to preserve the areas natural aspects as far as possible. Other forms of land use compatible with these goals may be allowed. These areas may be managed by a central authority, or through agreement, by other levels of government, species trusts or local community

institution as appropriate under the overall supervision of Wildlife Division.

Ramsar Site: A wetland set aside for conservation because of its international importance according to set criteria. They are normally managed to provide maximum benefit to the local communities living within and around the area

APPENDIX

APPENDIX 1SUMMARY OF SOME PAST INTERVENTION IN THE FOREST AND WILDLIFE SECTOR WITH IMPACT ON BIODIVERSITY CONSERVATION

Program/Project Description	Aim/Objective & scope	Achievement(s)	Implications on Biodiversity conservation
1. Forest Resource Management Project (FRMP) funded jointly by the World Bank (IDA), (DANIDA) and the Overseas Development Administration of the United Kingdom (ODA) FRMP started in Nov.,1989 and expired in June 1997	The main focus of the FRMP was the institutional strengthening of forest sector agencies, including infrastructure and training, and development of policy planning, monitoring and evaluation capability. At the same time, management planning of protected areas was introduced to systematize development and management of wildlife resources.	Some expectations at the end of the project were as follows: - Conduct a review MLNR& FC Develop integrated land use plan - Ensure regulators and policy makers develop appropriate policy plans backed by appropriate monitoring and evaluation systems - FC include unreserved forests under forest management system - FC revise resource management standards - Review fees to reflect true stumpage and product values -MLNR& FC Implement National Parks & Protected Areas System Plan - Promote dialogue with private sector	Examples included: -The project strengthened management capacity within MLNR leading to improvements in forest sector monitoring and regulation e.g. carried out a national forest inventory and setting of Annual Allowable Cut (AAC) of 1million m3 - Log export ban enforced - FC included off-reserve forest areas under forest management - Improved timber royalty collection and disbursement to local traditional authorities/ stools; - Strengthened research and training capacity through support to FORIG and IRNR.
2. Forest Sector Development Project (FSDP-1) FSDP-1 was launched in 1995 and expired in 1999. DFID supported project	To assist with the establishment of a forest service capable of effective and efficient implementation of forest policy and to transfer the then Ghana Forestry Department (FD) into an autonomous self- financing Forest Service(FS)	At the end of the project the newly created FS shall: - be financially independent - maintain a lean staff size yet efficient in the discharge of its mandate - improve internal management systems; well defined job description for all positions, new grading and pay structure, conditions of service and appropriate HR policies and procedures in place -recruitment to an agreed organogram -capacity building of staff - operationalized collaborative management principles - set up an approach for the management of the northern savannah forest	i) Enabled the FS to access the state share of forest charges to offset the cost of management and regulation of forests in the HFZ; and increased these charges (by up to 1000%) to benefit resource owners. ii) Established a Forest Services Division iii) Partially completed a recruitment exercise to an agreed organogram for FSD iv) Partially completed an internal management system, job description for all position; a new grading and pay structure responsive to performance appraisal+ initiation of a modern financial administration system v) Majority of the professional staff received formal management and leadership training vi) completed pilot studies to guide the operationalization of collaborative forest management vii) A complete set of manuals of procedures were produced for forest resource management

			planning in the HFZ.
3. Forest Sector Development Project (FSDP-2) FSDP-2 was launched in April 2000 and expired in 2006. DFID supported project	Aimed to assist GoG and other stakeholders in the creation of an institutional framework that increases the sector's contribution to poverty reduction and sustainable economic growth (incorporating income, well-being, and empowerment and sustainability indicators at goal level). Scope: They aim at attaining a high level of local ownership and include: a) Institutional reform initiatives (changing the rules of the game, both de-jure and de-facto); and b) Organizational development initiatives (-building the capacity of sector agents, especially the Forestry Commission, to play by the rules).	At the end of the project the Forestry Commission shall effectively fulfil its roles as defined in the Constitution, the Timber Resource Management, Forestry Commission Acts, sector and other GoG policies.	Examples include i) Institutional merger of five different agencies(FSD, WD, FPIB, TEDB &RMSC) under the new Forestry Commission ii) supported fiscal reforms(e.g. upward adjustment of stumpage fees from current levels (at the average below $ 3 per cubic meter) in 2002 to $11.1 in three steps untilmid-2003) iii) developed guidelines for the publication of royalties iv) developed and operationalized FC-HR databases v) completed a graded and harmonized pay structure is in place throughout the whole of the FC vi) Influenced policy and legal framework and established facilities to support the work of civil society as "watch dogs"
4. Natural Resources Management Programme (NRMP) The NRMP, which was originally planned three-phase ten-year multi-donor(IDA of the World Bank, EU, AfDB, DFID, RNE, JICA, DANIDA, GTZ, WFP, GEF) investment programme launched in September, 1999,had five (5)components. institutional framework	Phase 1 of NRMP(NRMP-I) aimed at assisting GoG to implement is policy of protecting, rehabilitating and sustainably managing national land, forest and wildlife resources by: (i)institutionalizing viable sustainable land, forest and wildlife management systems nationwide and (ii)establishing effective national policy and institutional framework and developing collaborative natural resource management	- Improvement in the policy and regulatory environment for high forest management and timber industry development - Enhanced community involvement in the management of forest, wildlife and savannah woodland resources and improved benefit flows to communities from resource sales; - Community and farmer adoption of improved land and water management techniques; - Improved management of wildlife resources while increasing their contribution to local livelihoods and economic development; and - Implementation of the protection strategy to enhance conservation of globally significant	See description under each selected component below

and developing collaborative natural resource management systems NRMP-I officially closed in June 2003.NRMP risks and risk mitigation efforts were fairly identified	systems	biodiversity in forest reserves and national parks.	
High Forest Resource Management (HRM) Component. This was further divided into six (6) subcomponents	To establish the policy, legal, administrative, financial and technical bases for sustainable forest management including biodiversity conservation, collaboration and efficient utilization of forest products by private and public sectors and local communities.	i) Policy and legislative reform in the HFZ-e.g.-introduce new regulations for timber resources management +under-pricing of timber resources; - Undertake study to help decide if a log export ban is the most efficient way of protecting the resource base, or if another policy (e.g. an export levy) would have the same effect at a lower economic cost; ii) Sector institution reform in place i.e. The Forestry Department (FD) will be transformed into a semi-autonomous body. Ghana Forest Service (GFS) which will be more client-oriented and manage the HFZ for the benefit of resource owners. iii) Establish integrated forest reserve management iv) Establish bush fire management in the transitional zone v) Forest plantation management in the HFZ in order to satisfy future demand for timber; rehabilitate unproductive lands; provide livelihood options for rural people and private investors; reduce pressure on natural forest vi) Wood industry development including forest certification	i) New timber Regulations adopted; e.g. timber concession lease replaced by TUC through a parent Act 547and supporting legislation; - There was an increase in the rate of collection of outstanding royalties decide if a log export ban is the most efficient way of protecting the resource base, or if another policy (e.g. an export levy) would have the same effect at a lower economic cost; ii) Sector institution reform in place i.e. The Forestry Department (FD) will be transformed into a semi-autonomous body. Ghana Forest Service (GFS) which will be more client-oriented and manage the HFZ for the benefit of resource owners. iii) Establish integrated forest reserve management v) Modalities for plantation development including a land bank completed. Plantation targets were not fully achieved (. %). Communities involved in the modified Taungya plantation earn cash from sale of farm produce and other private operators earn cash from the sale of tree seedlings vi) Export Incentive Scheme and Small Producers Scheme introduced to encourage processing of Lesser-Used Species (LUSH); Forest management certification system initiated but never completed
Savannah Resource Management (SRM)	To provide an enabling environment for poverty	The project was expected to:	The SRMC, including the TREU established and staffed and operating modalities developed.

Component. This was further divided into seven (7) sub-components	alleviation activities through local community participation in sustainable management of Savannah Zone natural resources, development and utilisation of woodland resources and improved land management created within the three northern Regions	(i) Support local communities and District Assemblies to define interventions and prepare resource management plans for a number of pilot forest reserves. ii) Pilot Integrated Watershed Management Off Reserve in the SZE iii) Establish wood fuel production and marketing in SZ iv) Put in place a national action program to control desertification v) Biodiversity conservation in the savannah zone vi) Management and utilization of medicinal plants in the savannah zone vii) Develop essential institutions (e.g. Savannah Resource Management Centre)	- Participatory planning completed for six community based pilots for woodland reserve management. - Participatory planning completed for 6 priority off-reserve watershed areas in support of actions identified by farmers and communities. - National Wood fuel Policy prepared. - Wood fuel production systems developed and tested at pilot sites and integrated into SRM programmes and National wood fuel policy. - National Action Programme to Combat Desertification planned discussed and endorsed by regional and district administrations in the three northern regions. - Biodiversity conservation programme prepared, including medicinal plans.
Wildlife Resource Management (WRM) component The WRM component comprises seven sub components.	To ensure policy, legal, administrative and technical framework for conservation and sustainable management of wildlife resources with the participation of rural communities established both within and outside of Protected Areas	The project was expected to achieve the following: i) Institutional Reform and Human Resource Development in the WD ii) Improved community Participation in Wildlife Management III) Enhanced economic Development of Wildlife Resources IV) Management of Wildlife Protected Areas v) Public education and awareness of wild life resources including establishment of public education unit at WD headquarters vi) strengthen the capacity of the WD to undertake research and monitoring functions vii) create an enabling environment for the participation of local communities and other wetlands resource users and stakeholders in the sustainable management of wetlands	Specific achievements include: - Creation of three (3) new divisions under WD as; Operations Division; Development Division and Administration, Finance and Human Resource Division and headed by suitably qualified managers. -Management procedures introduced to ensure transparency and to foster a sense of involvement and commitment to decision-making. - Training Plan for WD implemented - Community Participation Unit established, operations manual for community participation published and necessary legislation enacted - Regulatory and legal framework for wildlife enterprise development revised - All Protected Area management plans revised and updated and annual work planning procedures adopted - Policy framework, basic infrastructure and institutional arrangements in place to facilitate participatory and sustainable management and

			conservation of Ghana's wetland resources
High Forest Biodiversity Conservation Project Component. The project consisted of five components	The global environment objective was to increase the ecological security of globally significant biological resources, especially within threatened tropical moist forest ecosystems. Specific objectives included among others: (i) protect a significant proportion of forest biodiversity through implementing an ecosystem approach to management within the high forest zone that involves strengthening management of national parks and taking selected high-biodiversity forest reserves out of production; (ii) improve knowledge of the distribution and status of rare, threatened and endemic species through targeted surveys to better focus on conservation measures	At the end of the project the following were expected to be achieved: i) GSBA sites identified, prepared and management plans developed ii) Baseline surveys completed and applied research and monitoring in place to support objectives of sustainable conservation and locally based management. iii) Provenance reserves identified and established iv) Alternative livelihood investments secured in order to improve the economic status of the communities living around the GSBAs and encourage them to participate in the programme and also relieve pressure on biological resources by supporting alternative development options v) National capacity for collaborative resource management built with maximum involvement of local communities in planning, implementation and monitoring activities	Some achievements are listed as follows: - A total number of 30forest reserves (11 and 19wholly protected and partially protected forest reserves, respectively) were identified and excluded from timber harvesting on the merit of their significance as biodiversity-rich areas. - All the 30 GSBAs were surveyed, demarcated and pillared; legal documents forwarded to cabinet for approval and re-gazzetting. - The survey, demarcation and pillaring of 42 PAs were also completed- Biodiversity management plans for all GSBAs have been written. - Undertook Capacity development for GSBA management. Staff of FC, University of Ghana and RMSC benefited from knowledge, skills acquisition and equipment supplies. - Community Biodiversity Advisory Groups were created - Baseline studies were conducted for some critical areas of biodiversity maintenance. Examples are: socio-economic surveys, feasibility studies

APPENDIX 2: WILDLIFE CONSERVATION AREAS IN GHANA

Type	Name	Area (km^2)	Year of	Location / Region
National Pack	Mole	4,840	1971	Northern
	Digya	3,478	1971	Volta
	Bui	1,821	1971	Northern / Brong-Ahafo
	Kyabobo	360	2009	Volta
	Kakum	207	1990(?)	Central
	Nini-Suhien	160.2	1976	Western
	Bia	78	1977	Western
Wildlife Sanctuary	Bomfobiri	*53*	1975	Ashanti
	Owabi	13	1971	Ashanti
	Buabeng-Fiema	4.4	1974	Brong-Ahafo
	Agumatsa	3	*Proposed*	*Volta*
Resource Reserve	Gbele	565	1975	Upper West
	Ankasa	343	1976	Western
	Kalakpa	320	1975	Volta
	Bia	228	1977	Western
	Assin-Attandaso	140	1990(?)	Central
	Shai Hills	49	1971	Greater-Accra
Strict Nature Reserve	Kogyae	386	1971	Ashanti
Ramsar Site	Keta Lagoon Complex	1,200		Volta
	Songor	330		Greater-Accra
	Muni-Pomadze	90		Central
	Densu Delta	70		Greater-Accra
	Sakumo	*35*		Greater-Accra
		13		Ashanti
Total Area		14,786.6		

APPENDIX 3: INTERNATIONAL BIODIVERSITY CONVENTIONS AND AGREEMENTS TO WHICH GHANA IS SIGNATORY

Convention	Date of Ratification
International Convention for the Prevention of Pollution of the Sea by Oil	21 October 1962
Convention on the African Migratory Locust	25 May 1962
International Convention for the Conservation of Atlantic Tunas	4 May1966
African Convention on the Conservation of Nature and Natural Resources	15 September 1968
International Convention on Civil Liability for Oil Pollution Damage	29 November 1969
Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention)	2 February 1971
Convention Concerning the Protection of the World Cultural and Natural Heritage	16 November 1972
Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES)	3 March 1973
Convention on the Conservation of Migratory Species of Wild Animals (CMS)	23 June 1979
United Nations Convention on the Law of the Sea	10 December 1982
International Tropical Timber Agreement	18 November 1983
Montreal Protocol on Substances that Deplete the Ozone Layer	16 September 1987
Vienna Convention for the Protection of the Ozone Layer	24 July 1989
Convention on Biological Diversity(Bonn Convention) (CBD)	June 1992
United Nations Framework Convention on Climate Change (UNFCCC)	June 1992
Convention to Combat Drought and Desertification	1996

APPENDIX 4: INDICATIVE COST OF IMPLEMENTING NBSAP (2016-2020)

Action Plan 1: create public awareness of the values of biodiversity to promote conservation, restoration and sustainably usage (Aichi Target 1)

National Strategy	National Target	Indicator	Description of Indicator	Actor(s)	Frequency of Monitoring	Indicative Budget		
						GEF Support	Co-Financing	Total
Implement the CBD and related biodiversity conventions	Complete the NBSAP to implement the objectives, articles and programmes of work of biodiversity convention.	NBSAP approved and become operational by December 2016	A national framework for implementing CBD available.	MESTI	Monthly	0.1	0.15	0.25
	Implement Regulations for the Biosafety Act 831.	Biosafety Regulations published and distributed by mid-2017	Biosafety Regulations available, known and used by relevant stakeholders	National Biosafety Authority (NBA)	Quarterly	0.1	0.15	0.25
	Initiate discussions on biodiversity on the electronic and print media	At least 200 environmental journalists trained to report and generate public discussions on biodiversity issues by Mid-2018	Weekly radio discussion on Biodiversity issues. Bi-weekly feature articles on biodiversity issues Weekly reporting on environmental abuses in print and electronic media.	MESTI Media Houses	Weekly/ Monthly	0.1	0.15	0.25

Action Plan 2: Integrate and mainstream biodiversity values into national accounts and local development and poverty reduction strategies and planning processes with reporting systems (Aichi Target 2)

National strategy	National target	Indicator	Description of indicator	Actors	Frequency of Monitoring	Indicative Budget		
						GEF Support	Co-financing	Total
Incorporate Biodiversity considerations sustainable use and equitable sharing of benefits arising from the use of genetic resources into policies governing sectoral activities	Integrate-biodiversity conservation strategies into national development policies and plans	Strategic plans of MoFA, MoFAD, and COCOBOD achieve gains in biodiversity by ending 2018.	Agro-biodiversity conservation practices are integrated into strategic plans of MoFA, MoFAD, COCOBOD	MoFA, FC, MLNR, MoFAD, MESTI COCOBOD Water Resources Commission	Annually	0.10	0.15	0.25
	Develop tools and guidance that facilitate the implementation of the Cartagena Protocol's provisions on transit, contained use, environmental release and unintentional transboundary movements and emergency measures	Developed tools and guidelines by December 2017.	Tools and guidelines to facilitate the Cartagena Protocol implementation available.	MoFA, Forestry Commission MLNR, MoFAD, MESTI COCOBOD	Annually	1.00	1.45	2.45
	Set up the reconstituted National Biodiversity and Biosafety Authority (NBBA) to oversee the mainstreaming of biodiversity into sectoral policies and programmes	National Biodiversity and Biosafety Authority made functional by 2018.	The legislation setting up the NBBA passed and secretariat in place	MESTI/ NBA, EPA, CSIR	Quarterly reporting	1.60	2.32	3.92

Action Plan 3: Incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed (Aichi Target 3)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring	Indicative Budget		
						GEF Support	Co-financing	Total
To eliminate/phased out/reformed incentives (including subsidies) harmful to biodiversity conservation taking into account national socio economic conditions	Accelerate the process of the removal of incentives harmful to biodiversity					0.10	0.15	0.25
	Identify incentives within initiatives that drive biodiversity loss or degradation	Harmful incentives identified by December 2017	Catalogue of incentives harmful to biodiversity conservation	MESTI, MoTI, MoFA, MoFAD, Research Institutions, Universities, NGOs	Half Yearly reporting	0.10	0.15	0.25
	Develop mechanism for phasing out incentives harmful to biodiversity	Disincentives to biodiversity phased out incentives by December 2020	A number of harmful incentives to biodiversity expunged from national plans and policies	MESTI, MoTI, MoFAD, MoFA, MoF, FC, CEPS, MoJ&AG's Dep't	Periodically	0.30	0.44	0.74

Action Plan 4: Governments, business and stakeholders develop plans for sustainable production and consumption and keep the impacts on resource use within safe ecological limits. (Aichi Target 4)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring	Indicative Budget		
						GEF Support	Co-financing	Total
To support stakeholders to implement plans for sustainable production and consumption at all levels	Develop public awareness, understanding, appreciation and support for preservation and conservation of Ghana's biological	A biodiversity communication and public awareness strategy on the preservation and conservation of Ghana's biological heritage developed and implemented in place by June	A strategy document outlining the message and communication channels for the various stakeholders available	MESTI, MLNR, National Commission for Civic Education (NCCE), Media, Civil Society, EPA, Ministry of Education.	Annually	3.10	4.50	7.60

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring	Indicative Budget		
						GEF Support	Co-financing	Total
	heritage are	2017.						
Enhance the sustainable production and consumption of biological resources.	Businesses and other stakeholders develop plans and programmes to sustainably utilize natural resources in schemes that benefit biodiversity and ecosystems	Biodiversity offset schemes are in place and benefitting society and the environment by December 2018.	Functional biodiversity offset scheme	EPA, Private Sector (businesses including realty, actuarial, investment houses etc.), NGOs, Research institutions, Universities	Annually	4.00	5.80	9.80
	Strengthen the National Biosafety Clearing House (BCH) as a public awareness and information exchange mechanisms	An updated National BCH by December 2017	Updated and functional national BCH available	NBA and CSIR	Periodically	2.00	2.90	4.90
Communicate, educate and make the public aware of Traditional Knowledge issues	Traditional knowledge systems on biodiversity documented for the present and future generations	A compilation of traditional knowledge systems on biodiversity completed by December2019	A document cataloguing biodiversity-related traditional knowledge systems of the various ethnic groups in Ghana available.	Universities, Research Institutions, Traditional Authorities, MoFA, Forestry Commission , MoFAD, NGOs	3-5 years	4.00	5.80	9.80
	The recognition, integration and promotion of traditional biodiversity conservation knowledge of local communities by state institutions enhanced	Traditional biodiversity conservation knowledge of local communities is used in state institutional activities and reports by mid-2020	Reference to the use in state institutional activities and reports available in major institutions.	Universities, Research institutions, traditional authorities, MoFA, Forestry Commission , MoFAD, NGOs	Periodically			

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring	Indicative Budget		
						GEF Support	Co-financing	Total
	Conduct biosafety risk assessment by incorporating socio-economic considerations through the Biosafety Clearing House (BCH) mechanism.	Records on socio-economic issues regarding Biosafety Applications in place by December 2018.	Compilation of reports of risk assessment undertaken and their socio-economic impacts available	NBA, CSIR, GAEC,	Quarterly	1.00	1.45	2.45
Manage effectively Invasive Alien Species (IAS) in Ghana	Systems to enhance IAS management developed or strengthened.	A national IAS management system developed by December 2017.	A geo-referenced database system together with a reporting, control and management protocols and guidelines are available.	EPA MESTI, CSIR FC MoFA, MoFAD Universities & Research Institutions	Annually	3.00	4.35	7.35
	Develop the capacity of the Biosafety Technical Advisory Committee to review applications regarding GMOs which may become IAS	Guidelines on IAS with special reference to GMOs in place by mid-2018	Guidelines on IAS and those from GMOs available	NBA, EPA, CSIR,	Reviewed as and when necessary	1.80	2.61	4.41
Increase awareness and build communication about the taxonomy of biodiversity by maintaining a directory of taxonomists and their expertise and	Create a directory of taxonomists and their expertise	A directory of taxonomists available by December 2018	A database of taxonomists available	Universities and Research institutions in Ghana	Annually	1.00	1.45	2.45
	Implement olicy needs identified in Global Taxonomy Initiative (GTI)	Relevant policy needs formulated by December 2019	Relevant policy needs identified within GTI applied	Research institutions, universities	Periodically			

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring	Indicative Budget		
						GEF Support	Co-financing	Total
implementation of policy needs identified in Global Taxonomy Initiative	Develop a communication strategy between different sectors on general taxonomy	Knowledge about taxonomy of biodiversity in place by 2019.	Indication of collaboration among taxonomists based on reports, workshop proceedings, publications, research findings.	Research institutions, universities	Periodically	0.30	0.44	0.44
Build capacity of young scientists to improve taxonomic information delivery.	Provide training resources for taxonomy to educational establishments	At least 30 young scientists trained in taxonomy by December 2020	The number of young scientists trained in taxonomy available in the directory	Universities, Research institutions	Annually	1.00	1.45	2.45
Develop national GMO repository directories in the BCH	Create hyperlinks to GMO repository directories in the BCH and other digital libraries	Hyperlinks in place by mid-2018	Hyperlinks available for use	NBA and collaborating institutions	Quarterly	0.40	0.58	0.98

Action Plan 5: Reducing the rate of loss of all natural habitats, including forests, to at least half and where feasible brought close to zero, and degradation and fragmentation significantly reduced. (*Aichi Target 5*)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Provide incentives to communities	Institute a Payment for Ecosystem Scheme for communities	Modalities for payment of ecosystem services approved legislated by December 2017	Forest fringe communities are aware and can apply for	FC MESTI MLNR CSOs	Quarterly	6.00	8.70	14.70
Involve local communities	Establishment of CREMA,	Legislations on CREAM and	Modalities for community	WD, CSOs,	Half-yearly	4.40	6.38	10.78

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
in the conservation and restoration of biodiversity	national plantation development programme	Plantation development establishment in place by Mid 2018	involvement on biodiversity conservation are in place and being applied	FC MLNR				
Maintain and Enhance programmes that support the preservation of natural habitats	Establish marine protected areas	Guidelines for the establishment of Marine protected areas in place by December 2018	Guideline on marine protected areas management system is being used	Fisheries	Quarterly	1.00	1.45	2.45
	Protect important wetlands	Management Plans for important wetlands developed and approved by Mid-2018	Availability of management plans	WD, CSOs, FC MLNR	Yearly			
	Ensure the effective management of biosphere reserves and other biodiversity hotspots	Important biosphere reserved identified and gazetted by 2019	Database of Biosphere reserves in place	EPA MESTI	Yearly	1.00	1.45	2.45
	Establish biological corridors to link national parks	A legal framework to support the creation of the corridor in place by 2019	Availability of legal framework	FC MLNR	Yearly			

Action Plan 6: All stocks managed and harvested sustainably, so that overfishing is avoided (Aichi Target 6)

National Strategy	National Target	Indicator	Description of Indicator	Actors	Frequency of Monitoring/ Reporting	Indicative Budget		
						GEF Support	Co-financing	Total
Incorporate Biodiversity Conservation, sustainable use and equitable sharing of benefits arising from the use of genetic resources into National Fishery Policy	Sustainable culture and capture fishing practices and programs that enhance biodiversity conservation and ecosystem services promoted	Sustainable marine fisheries management plans in place by ending 2018	Fisheries management plan is available	MMDAs MOFA MDAs Research Inst. Judiciary Fisheries Assoc.	Bi-annually Annually	2.40	3.48	5.88
	Enhance registration/certification as a tool for sustainable fishing management.	Improvement in the Registrations process and certificates issued or renewed by December 2019	Frame survey conducted	Fisheries Commission	Annually	0.50	0.73	1.23
	Support the implementation of the guidance on risk assessment and risk management including guidance on new developments in agricultural modern biotechnology	National Biosafety Risk Assessment guidelines	A document guiding the NBA in the conduct of risk assessment on agricultural biotechnology applications	NBA/TAC	Annually	0.10	0.15	0.25

Action Plan 7: Areas under agriculture, aquaculture and forestry managed sustainably, to ensure conservation of biodiversity (*Aichi Target 7)*

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Strengthen management of biodiversity in all habitats	Encourage correct use of agro-chemicals	Standards and best practices guidelines in place by December 2017. Enforce compliance to the guidelines on safe use of agrochemicals by 2018	Standards and best practices guidelines available Guidelines on safe use of agrochemicals	EPA MOFA MMDAs MOT GSA FBOs COCOBOD NGOs MoFAD Research Inst. FC Universities	Bi-annually	1.00	1.45	2.45
Strengthen the management of existing protected areas and off reserve areas	Develop a GIS-based map of sacred groves	Best management practices for protected areas and off-reserved areas developed by December 2019	Best practices available GIS maps available	EPA, MOFA MMDAs MOTI, GSA COCOBOD NGOs MoFAD FORIG , FC Universities	Bi-annually	3.00	4.35	7.35
	Support the implementation of global significant biodiversity areas	Development of a national register of community conserved areas in place by mid-2019	National register of community conserved areas available in digital form and in print.	FC MLNR MESTI EPA Traditional Authorities	Annual	0.30	0.44	0.74
		Capacity building for managers of protected areas developed by mid-2020	Register of community protected area managers	FC MLNR MESTI EPA Traditional Authorities	Annual			
	Guidance on risk assessment and risk management including guidance on new developments in agricultural	National Biosafety Risk Assessment guidelines in place by December 2019	A document guiding the NBA in the conduct of risk assessment on agricultural biotechnology applications	NBA/TAC	Periodically			

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
	modern biotechnology developed							
Strengthen risk management in handling and use of agricultural modern biotechnology	Develop Strategies and guidance to identify, assess, and monitor GMOs	Document on identification and monitoring of GMOs developed by ending 2018	Document on identification and monitoring of GMOs available	NBA/IBC/TAC Local Communities Regulatory Agencies EPA, MoFAD, FC, Marine Police, MDAs	Half Yearly	0.10	0.15	0.25
	Implement the Sections of the Biosafety Act, 2011 regarding GMOs	GMOs issues within District plans by mid-2019	District plans reflecting GMOs	NBA, MLGRD, MESTI, NDPC	Half Yearly	0.50	0.73	1.23

Action Plan 8: Minimizing pollution, including excess nutrients, to levels that are not detrimental to ecosystem function and biodiversity (Aichi Target 8)

National Strategy	National Target	Indicator	Description of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Strengthen compliance with and enforce relevant laws on pollution control	Create awareness on pollution reduction measures	Community participating and adopting pollution reducing measures by ending 2018	Number of communities/ individuals adopting pollution reducing measures	NBA EPA WRC MOFA COCOBOB FC, GSA Research institutions MMDAs.	Bi- annual or annual	0.4	0.58	0.98
	Develop standards, guidelines and regulations for adoption	Standards, guidelines and regulations in place by December 2019	Standards, guidelines and regulations operational	MESTI EPA GSA GMA	Annually			

National Strategy	National Target	Indicator	Description of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
	Improve environmental information management system	BCH website created by December 2018	Harmonized system of environmental data storage and retrieval available	MESTI; EPA MOFA-PPRSD FC GMA Research inst. NADMO Navy; MDAs	Annually	0.50	0.73	1.23

Action Plan 9: Ensuring that invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment. (Aichi Target 9)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Develop an early warning system for detection of IAS	Develop and implement communication protocols for early warning detection	Communication protocol completed by December 2018	Communication protocol available	MESTI EPA MOFA-PPRSD FC Research institutions NADMO Navy MDAs GIS	Periodically	0.30	0.44	0.74
Promote Integrated management of IAS in all habitats	Develop and implement Invasive Alien Species policy and strategy	Requisite documents in place by December 2018	Policy and strategy document available	NBA/IBC, Regulatory Agencies EPA, MoFAD, FC, Marine Police, MDAs	Periodically	0.10	0.15	0.25
	Implement projects and programmes on IAS in all habitats	Projects and programmes in place to prevent, control and manage IAS by mid-2019	No. of projects being implemented	NBA/IBC, Regulatory Agencies EPA, MoFAD, FC, Marine Police, MDA and CSOs	Periodically			

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
	Implement the Sections of the Biosafety Act, 2011 regarding IAS and GMOs	IAS and GMOs issues within District plans by mid-2020	District plans reflecting IAS and GMOs	NBA, MLGRD, MESTI, NDPC,	Periodically	2.00	2.90	4.90

Action Plan 10: Minimizing the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification, so as to maintain their integrity and functioning. (Aichi Target 10)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Strengthen the legal and regulatory framework for the protection of coral reefs, mangrove ecosystems, estuaries, and community protected areas	Develop regulations to protect coral reefs	Regulation on the protection of coral reefs by December 2018	Regulation available	MoFAD, EPA, GMA,	Periodically	1.00	1.45	2.45
	Develop and enforce relevant regulations protecting mangrove ecosystems and estuaries	Guideline on ecological health of mangroves and estuaries in place by December 2017	Ecological health of mangroves and estuaries improving	MoFAD, EPA, GMA, FC, NGOs, CSOs, MMDAs, Universities, Traditional Authorities, Fishermen Associations (NAFAC)	Periodically	3.00	4.35	7.35

Action Plan 11: Ensuring that at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas are conserved through systems of Protected Areas (Aichi Target 11)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Enhance the preservation and conservation of Ghana's biological heritage through systems of protected areas	Update and revise existing management plan measures for the ex-situ conservation of Ghana's Biological heritage including non-native species are adopted	Rehabilitated or upgraded conservation centres by December 2018 Management Plans of ex-situ conservation updated by mid-2018	Numbers of conservation centres functioning Updated management plans	WRC, FC, Research Institutions, Universities EPA, CSOs, NGOs MoE, MoTCCA, Traditional Authorities, MoJ&AG's Dept.	Annually	0.30	0.56	0.86
	Enforce existing management plans for protected areas	Updated management plans implemented by December 2020	Manuals for the implementation of management plans in place	FC MLNR	Annually	5.00	9.25	14.25
	Revise the regulations on wetland management	Wetland regulation revised by December 2017	Wetland regulation available at all levels					
	Establish, maintain and improve facilities and plans for in-situ conservation including research on plants, animals and micro-organisms	An inventory of materials considered for in-situ and ex-situ conservation completed by mid-2018	An in-situ and ex-situ inventory is available	MoJ&AG's Dept. Minerals Commission, GMA, Media, Traditional Authorities, MLGRD, Fisheries Commission FC (WD)	Periodically	3.00	5.50	8.50

Action Plan 12: Preventing the extinction of known threatened species and their conservation status, particularly of those most in decline, and improving and sustaining their status (Aichi Target 12)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Protect threatened species in all habitats	Create an inventory of threatened, vulnerable and endangered species using the RED list category of IUCN	Database on threatened species for all habitats in place by mid-2018	Details of the status of threatened species available	FC, WC, MoFAD, Universities, Research Institutes, NGOs, CSOs, Traditional Authorities	Periodically	0.30	0.56	0.86
	Develop regulations to protect endangered species	Regulations to protect endangered species enacted by December 2019	Regulation available and implemented	FC, WC, MoFAD, Universities, Research Institutes, NGOs, CSOs, Traditional Authorities	Annually	0.30	0.56	0.86

Action Plan 13: Maintaining the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives (Aichi Target 13)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Support the preservation and conservation of genetic biodiversity of cultivated plants, farmed and domesticated animals and their wild relatives	Promote and enhance research on Genetically Modified Organisms (GMOs)	Permits granted for research on GMOs per year	Details of research available	GAEC, CSIR, Universities, CRIG	Annually	1.60	2.96	4.56
	Support collection and conservation of genetic diversity of cultivated plants, farmed and domesticated animals and	Inventory of the gene bank developed for cultivated plants, farmed and domesticated animals and their wild relatives by December	Inventory of the gene bank available	Research and Academia Farmer groups, CSOs Fishermen/ Fish farmers Traditional Authorities, Local Communities	Periodically	1.00	1.85	2.85

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
	their wild relatives	2019						
	Strengthen National Biosafety Authority (NBA) including its inspection and monitoring outfits	At least 50% of required staff and appropriate infrastructure developed by mid-2020	Staff strength and logistics improved	NBA/ MESTI/ Regulatory Agencies	Periodically	1.00	1.85	2.85

Action Plan 14: Restoring and safeguarding ecosystems that provide essential services, including ecosystem services (Aichi Target 14)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Incorporate Biodiversity Conservation, sustainable use and equitable sharing of benefits arising from the use of genetic resources, into development plans and programmes	Mainstream watershed protection, land use and spatial planning Environmental, Biosecurity and Natural resource policies into sector and district development plans and programmes to protect watersheds and wetlands that provide essential services	Guideline to mainstream watershed protection into district level planning developed by December 2017 Ecosystem health indices identified and published by Mid-2018	Monitoring of the ecosystem health	MMDAs, Local communities, CSOs, Research Institutions, Universities, NGOs	Annually	0.20	0.35	0.55
Protection of watersheds, wetlands that provide essential services	Restore degraded ecosystems through community efforts.	Community-based watershed restoration plan developed by the end of	Degraded land restoration programme on-going	FC Water Resources Commission MMDAs	Annually	0.10	0.18	0.28

		2018 At least 15 % of degraded ecosystems restored by mid-2019						
	Develop and implement relevant legal instrument and guidelines for Nagoya Kuala Lumpur Supplementary Protocol on Liability and Redress and develop and implement PES	Guidelines for PES in watershed restoration in place by December 2017	Implementation of PES	FC Water Resources Commission MMDAs	Annually	0.10	0.18	0.28

Action Plan 15: Enhancing ecosystem resilience and restoration to promote the contribution of biodiversity conservation to carbon stocks and ensure restoration of at least 15 per cent of degraded ecosystems restoration. (Aichi Target 15)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Enhance ecosystem resilience through conservation and restoration programmes	Restore degraded ecosystems in the forests, wetlands and aquatic ecosystems	At least 15% of degraded ecosystem restored by December 2019	Ecosystem resilience indices	Research Institutions, Universities, CSOs, NGOs, FC, WC, MoFAD, MLNR, MLGRD, MoJ& AG's Dept.	Annually	0.70	1.23	1.93
	Develop and implement community-based incentive reward system for Ecosystem	Guidelines for community-based incentive system for ecosystem services	Implementation of incentive system for ecosystem services	CSOs, NGOs, FC, WC, MoFAD, MLNR, MLGRD, MoJ& AG's Dept.	Annually	0.20	0.35	0.55

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
	Services	developed by mid-2018						

Action Plan 16: Operationalising the Nagoya Protocol on access and benefits sharing (Aichi Target 16)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Ratify and domesticate the Nagoya Protocol on Access and Benefit Sharing (ABS)	Relevant legal instrument and guidelines for ABS developed and implemented	Relevant legislations enacted by ending 2017.	Approved legal instrument for accession to the protocols available and deposited at the UN in New York	NBA, MESTI, MoJ & AG's Dep't, Parliament, MFARI, CSOs	Urgent	0.10	0.18	0.28
Ratify and domesticate the Nagoya Kuala Lumpur Supplementary Protocol on Redress and Liability	Relevant legal instrument and guidelines for Nagoya Kuala Lumpur Supplementary Protocol on Liability and Redress developed and implemented	Nagoya Protocol ratified by December 2017. Guidelines for Nagoya Kuala Lumpur Supplementary Protocol in place by mid-2019.	Implementation of Nagoya Kuala Lumpur Supplementary Protocol.	NBA, MESTI, MoJ & AG's Dep't, Parliament, MFARI, CSOs	Annually	0.10	0.18	0.28

Action Plan 17: Developing and adopting a policy instrument, for the implementation of an effective, participatory and updated NBSAP (Aichi Target 17)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Implement the NBSAP	Develop the M&E Plan to support the implementation of the NBSAP	NBSAP M&E Plan in place by end of 2017	NBSAP together with M&E Plan reflecting emerging issues	MESTI	Periodically	0.20	0.37	0.57

Action Plan 18: Ensuring that the traditional knowledge, innovations and practices of indigenous and local communities and their customary use, are respected (Aichi Target 18)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Compile and harmonise Traditional Knowledge issues on biodiversity	Traditional knowledge on sacred landscape compiled and processed	Traditional knowledge on sacred landscape compiled and processed by mid2018 Public engagements on traditional knowledge initiated by mid-2017	Number of workshops, media engagements, Publications	Traditional Authorities, Media NGOs, Research Institutions, Universities	Periodically	3.00	5.49	8.49
Educate the public on traditional knowledge issues on biodiversity	Create awareness on traditional knowledge issues on biodiversity	Traditional knowledge awareness programme initiated by ending 2017	Programme on TK initiated	Traditional Authorities, Media NGOs, Research Institutions, Universities	Annual	7.00	12.81	19.81
Develop a legislation for local communities on the rights on genetic	Develop legislation on community rights on genetic	Legislation on community rights on genetic resource in	Communities are aware of their rights in genetic resource	MLNR, FC, MMDAs, MoJ&AG's Dept., NCCE,	Annual	1.00	1.83	2.83

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
resources	resource.	place by December 2018		NGOs, Registrar General's Dep't				
Operate *sui generis* (peculiar to local communities) system for the protection of Traditional and Indigenous Knowledge	Develop a *sui generis (*peculiar to local communities) system for Traditional Knowledge is as part of Ghana's legislation	Guidelines for the enactment of community level Legislation on Traditional Knowledge fully operational by mid-2020	A Documentation outlining opportunities and proposed guidelines on traditional knowledge system available to all	Traditional Authorities, Land owners, MLNR, FC, MMDAs, MoJ&AG's Dep't, NCCE, NGOs, Registrar General's Dept.	Periodically	2.40	4.39	6.79
Integrate local and scientific knowledge on biodiversity into national development	Integrate Traditional Knowledge and Formal Science in biodiversity conservation	A document on existing biodiversity related traditional knowledge systems developed by December 2019	A document on existing biodiversity related traditional knowledge systems available	Traditional authorities, MESTI, MLGRD, MoTCCA (Ghana Museums and Monuments Board), Opinion Leaders, NGOs, Research institutions, Universities	Periodically	1.00	1.83	2.83
	Use national forestry and agricultural policies to sustain ethno-forestry and agro-silvo-pastoral arrangements at the local level	Productivity of pilot schemes integrating traditional knowledge and basic science initiated by Mid-2017	Performance of pilot schemes compared with existing traditional practices in ethno-forestry and agro-silvo-pastoral arrangements	MESTI, MoFA, Research Institutions, Universities, NGOs, FC, MMDAs, Traditional Authorities	Periodically	0.50	0.92	1.42

Action Plan 19: Knowledge, on the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied (Aichi Target 19)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Use science and technology for disseminating biostatistics for the effective management of biodiversity	Prepare and publish information on biodiversity	Biodiversity publications, websites, social media presence initiated by ending 2017	Improving biodiversity information dissemination through an integrated approach	Research Institutions, Universities Ministries CSIR, FC Cocoa Research Institute, Agric. Extension Services, NGOs, FORIG	Based on institution's reporting system.	2.10	3.84	5.94
	Disseminate biodiversity information nationally and internationally	Biodiversity information dissemination begins by mid-2017	Improving biodiversity information dissemination through an integrated approach	Research Institutions, Universities Ministries CSIR, FC Cocoa Research Institute, CSO FORIG	Annually.	2.10	3.83	5.94
Enhance Research and Development in Agricultural Biodiversity	Research gaps for improving agricultural biodiversity conservation identified and addressed	Research gaps identified and published by mid-2018	Closing research gaps in agricultural biodiversity	Research Institutions, Universities Ministries CSIR, FC Cocoa Research Institute, NGOs Agric. Extension Services	Based on institution's reporting system	2.40	4.39	6.79
	Research and extension linkages on agricultural biodiversity conservation and agricultural productivity	Personnel trained or engaged in programs in biodiversity and agriculture by December 2018	Improving the knowledge and skills of agricultural extension personnel engaged in biodiversity	Research Institutions, Universities Ministries CSIR, FC Cocoa Research Institute, NGOs Agric.	Based on institution's reporting system	1.00	1.83	2.83

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
	promoted			Extension Services				

Action Plan 20: Mobilizing increased financial resources for effectively implementing the strategic plan for biodiversity 2016- 2020 from all sources (Aichi target 20)

National Strategy	National Target	Indicator	Description Of Indicator	Actors	Frequency Of Monitoring/ Report	Indicative Budget		
						GEF Support	Co-financing	Total
Build capacity of relevant institutions on resource mobilization	Potential funding sources and conditions for accessing funds determined	An inventory of potential donors completed by mid-2017	List of donors and their conditions for accessing available funds	MESTI	Periodically	5.00	9.15	14.15
	Train public servants in resource mobilization and financial re-engineering	At least training of 20 public servants on resource December 2017	Public servant capable of formulating projects to attract funding	MESTI, EPA, MLNR	Annually	0.10	0.18	0.28
Develop and Implement Resource Mobilization Strategies	Publish NBSAP and use it as reference material for MMDAs, CSOs and donors when preparing programmes and plans for donor/ Government funding	NBSAP formulation completed by December 2016.	Number of biodiversity related funded projects.	MoF, MESTI, DPs, NGOs.	Annually	1.00	1.83	2.83

Table 2: Indicative Summary Cost of Implementing NBSAP (2016-2020)

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
Addressing the underlying causes of biodiversity loss.	To create public awareness of the values of biodiversity to promote conservation, restoration and sustainable usage Implement the CBD and related biodiversity conventions.	Complete the NBSAP to implement the objectives, articles and programmes of work of biodiversity convention	0.25
		Implement Regulations for the Biosafety Act 831	02.5
		Initiate discussions on biodiversity on the electronic and print media	0.25
	To integrate and mainstream biodiversity values into national accounts and local development and poverty reduction strategies and planning processes with reporting systems.	Integrate-biodiversity conservation strategies into national development policies and plans.	0.74
		Mainstream biodiversity offsetting and payments for ecosystem services into economic decision-making, through governments' planning processes, licenses and permits and financial institutions' lending and investment decisions	0.98
		Develop tools and guidance that facilitate the implementation of the Cartagena Protocol's provisions on transit, contained use, environmental release and unintentional transboundary movements and emergency measures	2.45
		Set up a National Biodiversity Commission (NBC) to oversee the mainstreaming of biodiversity into sectoral policies and programmes	3.92
	To eliminate/phased out/reformed incentives, (including subsidies), harmful to biodiversity conservation taking into account national socio economic conditions.	Accelerate the process of the removal of incentives harmful to biodiversity	0.25
		Identify incentives within initiatives that drive biodiversity loss or degradation	0.25
		Develop mechanism for phasing out incentives harmful to biodiversity	0.74
	To support stakeholders to implemented plans for sustainable production and consumption all levels of governance within safe ecological limits.	Public awareness, understanding, appreciation and support for preservation and conservation of Ghana's biological heritage is developed	7.60
		Enhance the preservation and conservation of Ghana's biological heritage including non-native species through public awareness, understanding, appreciation and support for preservation and conservation of Ghana's biological heritage.	9.80
		Enhance the sustainable production and consumption of biological resources by encouraging Businesses and other stakeholders to develop plans and programmes to sustainably utilize natural resources in schemes that benefit biodiversity and ecosystems.	2.45
		Strengthen the National Biosafety Clearing House (BCH) as a public awareness and information exchange mechanism.	7.35

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
		Communicate, educate and make the public aware of Traditional Knowledge issues through the documentation of traditional knowledge systems on biodiversity, recognition, integration and promotion of traditional biodiversity conservation knowledge of local communities by state institutions enhanced;	4.41
		Conduct biosafety risk assessment by incorporating socio-economic considerations through the Biosafety Clearing House (BCH) mechanism	2.45
		Manage effectively Invasive Alien Species (IAS) in Ghana by developing systems to enhance IAS management.	7.35
		Develop the capacity of the Biosafety Technical Advisory Committee to review applications regarding GMOs which may become IAS.	4.41
		Increase awareness and build communication about the taxonomy of biodiversity by maintaining a directory of taxonomists and their expertise and implementation of policy needs identified in Global Taxonomy Initiative (GTI)	2.45
		Develop a communication strategy between different sectors on general taxonomy.	0.74
		Build capacity of young scientists to improve taxonomic information delivery and provide training resources for taxonomy to educational establishments.	2.45
		Develop national GMO repository directories in the BCH by creating hyperlinks to GMO repository directories in the BCH and other digital libraries.	0.98
	To reduce the rate of loss of all natural habitats, including forests, to at least half and where feasible brought close to zero, and degradation and fragmentation significantly reduced.	Provide incentives to local communities to conserve biodiversity by instituting Payment for Ecosystem Schemes	14.7
		Involve local communities in the conservation and restoration of biodiversity through support for the establishment of community resource management areas (CREMA), woodlot establishment and plantation development programme	10.78
		Maintain and enhance programmes that support the preservation of natural habitats including the establishment of marine protected areas and protection of important wetlands	2.45
		Ensure the effective management of biosphere reserves and other biodiversity hotspots through the establishment of biological corridors to link national parks	2.45
	To promote sustainable management of all fish and invertebrate stocks as well	Incorporate biodiversity conservation, sustainable use and equitable sharing of benefits arising from the use of genetic resources into national fishery	5.88

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
	as aquatic plants to avoid overfishing.	policy.	
		Introduce sustainable culture and capture fishing practices and programs that enhance biodiversity conservation and ecosystem services	0.25
		Enhance registration/certification as a tool for sustainable fishing management.	1.23
		Support the implementation of the guidance on risk assessment and risk management including guidance on new developments in agricultural modern biotechnology.	0.25
	To promote the sustainable management of areas under agriculture, aquaculture and forestry, to ensure conservation of biodiversity.	Strengthen the management of biodiversity in all habitats through the correct use of agro-chemicals	2.45
		Strengthen the management of existing protected areas and off reserve areas including sacred landscapes and significant biodiversity areas	7.35
		Develop guidance on risk assessment and risk management including guidance on new developments in agricultural modern biotechnology developed	0.74
		Strengthen risk management in handling and use of agricultural modern biotechnology and monitors for GMOs	0.25
		Support the implementation of the Sections of the Biosafety Act, 2011 regarding GMOs	1.23
	To minimize pollution, including excess nutrients, to levels that are not detrimental to ecosystem function and biodiversity	Strengthen compliance with and enforce relevant laws on pollution control by creating awareness on pollution reduction measures and developing standards, guidelines and regulations.	0.98
		Improve on environmental information management systems	1.23
	To ensure that invasive alien species and pathways are identified prioritized, and controlled or eradicated, to manage pathways to prevent their introduction and establishment	Develop an early warning system for detection of Invasive alien species IAS and promote Integrated management of IAS in all habitats	0.74
		Formulate Invasive alien species (IAS) policy and strategy and monitor its implementation	0.25
		Implement projects and programmes on IAS in all habitats including portions of the Biosafety Act, 2011 and GMOs	4.90
	To minimize the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification, so as to maintain their integrity and functioning	Strengthen the legal and regulatory framework for the protection of coral reefs, mangrove ecosystems, estuaries, and community protected areas.	2.45
		Develop and enforce relevant regulations to protect mangrove ecosystems and estuaries	7.35
Improving the status of biodiversity by	To ensure that at least 17 per cent of terrestrial and inland water, and 10 per	Enhance the preservation and conservation of Ghana's biological heritage through systems of protected areas	8.55

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
safeguarding ecosystems, species and genetic diversity	cent of coastal and marine areas are conserved through systems of Protected Areas	Update and revise existing management plan and develop measures for the ex-situ conservation of Ghana's Biological heritage including non-native species	0.86
		Revise the regulations on wetland management.	14.25
		Establish, maintain and improve facilities and plans for in-situ conservation including research on plants, animals and micro-organisms	8.55
	To prevent the extinction of known threatened species and their conservation status, particularly of those most in decline, and improve and sustain their status	Create an inventory of threatened, vulnerable and endangered species using the RED list category of IUCN	0.86
		Develop regulations to protect endangered species.	0.86
	To maintain the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives	Support the preservation and conservation of genetic biodiversity of cultivated plants, farmed and domesticated animals and their wild relatives	2.85
		Promote and enhance research on Genetically Modified Organisms (GMOs).	4.56
		Support collection and conservation of genetic diversity of cultivated plants, farmed and domesticated animals and their wild relatives.	2.85
		Strengthen National Biosafety Authority (NBA) including its inspection and monitoring outfits.	2.85
Enhancing the benefits to all from biodiversity and ecosystem services	To restore and safeguard ecosystems that provide essential services, including ecosystem services	Ensure the effective management of biosphere reserves and other biodiversity hotspots.	8.28
	To enhance ecosystem resilience and restoration to promote the contribution of biodiversity conservation to carbon stocks and ensure restoration of at least 15 per cent of degraded ecosystems	Incorporate Biodiversity Conservation, sustainable use and equitable sharing of benefits arising from the use of genetic resources, into development plans and programmes	1.93
		Mainstream watershed protection, land use and spatial planning environmental, biosecurity and natural resource policies into sector and district development plans and programmes to protect watersheds, and wetlands that provide essential services.	0.55
	To operationalize the Nagoya Protocol on access and benefits sharing	Ratify and domesticate the Nagoya Kuala Lumpur Supplementary Protocol on Redress and Liability	0.28
		Develop and implement relevant legal instrument and guidelines for Nagoya Kuala Lumpur Supplementary Protocol on Liability and Redress.	0.28

Policy Focus	Strategic Objectives	Policy Strategies	Indicative Short term Budget (2016-2020) (US$' million)
Enhancing strategy implementation through participatory planning, knowledge management and capacity building	To develop and adopt a policy instrument, for the implementation of an effective, participatory and updated national biodiversity strategy and action plan	Develop the monitoring and evaluation plans to support the implementation of the NBSAP.	0.57
	To ensure that the traditional knowledge, innovations and practices of indigenous and local communities and their customary use, are respected	Compile and harmonise Traditional Knowledge issues on biodiversity including sacred landscapes	8.49
		Educate the public on traditional knowledge issues on biodiversity.	19.81
		Develop a legislation for local communities on the rights on genetic resources	2.83
		Operate sui generis (peculiar to local communities) system for the protection of Traditional and Indigenous Knowledge	6.79
		Integrate local and scientific knowledge on biodiversity into national development	2.83
		Use national forestry and agricultural policies to sustain ethno-forestry and agro-silvo-pastoral arrangements at the local level Encourage correct use of agro-chemicals	1.42
	To improve widely share transfer and apply knowledge, on the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss	Use science and technology for disseminating biostatistics for the effective management of biodiversity	1.13
		Prepare and publish information on biodiversity	5.94
		Enhance Research and Development in Agricultural Biodiversity	8.49
		Research gaps for improving agricultural biodiversity conservation identified and addressed	6.79
		Research and extension linkages on agricultural biodiversity conservation and agricultural productivity promoted	2.83
	To mobilize increased financial resources for effectively implementing the strategic plan for biodiversity	Build capacity of relevant institutions (state and non-state) on resource mobilization and financial re-engineering.	14.15
		Develop and implement resource mobilization strategies	0.28
		Publish NBSAP and use it as reference material for MMDAs, CSOs and donors when preparing programmes and plans for donor/ Government funding	2.83
TOTAL INDICATIVE COST (GHS)			**297.43**

Foot note: Costing took cognisance of GEF 7 Funding Needs Assessment/National Portfolio Exercise