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SIXTH NATIONAL REPORT TO THE CONVENTION ON BIOLOGICAL DIVERSITY FOR UGANDA

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY
MINISTRY OF WATER AND ENVIRONMENT

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FOREWORD

The Conference of the Parties to the Convention on Biological Diversity (CBD) at its tenth meeting in October 2010 adopted the Strategic Plan for Biodiversity 2011-2020 and its associated Aichi targets. Parties to the CBD subsequently reviewed and updated their National Biodiversity Strategy and Action Plans (NBSAPs) to align them to the Strategic Plan and developed national targets using the Aichi targets as a flexible framework. Uganda reviewed and completed the updating of its NBSAP in 2015 in line with the guidance from the Conference of the Parties.

The revised NBSAP II (2015-2025) has national biodiversity targets that were developed with involvement of wide stakeholders from government intitutions, academia, research institutions, CSOs, NGOs, and representatives of private sector and representatives of indigenous peoples and local communities (IPLCs). The national targets were set using the global Aichi targets as a flexible framework. Uganda also included national targets on biosafety and biotechnology under Aichi target 19 and made use of the elements of the Strategic Plan for the Cartagena Protocol on Biosafety 2011-2020. Most importantly, the revised NBSAP has specific objective on biotechnology and on innovative financing mechanisms which were not in the first NBSAP.

Uganda has up to-date fully complied with the requirements of Article 26 of the Convention and has prepared five national reports as guided by the Conference of the Parties. Furthermore, Uganda has also prepared all the national reports to the Cartagena Protocol on Biosafety. All these reports are available on the CBD website. Uganda completed the preparation of the sixth national report following the guidance from the Conference of the Parties.

The sixth national report has mainly focused on progress of implementation of the Aichi targets. The report also highlights progress on implementation of national targets on biosafety and biotechnology. This is unique for Uganda in the sense that the Strategic Plan for Biodiversity 2011-2020 did not have targets on biosafety but Uganda included targets on biosafety and biotechnology in its NBSAPII. The sixth national report is principally centred on the seven strategic objectives of NBSAP II each with national targets aligned to the Aichi targets.

The sixth national report has generated very useful information on the status and trends of biodiversity. The national state of environment report for Uganda 2018 has incorporated information from the sixth national report. Different stakeholders will use the report when planning for biodiversity conservation and management in Uganda. The report has very useful information to support additional resource mobilization for biodiversity.

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Dr. Tom O. Okurut
EXECUTIVE DIRECTOR
NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

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The National Environment Management Authority (NEMA) is grateful to the Global Environment Facility (GEF) for providing the financial support for preparation of the sixth national report and to the United Nations Environment Programme (UNEP) for assisting Uganda to access the funds from the GEF. Sharing of information and data was a very important aspect in preparation of the sixth national report for Uganda. NEMA acknowledges with profound appreciation the support from those stakeholders that shared data and information to inform preparation of the report.

The technical committee on biodiversity conservation provided overall technical guidance while the experts working group reviewed the report at various stages of its development which was very critical in ensuring quality of information and data. NEMA commends the technical committee on biodiversity conservation and the experts working group for their support and commitment.

The national focal point for the Convention on Biological Diversity, Mr. Sabino Francis Ogwal did a great job in coordinating and providing technical backstopping during the preparation of the sixth national report. NEMA extends appreciation to him for the hard work and his commitment in advancing implementation of the CBD at the national, regional and global level.

ACRONYMS

ABNE	African Biosafety Network of Expertise
ABS	Access and Benefit Sharing
AGRA	Alliance for a Green Revolution in Africa
AIK	Agricultural Indigenous Knowledge
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
CAES	College of Agricultural and Environmental Sciences
CBD	Convention on Biological Diversity
CHM	Clearing House Mechanism
CITES	Convention on International Trade on Endangered species of wild flora and fauna
COP	Conference of Parties
ESIA	Environment Social Impact Assessment
FSSD	Forestry Sector Support Department
GEM	Genetically Engineered Materials
GSPC	Global Strategy for Plant Convention
IARC	International Agricultural Research Centre
IBCs	Institutional Biosafety Committees
ICGEB	International Centre for Genetic Engineering and Biotechnology
IK	Indigenous Knowledge
IPLCs	Indigenous Peoples and Local Communities
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IUCN	International Union for the Conservation of Nature
LMO	Living Modified Organism
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
MDAs	Ministries, Departments and Agencies
MEMD	Ministry of Energy and Mineral Development
MoES	Ministry of Education and Sports
MFPED	Ministry of Finance Planning and Economic Development
MoGLSD	Ministry of Gender Labour and Social Development
MoH	Ministry of Health
MTAs	Multilateral Trade Agreements
MTIC	Ministry of Trade Industry and Cooperatives
MTWA	Ministry of Tourism Wildlife and Antiquities
MWE	Ministry of Water and Environment
NaCRRI	National Crop Resources Research Institute
NaFIRRI	National Fisheries Resources Research institute
NARIs	National Agbicultural Research Institutes
NARO	National Agricultural Research Organisation
NARS	National Agricultural Research Systems
NBC	National Biosafety Committee
NBIL	National Biodiversity Information Landscape
NBSAP	National Biodiversity Strategy and Action Plan
NDA	National Drug Authority
NDP	National Development Plan
NEMA	National Environment Management Authority
NFA	National Forestry Authority
NISM	National Information Sharing Mechanism
NLU	National Library of Uganda
NPA	National Planning Authority
OECD	Organization for Economic Co-operation and Development

OPM	Office of the Prime Minister
PA	Protected Areas
PEA	Political Economy Analysis
PGR	Plant Genetic Resources
PGRFA	Plant Genetic Resources for Food and Agriculture
PPDA	Public Procurement and Disposal of Assets
REDD+	Reduced Emissions from Deforestation and forest Degradation (plus)
SEA	Strategic Environmental Assessment
TK	Traditional Knowledge
UBIC	Uganda Biosciences Information Centre
UBTF	Uganda Biodiversity Trust Fund
UCDA	Uganda Coffee Development Authority
UEPB	Uganda Export Promotion Board
UGGDS	Uganda Green Growth Development Strategy
UNBS	Uganda National Bureau of Standards
UNCC	Uganda National Cultural Centre
UNCST	Uganda National Council for Science and Technology
UWA	Uganda Wildlife Authority
UWEC	Uganda Wildlife Education Centre
WCS	Wildlife Conservation Society
WMD	Wetland Management Department
WQMD	Water Quality Monitoring Department
WRMD	Water Resources Management Directorate

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EXECUTIVE SUMMARY

Uganda's Sixth National Report provides information on the progress Uganda is making in implementing the national targets in the Second National Biodiversity Action Plan (NBSAPII) and the Strategic Plan for Biodiversity 2011-2020, particularly for the timeline between the fifth National Report and the Sixth National Report. The report evaluated the effectiveness of the measures taken; identified lessons learned; technical, scientific and capacity needs as well as needs for implementation support for comprehensive biodiversity conservation and management in the country. Uganda's first five national reports were produced in 1998, 2001, 2006, 2009, and 2014. The sixth national report produced in 2019 comes three years into the implementation of NBSAP II and one year before the end of the timeline for the Strategic Plan for Biodiversity 2011-2020.

The sixth national report was designed as both an ex-post and an ex-ante evaluation. In addition to reviewing the period since the last National Report in 2014, the six national report looks at progress of key targets of forest conservation, wetlands management, carbon storage, land use/ land cover change, and financing for biodiversity conservation among others

The assessment framework comprised literature review, an experts working group to synthesize outputs generated by the consultant, validation of findings and post-validation review. The assessment process was based on stakeholder engagement through inception workshop, review meetings and validation workshops, key informant discussions with experts and data sources, as well as desk reviews.

Figure ES-1: Assessment framework

The report is divided into three parts: Part 1 deals with assessment of progress towards the national biodiversity targets; Part 2 covers evaluation of the effectiveness of measures taken, identification of lessons learned and technical, scientific capacity needs; and Part 3 is on national contribution towards Aichi Biodiversity Targets and the Global Strategy for Plant Conservation (GSPC). The results of the progress on the NBSAP II and Strategic Plan for Biodiversity 2011-2020 are included in this report while spread sheets included separately cover the evaluation of effectiveness, contribution to the Aichi targets and the GSPC.

Part 1 of the report covers the background, information on the targets being pursued at national level, and assessment of progress towards the targets. The assessment of progress was subdivided basing on the seven strategic objectives of the NBSAPII. The targets under each of the strategic objectives and their indicators are the sub-sections of the report. The seven strategic objectives, and thereby sections of the report, are: (i) strengthen stakeholder coordination and frameworks for biodiversity

management; (ii) facilitate and build capacity for research, monitoring and information management; (iii) reduce and manage negative impacts while enhancing positive impacts on biodiversity; (iv) promote the sustainable use and equitable sharing of the costs and benefits of biodiversity; (v) enhance public awareness and education on biodiversity issues among the various stakeholders; (vi) harness modern biotechnology for socioeconomic development with adequate safety measures for human health and the environment; and (vii) promote innovative and sustainable financing mechanisms to support NBSAP implementation.

Strategic objective one: strengthen stakeholder coordination and frameworks for biodiversity management

Progress on integrating biodiversity values into the National Development Plan was determined based on the budget allocations for biodiversity management, level of integration of biodiversity issues into the national, sectoral and local government plans and the implementation of the monitoring and evaluation framework. The direct biodiversity expenditure increased in magnitude of biodiversity expenditure from UGX 51.2 to 145.95 billion between 2005/6 and 2014/15. However, in terms of percentage of the national budget, biodiversity expenditure declined from 1.4% in 2005/6 to 0.9% in 2014/15.

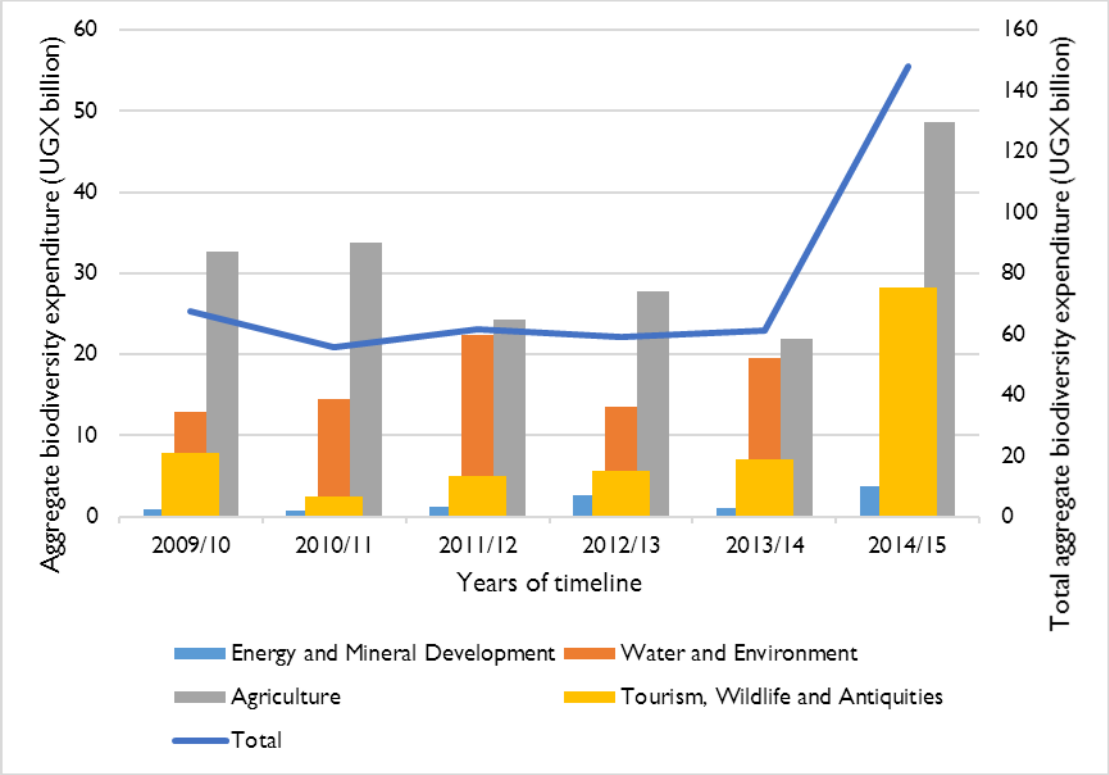

*Figure ES.2: Expenditure on biodiversity management by core Government ministries, FY 2005/6 – 2014/15 (*Source: NEMA et al. 2017b)

The synthesis showed that a lot of the biodiversity related expenditure goes towards policy development and enabling processes at the national level while less was spent on reducing negative impacts and promoting positive ones, sustainable use and equitable sharing, information and awareness, and harness biotechnology. At the sub-national level, the biodiversity investment is quite low, while a lot of the biodiversity-related expenditures are not monitored or evaluated, the only direct biodiversity management grant, is the Poverty Action Fund (PAF) for wetlands management which ranged between UGX 1.0 to 1.29 billion/year between 2014/15 and 2017/18 shared amongst 112

District Local Governments. The National Environment Management Authority (NEMA) is leading the process of developing the monitoring and evaluation framework for the NBSAPII which should be completed by July 2019. Current reporting is based on linking NBSAPII outputs to the national indicators for reporting on progress in implementation of the National Development Plan II and Vision 2040 into which the NBSAPII is fully integrated.

Progress towards facilitating and building capacity for research, monitoring and information management on biodiversity. There was a general but relatively small increase in support for research, monitoring and capacity building for biodiversity, ranging between 10 and 20% of biodiversity expenditure. The highest was in the agriculture sector where expenditure was higher than 20% of the Ministry's expenditures between 2005/6 and 2014/15, and peaked at 32% in 2011/12. For the Tourism, Wildlife and Antiquities sector, expenditure to facilitate research, monitoring and information increased in the first three financial years peaking at over 20% before declining to less than 5%. Support for research, monitoring and information was at less than 2% of all biodiversity expenditure for the Water and Environment sector.

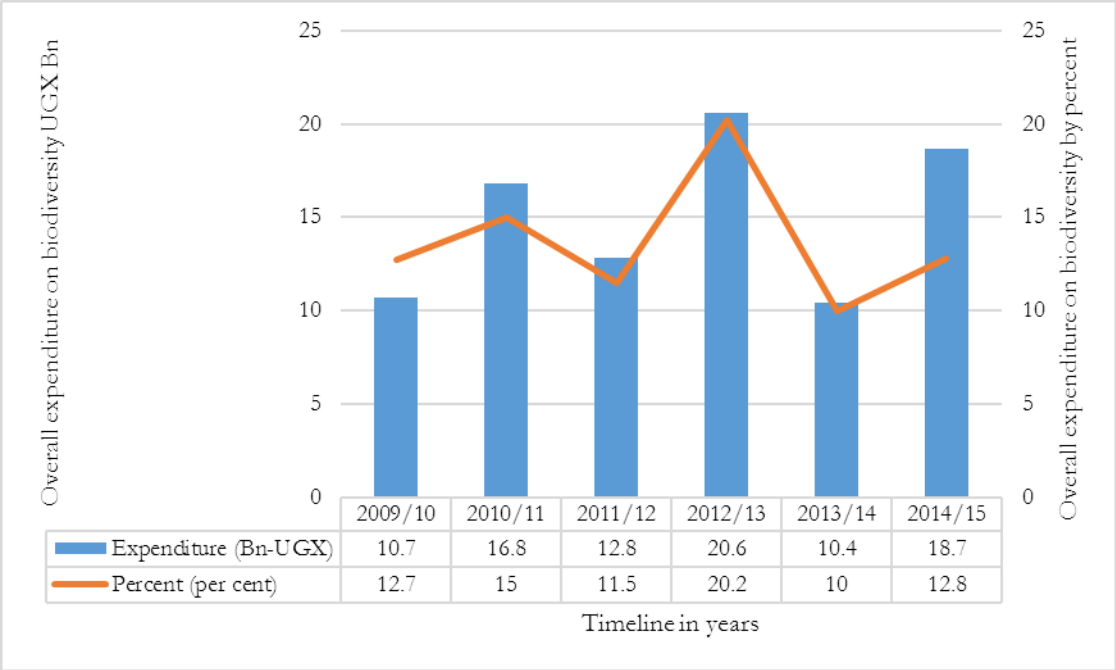

Figure ES.3: Overall trends in investment towards research, monitoring and information
Source adapted from NEMA et al. 2017b

Progress towards partnerships in biodiversity-related research, monitoring and information management. There are about four groupings of research monitoring and information management activity that occur in the country and most have strengthened in the last five years (Agriculture, Biotechnology, Water and Environment, and Financing and Economic Instruments for biodiversity conservation and management). These research groupings are fully or partially formalised through legislation and coordination arrangements. Under the National Agricultural Research System (NARS); the number of national research institutes under the National Agricultural Research Organisation increased from six to seven with the conversion of the Coffee Research Centre at Kituuza in Mukono in 2014, originally under the National Crop Resources Research Institute (NaCCRI) into a full national research institute of NARO. Research activities under the other NARO institutes particularly the National Fisheries Resources Research Institute (NaFIRRI) have strengthened including intensive research activities under the Lake Victoria Environment Management Program (LVEMP), and the Nile Equatorial Susidiary Action Program (NELSAP) one

of the two investment programmes under the Nile Basin Initiative (NBI). The NARS partnerships includes public universities (Makerere University, Gulu University, Busitema University, Muni, Soroti, Lira and Kabale University), private companies (such as Agro-Genetic Technologies, Victoria seeds, East African seeds, FICA seeds and Pearl seeds, among others), farmer Associations include the Uganda National Federation of Farmer Federation (UNFFE), National Union of Coffee Agro-enterprises Farmer Enterprises (NUCAFE), and the National Organic Agriculture Movement of Uganda (NOGAMU), among others, international and regional research organisations such as the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), the Alliance for a Green Revolution in Africa (AGRA), the Consultative Group on International Agricultural Research (CGIAR) through its 15 research centre, The African Agricultural Technology Foundation (AATF), The Forum for Agricultural Research in Africa (FARA) and the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM). Multilateral and such as the World Bank, the European Union, the International Fund for Agricultural Development and the United Nations Food and Agriculture Organisation (FAO) and bilateral partners including the United States Agency for International Development (USAID), the Department for International Development (DFID) of the United Kingdom, and the Japan International Cooperation Agency (JICA), among others.

Biotechnology research in Uganda is also generally centred on agriculture and medical research. Uganda National Council for Science and Technology (UNCST), the Competent Authority for Biosafety in Uganda, has adopted the concept of an annual Biosafety platform for the National Biosafety Committee (NBC), Institutional Biosafety Committees (IBCs), Policy Makers, Media, Civil Society and researchers involved in Gene Technology research. In addition, the Uganda Biotechnology and Biosafety Consortium (UBBC) is a coalition of different stakeholders ranging from policy makers, scientists, private sector leaders, civil society organisation leaders and government officers in their individual capacities as well as stakeholder agencies both public and private united for a common cause of advancing the role of biotechnology in improving livelihoods of the people in Uganda. At the regional and international level strongest opportunities for promoting genetic engineering in Ugandan include the African Biosafety Network of Expertise of the New Partnership for Africa's Development (NEPAD); Program for Biosafety Systems (PBS); International Centre for Genetic Engineering and Biotechnology (ICGEB); and the International Plant Biotechnology Outreach program of the University of Ghent. In addition to the UBBC and Uganda Bioscience Information Centre (UBIC) under NARO.

Since the early 2000s, there has been a flurry of applied research to support water resources management, environmental management and climate change research linked to biodiversity management. For example, in line with National Water Policy (1999) the Government undertook a Water Resources Management Reform (WRM) study from 2003 to 2005. The reform study led to preparation of a WRM reform strategy paradigm shift in WRM from centralised to Catchment/Basin. Since, the initiation of catchment-based integrated water resources management, a number of catchment management plans have been developed. Implementation of catchment-based water resources management is ongoing in the four Water Management Zones (WMZs) and 15 catchments were formally established and are operational. Between 2015 and 2018, the following catchment plans were completed for River Mpanga finalized 2015, River Semliki finalized 2016, River Ruhenzamyenda finalized 2015, Lake Albert finalized 2017 River Kiiha finalized 2017, Kyoga-Awoja finalized in 2013, River Mpologoma finalized 2016, Victoria Nile finalized 2016, Lokere finalized 2017and Lokok finalized 2017. These activities have been implemented with financial support from the Government of Uganda, the World Bank, and the European Union, among others. There is on-going support from NELSAP to develop catchment management plans for Rivers Muzizi,

Nyamwamba and Nkuse catchments. Applied research conducted by the Ministry and Water and Environment (MWE) with support from the United Nations Development Programme (UNDP) and the UN Environment between 2014 and 2017 led to the production of the Uganda Wetlands Atlas Volume I and Volume II.

Between 2015 and 2019, NEMA on behalf of the Government of Uganda implemented a series of applied research activities under the Biodiversity Finance Initiative (BIOFIN). The result were four report outputs; the Biodiversity Policy and Institutional Review (PIR), the Biodiversity Expenditure Review (BER), the Biodiversity Finance Needs Assessment (FNA), and the Biodiversity Finance Plan for Uganda (BFP). The information generated out of the BIOFIN process provides a perspective of biodiversity expenditure for Uganda between 2005/6 and 2014/15. BIOFIN was supported by partnership finance and technical backstopping from the United Nations Development (UNDP), the European Commission (EC), and the Governments of Germany and Switzerland, Norway and the Flanders. The Government is also implementing Natural Capital Accounting (NCA) with support from the United Nations Statistics Division (UNSD), the World Bank –Wealth Accounting and Valuation of Ecosystem Services (WAVES), the UN Environment World Conservation Monitoring Centre (UNEP-WCMC), the UNREDD+ programme and the United Nations Economic Commission for Africa (UNECA).

Strategic objective Two: facilitate and build capacity for research, monitoring and information management

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Progress towards knowledge, research and science base relating to biodiversity has been significantly improved, and relevant technologies have been improved, shared and applied

Uganda's Clearing House Mechanism (https//:chm.nema.go.ug) was launched in December 2013. Support for development of the Clearing House Mechanism (CHM) from GEF through the UN Environment. NEMA coordinated the development of the CHM on behalf of Government of Uganda the Uganda Clearing House Mechanism (UG-CHM) is a web-based portal designed to facilitate information exchange and utilization amongst all stakeholders in Uganda on Biodiversity. The CHM is operational and the Secretariat is located in NEMA.

The National Biodiversity Data Bank (NBDB) was established in 1990 at Makerere University with the aim of having a central repository for biodiversity data and information for Uganda. Since its establishment, a number of datasets have been computerised - mainly species checklists (higher plants, insects, fish, amphibians, reptiles, birds and mammals) and georeferenced occurrence records for these taxa. These data are analysed to produce regular State of Uganda's Biodiversity reports and other biodiversity reports and publications.

Progress towards basic taxonomic information is packaged in user-friendly formats and widely disseminated,

The standard process by which biodiversity information is transformed for use to guide national decision making is to ensure that the biodiversity priorities are highlighted in the national planning process and this continually helps to remind of Government of its commitment. The development of the NBSAPII was aligned to and fully integrated into the NDPII and aligned with the National Vision 2040.

The second route through which taxonomic data and information is used to guide decision making is the environmental regulatory process. Implementing the National Environmental Impact Assessment (EIA) and Environmental Audit and Monitoring Regulations, the Government through NEMA as the

lead regulator, the lead agencies (Ministries, Departments and Agencies – MDAs of Government and District Local Governments rely on taxonomic information to decide whether or not to approve proposed development projects.

To strengthen the flow of biodiversity information, including taxonomic information, Uganda along with Ghana and Mozambique in April 2016 received financial support from the Global Environment Facility (GEF) through the UN Environment World Conservation and Monitoring Centre (UNEP-WCMC) in the Connect Project (Mainstreaming biodiversity into the heart of government decision making). The project objective is to ensure that biodiversity is taken into account in decision making across government sectors by improving development decision makers' access to and use of biodiversity information and embedding biodiversity information within national development decision making processes. The Connect project currently supports attainment of; (i) a clear understanding of the in-country demands for, and the barriers to using, biodiversity information within government decision making including clarifying the format, timing and packaging required; (ii) mobilise and repackage existing biodiversity data and information from a range of sources (national and international) to meet the demands for such information; and (iii) strengthen the connection between government decision makers and biodiversity and ecosystem services data providers in order to sustainably provide policy-relevant, spatially explicit information to meet ongoing national needs. At of preparing the sixth national report Political Economy Analysis (PEA) and the National Biodiversity Information Landscape (NBIL) have been completed and the progress of mobilising and repackage existing biodiversity data and information from a range of sources (national and international) is in progress and information on this will be reported in the next national report.

Regarding freshwater biodiversity, GBIF supported the National Fisheries Resources Research Institute to mobilise and publish fish species occurrences in friendly formats. The project published two datasets, increasing the fish species occurrences available for Uganda through GBIF by >68%. By integrating the data with the IUCN conservation status, better information is now available on where threatened (Vulnerable-VU, Endangered-EN and Critically endangered-CE) and near threatened (NT) fish species of Uganda are located. The efforts to mobilise freshwater biodiversity data and transform it into biodiversity information has been scaled up to cover more taxa such as aquatic macro-invertebrates with support from the JRS Foundation (http://jrsbiodiversity.org/grants/nafirri-2018/).

Progress towards traditional knowledge and practices of indigenous peoples and local communities integrated into biodiversity conservation and sustainable use at all levels

Medicinal plants and food items represent the most inconspicuous form in which traditional knowledge and practices of indigenous peoples and local communities are integrated into biodiversity conservation and sustainable use at all levels. Medicinal plants are of special importance to Uganda because of their wide application in traditional medicine by both the rural and urban population. It is estimated that approximately 80% of Ugandans depend on indigenous medicine. There are various plants associated with medicinal value in Uganda including Moringa, *Aloe vera, Prunus africana, African tulip* and *African tonic* among others (NEMA 2016). Recent ethno botanical research has identified more than 300 plants (trees, shrubs, flowers and weeds) growing wild across the country associated with medicinal value. Some of these crops have gained value in the pharmaceutical industry and are now grown on a commercial value while others are harvested by herbalists at a zero price.

The foundations of traditional knowledge and practices of indigenous peoples and local communities associated with conservation and sustainable use of biodiversity are drawn from the Constitution of

Uganda (2005). The National Culture Policy (2006) provided strategies to enhance the integration of culture into development. These strategies include; advocating for culture, ensuring capacity building, ensuring research and documentation, promoting collaboration with stakeholders and mobilizing resources for culture.

The major progress achieved since the Fifth National Report is the National Medicines Policy (2015) which moves beyond the National Culture Policy and states explicitly policy objective on traditional and complementary medicine under the seeks to maximise the benefits of Traditional and Complementary Medicines (TCM) where possible and desirable and protect the public against their possible negative effects. Justification. Nearly 80% of the populations in Uganda use TCM for their primary health care needs due to its wide availability and accessibility.

Strategic objective Three: Progress towards reducing and managing negative impacts while enhancing positive impacts on biodiversity

Progress towards at least 17% of terrestrial and inland water ecosystems in Uganda are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas for socio-economic benefit of the population

Uganda's protected areas are divided into wildlife protected areas under the mandate of the Uganda Wildlife Authority (UWA), Central Forest Reserves (CFRs) under the mandate of the National Forestry Authority (NFA), and now wetlands under the management of the Ministry of Water and Environment and also covered under the National Environment Act (2017). UWA is mandated to manage the protected wildlife estate comprising 10 National Parks with an area of 11,180 sq. km., 10 wildlife reserves measuring 8,764 sq. km, seven Wildlife Sanctuaries measuring 850 sq. km, and 13 Community Wildlife Areas measuring 27,604 sq. km, making up 14% of the total land area of the country.

The CFRs cover an area equivalent to 6% of total area of the country. Therefore, together the gazetted protected areas of wildlife and the forest reserves cover about 20% of land cover above the 17% target of terrestrial land.

In 2018, the Government embarked on a process of gazetting and declaring some of Uganda's wetland cover as protected areas. The process of gazetting and converting some wetlands to protected areas is expected to be completed in the 2019/20 Financial Year. According to the 2016, Uganda Wetland Atlas Volume II, Uganda's wetlands cover an area of 11% of the land area; seasonal wetlands (7.7%), permanent (3.4%) and swamp forests (<0.1%) (MWE, 2016).

If all wetlands in the country are gazetted and considered protected area as proposed by Cabinet Decision of 16-04-2014, under Minute 114(CT2014), then the area *of* terrestrial and inland water ecosystems in Uganda that are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas for socio-economic benefit of the population is expected to increase to about 28%, (about 3% of the wetlands are already located in wildlife and forest protected areas).

Progress towards ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15% of degraded ecosystems

Carbon storage in Uganda is characterised by biomass and soil organic carbon. The highest storage of for both above ground and soil carbon occurs in the montane areas of Elgon and Rwenzori. For above

ground carbon, the high carbon storage in the montane areas is followed by the storage in a stretch of area along the Eastern border, the Lake Kyoga Basin and south-western Uganda.

A comparison of carbon stock changes for protected areas shows that the area-weighted mean annual carbon changes in PAs of Uganda showed annual carbon loss and gain ranging from −16 t/ha to 13 t/ha, on average. National Parks and Wildlife Reserves gained carbon, while the Central Forest Reserves (CFRs), Local Forest Reserves (LFRs) and Dual Joint Management (DJMs) lost carbon. In terms of numbers of PAs, 63% of the PAs lost carbon and the majority (70%) of these were CFRs. Forest protection in Uganda have primarily been intended for water catchment protection, habitat and biodiversity conservation. The net carbon gain estimated from PAs suggest that PAs are an effective policy tools to reduce carbon emissions. Nevertheless, a large number and size of PAs in Uganda have lost a substantial amount of carbon.

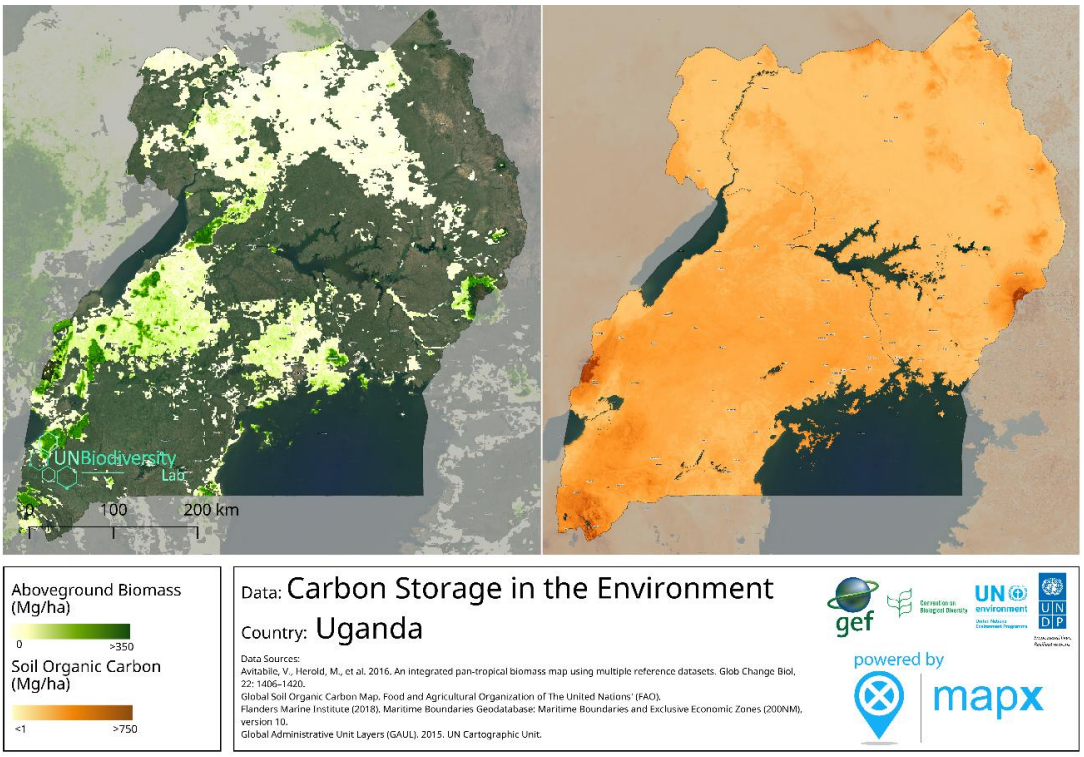


Figure ES-4: Carbon storage potential in the Environment

The restoration efforts in the country have been modest. Between 2011/12 and 2017/18, the Ministry of Water and Environment (MWE) documented restoration of just over 25,000ha of forests and wetlands. Under the Forest Landscape Restoration (FLR) Programme part of contribution to the Bonn challenge, the Ministry of Water and Environment and the International Union for Conservation of Nature (IUCN) identified about 8.08 million hectares for restoration. The restoration opportunity, which extends beyond forests to sustainable management among others, is, 8.08 million ha, larger than the Bonn challenge commitment of 2.5 million hectares restored by 2020.

Table E.S-1: Landscape restoration opportunity for Uganda

Landscape zonation	Deforested land (ha)	Degraded land (ha)	Area for restoration opportunity (ha)
1 Afro-montane	133,613	8,997	691,161
2 Lake Victoria crescent	706,376	205,640	394,491
3 Northern moist	4,553,045	932	2,631,315
4 South East Lake Kyoga flood	193,094	9,002	393,640

plain			
5 Southwest rangeland	1,506,253	347,428	1,154,340
6 Western mid-altitude	1,890,117	554,055	1,039,520
7 Karamoja	684,161	0	1,775,156
Total restoration opportunity			8,079,622

Source: MWE and IUCN 2016

Progress towards the extinction of known threatened species plants and animals inside and outside protected areas has been prevented and their conservation status improved

In protected areas, there was an overall increase in wildlife species that had been previously endangered, although a few others continued to decline. Wildlife populations are steadily building up in National Parks and Wildlife Reserves. Comprehensive surveys to determine the status of wildlife (medium - large mammals) in Uganda's savannah areas were carried out from the air courtesy of the Protected Area Assessment Programme in 1995 – 1996 and the results from these surveys provide baseline information for most protected areas. Populations have increased for some species for instance mountain Gorilla population increased from 292 in 1995 to over 400 in 2015, the Elephant population increased by over 1000% from 550 in 1995 to over 5,000 in 2014, Buffaloes increased from 7,000 in 1995 to over 36,953 in 2014, the Giraffe population increased from 153 individuals in 1995 to about 1064 in 2014 and the Chimpanzee population increased from 3, 300 in 1997 to 5,000 in 2003. However, for certain species such as Burchell's zebra, Hartebeest, Topi and Eland the increase has not been remarkable while Roan antelope and Bright's gazelle have declined.

Progress towards genetic diversity of cultivated plants and domesticated animals including their wild relatives and other socio-economically valuable species conserved

Uganda offers an exceptionally wide range of habitats available for human exploitation (Schoenburn 1998). The indigenous flora contains about 5,000 species of higher plants. By maintaining viable populations of threatened species like Shea butter trees (*Vitellaria paradoxa* subsp *nilotica*) rural communities have been sensitized by emphasizing the income generation aspects through value addition. In communities where land ownership is communal, participatory planning of the in-situ conservation is crucial since decisions taken incorporate cultural values as well as people's livelihood.

For cultivated species, assessment of Crop-species richness (CSR) based on the total numbers of arable, vegetable, tree and forage crops and was expressed as crop species richness, i.e. the total number of natural or cultivated populations of plant species for agricultural purpose per farm, and Crop-cultivar diversity (CCD) calculated as the total number of accessions (cultivars, landraces and 'unknown') divided by CSR per farm showed that in Uganda in situ conservation is the principal means of conserving crop species and genetic diversity.

Between 2011/12 an 2016/17, Uganda's ex situ crop genetic holdings in the National Plant Genetic Resources Centre consists of 5000 accessions from 56 genera, 109 species, in six gene banks. The gene bank ensures that seed placed in storage are of the highest quality and achieve maximum longevity. The seed are occasionally regenerated to ensure their genetic integrity is maintained. The germplasm held is available for different users on request. Since 2008, the Plant Genetic Resource Centre has been implementing community seed banks. The number of community seed banks and related initiatives increased from one in 2008 to four in 2017, with a fifth one established in 2018. The community seed banks were established with technical and financial support from Bioversity International. Community gene banks respond to local needs to access a wide range of diverse seeds and to conserve traditional varieties for future use. The community seed banks have received training in the production of Quality Declared Seed (QDS) and are currently producing QDS of two varieties of beans (Andersen et al. 2017).

Livestock plays an important role in the country's food security and livestock is the main source of proteins. There was a 2.4% increase in the cattle population from 14.03 million in 2015 to 14.37 million in 2016. Cattle, goats and poultry indigenous breeds continue to be dominant over the exotic ones. Conservation of livestock species and genetic diversity is almost entirely in situ. However, the National Livestock Resources Research Institute (NaLIRRI), is mandated to generate and transfer livestock-based technologies, knowledge and innovations on livestock and bees. The National Animal Genetic Resource Centre and Data Bank (NAGRC&DB) carries out research on genetic improvement to enhance productivity for livestock, and maintains a gene bank for livestock in Uganda. In 2016, the Government step up plans to enhance collaboration between NaLIRRI and NAGRC&DB by allowing the NaLIRRI to take over and share some of the farms managed by the latter.

Progress towards the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero to reduce degradation

The area and condition of natural habitats is generally getting worse. Increasingly, natural forests, grasslands and wetlands are being replaced with subsistence agriculture and/or degradation into inferior natural land covers (ES-2). The trends and proportion of degraded and threatened habitats were based on work assessing the future trends of land cover and land use. The highest gains in the land amongst the land use systems were experienced in subsistence agricultural land and protected grasslands, while the highest losses were seen in unprotected grasslands and woodland/forest with low livestock densities. In 2015, agricultural, grassland, and wetland-related land use systems remained the most dominant. Between 1990 and 2015, agricultural and woodland-related land use systems experienced the most significant changes in terms of gains or losses. Agriculture-related land use systems increased by 8.56%, while those related to woodland reduced by 11.86% compared to their original values.

Table ES-2: Changes in the extent of land use systems coverage between 1990 and 2015.

Land use system	**1990**		**2015**	
	Area (km^2)	**% areas (km^2)**	**Area (km^2)**	**% areas (km^2)**
Agricultural land – commercial	517.32	0.209	2587.71	1.06
Agricultural land – irrigated	28.8	0.012	46.08	0.02
Agricultural land subsistence	98,073.36	39.683	107,426.6	44.16
Bushlands – high livestock density	1,389.29	0.562	1,360.66	0.56
Bushlands – low livestock density	111.07	0.045	452.54	0.19
Bushlands – moderate livestock density	2,111.071	0.854	2,642.54	1.09
Bushlands – protected	5,206.78	2.107	7,410.41	3.05
Bushlands – unprotected	5,459.02	2.209	4,236.81	1.74
Grasslands – high livestock density	3,240.07	1.311	6,588.38	2.71
Grasslands - low livestock density	7,398.23	2.993	5,350.85	2.20
Grasslands – moderate livestock density	6,131.7	2.481	6,534.76	2.69
Grasslands - protected	6,648.12	2.690	27,146.2	11.16
Grasslands – unprotected	26,402.33	10.683	6,118.32	2.52
Impediments – protected	9.7	0.004	34.56	0.01
Impediments – unprotected	11.52	0.005	51.9	0.02
Open water	37,130.69	15.024	36,980.77	15.20
Tropical high forest (encroachment) –subsistence	2,186.91	0.885	872.06	0.36
Tropical high forest (encroachment) –subsistence	218,1	0.088	2,420.6	1.00
Tropical high forest (encroachment) –subsistence	6,765.05	2737	942.69	0.39
Tropical high forest (encroachment) –subsistence	2,715.46	1.099	3,199.14	1.32
Urban – settlement	362.1	0.147	1,340.09	0.55
Wetlands – protected	1,963.58	0.795	6,028.29	2.48
Wetlands – with crop farmland activities	217.43	0.088	347.64	0.14
Wetlands – with livestock activities	528.3	0.214	487.72	0.20
Woodland/forest – high livestock density	1,851.1	0.749	685.19	0.28

Woodland/forest – low livestock density	5,481.56	2.218	1,246.91	0.51
Woodland/forest – protected	4,092.06	1.656	6,822.21	2.80
Woodland/forest – unprotected	9,612.57	3.889	867.25	0.36
Woodland/forest – moderate livestock density	11,281.56	4.565	3,024.91	1.24

Source: Majaliwa et al. 2018

Progress towards management plans are in place and implemented for areas under agriculture, aquaculture and forestry

Uganda's farmlands are dominated by subsistence farms (ES-3). Whereas the land under commercial agriculture has increased four-fold from 68,580 to 256,746 hectares, the increase is modest in magnitude when compared to the 2.1 million hectare increased in farmlands between 1990 to 2015. Farmlands increased, from 8.5 to 10.6 million hectares by nearly 25%, and the land under subsistence agriculture also increased by 1.8 million hectares over the same time. Generally, no biodiversity planning occurs on both commercial or subsistence farms.

Table ES-3: Distribution of farming system

Type of farm system	**1990**	**2000**	**2005**	**2010**	**2015**
	Hectares				
Subsistence farms	8,405,204	8,913,924	8,936,378	9,787,587	10,274,975
Largescale farms	68,580	103,370	107,004	134,301	256,746

The trends of agricultural productivity also show that whereas the area under agricultural production has generally increased the agricultural productivity has not increased (UBOS 2018). Uganda's outstanding form of sustainable agriculture practice is organic agriculture. However, organic agriculture represents only 2.6% of the land under agricultural production. Nonetheless, organic agriculture production has been increasing in the country (Table 3.19). The leading organic crops are coffee, cocoa, fruits and vegetables and oil seeds. Wild plants and natural ingredients such as Shea are usually recorded as organic agriculture in Uganda. For the most part organic agriculture is practiced on smallholder farms (Willer and Lernoud eds 2016; 2017; 2018; 2019).

Whereas Uganda has over 506 Central Forest Reserves (CFRs), only one-fifth have active management plans (ES-4). There are on-going efforts to revise the management planning for CFRs in Uganda to enhance biodiversity conservation. CFRs in Uganda fall in two main categories namely those for production and those for protection. *Production* forests which include savannah bushland and grassland areas were gazetted for supply of forest products and future development of industrial plantations. The protection forests include all the Tropical High Forests (THFs), savannah woodlands and/or grasslands that protect watersheds and water catchments, biodiversity, ecosystems and landscapes that are prone to degradation under uncontrolled human use (MWLE 2005; MWE 2016).

Table ES-4: CFR number and areas 2005 and 2015

Description of CFRs	**Number of forests**	**Area of forest in 2005**	**Area of forest in 2015**
CFRs for ecological and biodiversity importance	353	1,073,983	504,391
Other CFRs not specifically designated	45	40,566	
CFRs for industrial plantations	108	151,193	73,000
Total	**506**	**1,195,742**	**577,391**

Source: MWE 2016

Progress towards pollution levels in critical urban ecosystems has been brought to levels that are not detrimental to ecosystem function and biodiversity

One of the indicators considered for pollution is trends in critical urban ecosystems was compliance to E. coli standards. For urban water supplies there was a general improvement in water quality starting in 2007/08. Since 2014/15, the water quality improvement has generally stagnated, although a small

improvement was observed for the water supply to large towns (ES-5). It ought to be noted that the water quality testing showed that the water quality in small urban towns was better than that for the larger urban towns (MWE 2017; 2018).

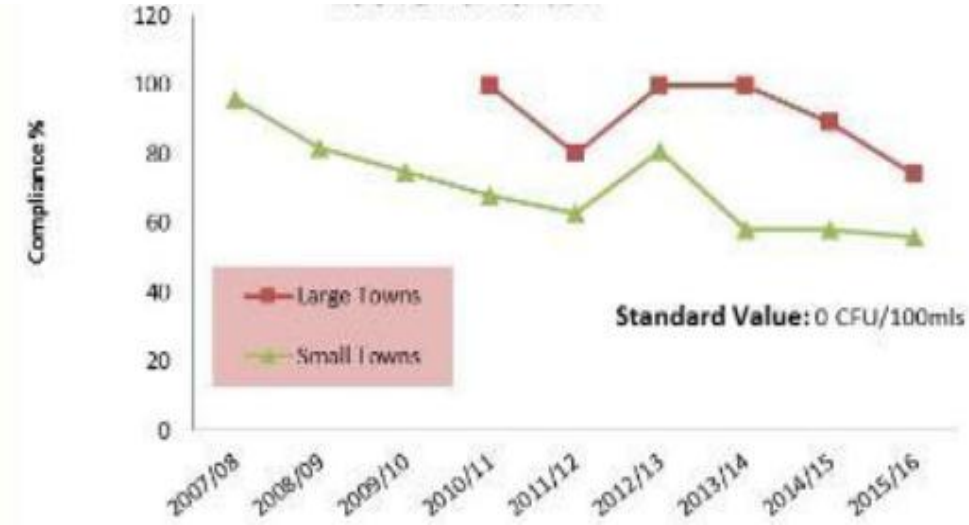


Figure ES-5: Trends of compliance to E. coli in urban drinking water supplies
Source: MWE (2017)

Progress towards invasive alien species harmful to biodiversity, socio-economic development and human health are managed to prevent their introduction and establishment

Compared to other Eastern African countries, Uganda has a relatively high invasive species coverage. Only Rwanda was considered to have a higher coverage of invasive species based on the sampling conducted (Witt et al. 2018).

Table ES-5 Surveys of invasive alien plant species using GIS grids

Country	Total number of grid cells	Number of grid cells surveyed	% of country & region surveyed
Kenya	201	129	64.0
Rwanda	13	12	93.3
Tanzania	344	169	49.1
Uganda	90	67	74.4
Total	**1063**	**522**	**49.1**

Source: Witt et al. 2018

Invasive alien species (IAS) as a priority concern for PA management. IAs are affecting habitats in Queen Elizabeth Conservation Area (QECA), Lake Mburo National Park (LMNP), Kidepo Valley Conservation Area (KVCA), Murchison Falls Conservation Area (MFCA), and nearly half of all National Parks (USAID ETOA 2015). National Agricultural Research Organization (NARO), in a study about removing barriers to effective invasive plant management under Aichi Target 9, identified invasive species of concern that need urgent control (ES-6).

Table ES-6: List of invasive species of national concern for urgent control

Species/Name	Remarks
Plants	
Black wattle	Source of timber woodchips, firewood and its tan is used in leather industry as well as building materials
Paper mulberry	Concern in Budongo and Mabira CFRs

Species/Name	Remarks
Plants	
Calliandra	Used in agroforestry for fodder and firewood, possible to contain
Kariba weed; (*Salvinia Molesta)*	Flooring on lakes, fern used as an ornamental, spread quickly and chokes fisheries resources
Water lettuce;	Biological control needed
Water hyacinth	Water weed affecting fisheries and other organisms, eradication, not feasible
Lantana camara	Common in fallow land and thickets and PAs (QENP and LMNP) reduces biodiversity and eradication impossible
Acacia hockii	Common in south-western Uganda, in rangelands and PAs- LMNP, MFNP and QENP. Displaces native species that are palatable to wildlife and livestock, difficult to eradicate
Stiga	Weed on agricultural land-lowers crop yields, poisonous and unpalatable to wildlife, present in QENP
Sensitive plant	Common along riverbanks and lake shores, it covers other vegetation and hampers movement
Lemon grass (*cympogon nardus*)	Common in rangelands-unpalatable to livestock and wildlife, common in Rakai district and Lake Mburo National Park.
Insect species	
• Cypress aphid Cinara cupressi	Pest attacks cypress trees. At the height of attack in 1995 on average 60% of the trees were under damage category 3 (26- 60%). • Following release of P. juniperorum 1995-1996, damage dropped to category 2(11-25%) in 1999 and category 1(0-10%) in release sites in 2006.
Pine woolly aphid	Before release of Tetraphleps raoi most of trees in woolliness category 1 (woolly spots<=10% adjacent spots touching) • After release most trees >95% in woolliness category 0 (no wool spots) in release sites and adjacent • Redistributing in other sites
Blue Gum Chalcid	Currently major problem • Present in all agro ecological zones but absent in Kabale district – Highland and cold. • Hill top areas of Mbale and Sironko districts-mild attacks • Most clones showing resistance. GU clones showing more resistance at seedling level. GC Clones 784, 540, and 514 showing susceptibility in that order at clonal hedge (mother garden).

Source: NEMA 2014

Control of water hyacinth is through manual, mechanical and biological control. Like water hyacinth, the Kariba weed can also be controlled through Manual, mechanical, biological and chemical methods. The manual removal method involves physical removal of the weed using hand tools like rakes and wheelbarrows with the help of protective gear. The Government still lacks the adequate human and machinery capacity to address the challenges posed by the Kariba weed. MWE in collaboration with the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and Office the Prime Minister has developed a costed action plan in form of immediate, short term and long-term strategies to combat the weed. The major constraint are financial resources and resource mobilization to implement the action (UGX 7,554 billion) is on-going.

Progress towards the impacts of fisheries activities on fish stocks, species and ecosystems are within safe ecological limits

The fishing effort on Lake Victoria was assessed based on the number of fishers, number of boats, number of motorised boats and number of owners of fishing crafts (or boats). Between 2014 and 2016, there was an increase in the fishing effort (MAAIF/DiFR 2017). Between 2000 and 2014, the number of fishers increased by 85% (Nakiyende et al., 2016) but between 2014 and 2016, the increase in number of fishers was marginal at 3.5%. The number of fishing boats increased by 4.1% from 28,239 fishing crafts in 2014 to 29,398 in 2016. The higher increases in number of fishers by 85% while the number of fishing boats increased by approximately 82% between 2000 and 2014 may have

levelled off between 2014 and 2016. However, the fishing effort is still reasonably high and this undermines sustainable management as it is a sign of increasing fishing pressure.

The majority of boats are paddle operated (61.1%), implying that fishing effort is concentrated close to shore; this contributes to localised over-fishing (Ikwaput, 2015). Motorised boats almost exclusively target Nile Perch in deeper waters (Ikwaput, 2015). Illegal fishing nets, which target smaller size of Nile Perch increased dramatically between 2012 and 2014: beach and boat seines increased by 47.3% and monofilament gillnets by 43.9% (Ikwaput, 2015). There has been an overall decline in the annual catch of the 3 commercially important species from 239,000 tonnes in 2005 to 149,000 tonnes in 2015 (Nakiyende et al., 2016). However, across the same period the beach value of the catch increased from 240 billion Ugandan shillings (UGX) to 416 billion UGX (Nakiyende at al., 2016).

Progress towards fish are managed and harvested sustainably, legally, overfishing is avoided and recovery plans and measures are in place for all depleted species

By 2016, the use of illegal gears had continued to persist. Boat/Beach seines had increased but the use of boat seines is on the increase. The use of monofilament nets in 2012 had increase to 15,148 (25%), to 21,818 (44%) in 2014 and further increase to 31,876 (46.1%) in 2016. Cast nets and traps had remained in use despite slight decline in number - 1,334 and 6010 in 2016 respectively (MAAIF/DiFR 2017).

The status of fishing was based on surveys of fish biomass and case studies of three fish species; Nile Perch, daaga, haplochrime cichlids, and *Caridinia nilotic*a (Nyamweya et al. 2017). Surveys indicate that there was a 16.2% increase in Nile perch biomass from 0.851 million tonnes in 2016 to 1.12 million tonnes in 2017. But a reduction of 11% in dagaa biomass between August 2016 and September 2017, adding to the 49% decline in 2015/16. There was an increase of 39% in biomass of haplochromine cichlids and other unidentified species relative to the levels recorded in the November 2016 survey, The biomass of Caridinia nilotica (a fresh water shrimp) decline by 58.5%.

In November 2015, in accordance with section 3, of the Fish Act Cap 197, the President of Uganda formed the Fisheries Protection Force (FPF) to fill the law enforcement gap that had hit the fisheries sector. At the same time the presidential directive also halted the operations of Beach Management Units (BMUs) that were introduced under the National Fisheries Policy (2004). Whereas the operations of the BMUs started well, their low management capacity was blamed for the excessive fishing effort and persistence of illegal fishing practices and gear (Parliament of Uganda 2019).

The new measures introduced include the ban of small boats, that increased the fishing effort, the introduction of standards on number of fishermen per boat, number and types of fishing gear. The enforcement of the standards is by the Fisheries Protection Force. The new standards target fishers who are willing and are able to invest in the proposed improvements, and many of the smaller fishermen now work as porters or have move away from the fish landing sites and sought other livelihoods. The number of fishers has decreased in Kalangala and Buvuma Islands as reported by the District Production officers.

Strategic Objective Four: To promote the sustainable use and equitable sharing of costs and benefits of biodiversity

Progress towards appropriate incentives for biodiversity conservation and sustainable use are in place and applied

Since the late 2000s, there has been an increase in the number of Government initiatives to cancel and/or reverse perverse subsidies that negatively impact on biodiversity and ecosystems. One of the most outstanding reverse of subsidies, was the Cabinet Decision on 16th April 2014 (Minute 114, CT 2014) to approve cancellation of land titles in wetlands on public land acquired unlawfully after 1995, as a measure to address the problem of wetland degradation.

Progress towards at least two partnerships established to ensure that wild harvested plant-based products are sourced sustainably

The most outstanding partnerships established were for the Shea tree and Shea butter processing. Shea butter products are a part of a rapidly increasing market. Shea has become a popular input into chocolate, cosmetics, and natural products. While historically about 90 percent of shea butter was used in chocolates, cosmetics represents a rapidly growing market segment. Uganda exports Shea products to Germany, Japan, Kenya, India, Canada, Middle East, Rwanda, France and Kenya (Business Week 2019). Less than 20% of the shea producers sell their nuts to organizations such as: The Northern Uganda shea Processors' Association - NUSPA) in Lira, Guru Nanak Oil Mills in Lira and CREAM in West Nile (Okullo et al. 2017). Uganda Export Promotions Board (UEPB) has set a target of supporting and enabling shea product producers to have at least 200,000 to 500,000 tonnes of shea nut produced by 2022. UEPB stated the trade targets will be achieved by conserving and stopping the depletion of the shea butter trees, which are largely cut down for charcoal burning (Business Week 2019). In 2015, NEMA supported private sector and District Local Government stakeholders in the Shea Belt of Northern Uganda to develop a "National strategy for the conservation and sustainable use of the threatened Shea butter trees in Uganda". Implementation of the strategy is estimated at a total to cost of US$ 21.65 million over the 10-year period. Implementation of the first five years is estimated at a cost of US$ 12.65 million which is US$ 2.53 million per annum while the last five years (second phase) is estimated to cost US$ 9.0 million which is US$ 1.8 million per annum. Government of Uganda (GoU) and local governments are expected to provide the funds for implementation of the project.

Progress towards a well-established framework for implementing the Multilateral System of accessing and sharing of benefits (ABS) arising from access to PGR in place

Uganda is a Party to the CBD and its Protocools. Uganda acceded to the Nagoya Protocol in June 2014, ratified the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). Uganda has also put in place national ABS relevant policies and legislation, including an ABS regulation and accompanying guidelines. The legal basis for both, the Regulations and the Guidelines, derived from the National Environment Act No.5 of 2019 that provided for guidelines and measures "for the sustainable management and utilization of the genetic resources". Other supporting legislations, with indirect or case-to-case relevance to ABS, are the Uganda Wildlife Act Cap 200, the Land Act Cap 227 and the Science and Technology Act Cap 209.

The regulatory pillar is the 2005 National Environment (ABS) Regulations, which not only recognizes the UNCST as the competent national authority (CNA) but also prescribes the procedure in accessing genetic resources for scientific research, commercial purposes, bioprospecting, conservation or industrial application. It further provides for the sharing of benefits derived from utilization genetic resources. The regulations promote sustainable management and utilization of genetic resources.

Progress towards the Nagoya Protocol on Access to Genetic Resources and Benefit Sharing in force

The National Environment (Access to Genetic Resources and Benefit-Sharing) Regulations was formulated in 2005 before the Nagoya Protocol was adopted. The object of the regulations is to: (a)

prescribe the procedure for access to genetic resources for scientific research, commercial purposes, bioprospecting, conservation or industrial application; (b) provide for the sharing of benefits derived from genetic resources, and (c) to promote the sustainable management and utilisation of genetic resources, thereby contributing to the conservation of the biological resources of Uganda. Uganda of Uganda has prioritized institutional capacity strengthening for implementing the Nagoya Protocol on Access to Genetic Resources and Benefit Sharing for support by GEF in the sixth replenishment window.

Strategic Objective Five: To enhance public awareness and education on biodiversity issues among the various stakeholders

Progress towards people are aware of the meaning and values of biodiversity and the steps they can take to use it sustainably

There are an increasing number of platforms for awareness creation and decision making on biodiversity management in the country. Since 2014, the Cabinet has made decisions on restoration of wetlands based on information gain from the development of wetlands atlases and reporting loss of wetland ecosystem services in the urban areas of the Greater Kampala Metropolitan Area. In 2017, the Government of Uganda developed the Green Growth Development Strategy (UGGDS) in which biodiversity was articulated as part of natural capital management, agriculture and green cities as three of the five cores strategies of the strategy. In 2019, Government passed the revised National Environment Act No. 5 of 2019

With support from UNEP-WCMC, the World Bank and the United Nations Statistics Division (UNSD), the Government of Uganda is actively integrating Natural Capital Accounting (NCA) into the System of National Accounts (SNA), and into the macroeconomic indicators. The NCA approach in addition to carrying forward the UGGDS, also seeks to ensure that natural wealth of the country is managed sustainably including investments to counter depletion of natural capital and investment in sustainable use and management.

Progress towards at the latest, students and teaching staff are aware of the values of biodiversity

The three areas of progress achieved are; implementation and reports from the Biodiversity Finance Initiative (BIOFIN); introduction of educational programmes which have integrated values of biodiversity conservation and integration of valuation of biodiversity into the process of implementing Environmental Social Impact Assessment (ESIA). The BIOFIN project introduced four new reports; the Policy and Institutional Review (PIR), Biodiversity Expenditure Review (BER), the Finance Needs Assessment (FNA) and the Biodiversity Finance Plan (BFP). The four reports explore and describe the value of biodiversity to the national economy and livelihoods.

Busitema University, a public University, offers a degree programme in Natural Resources Economics. The first graduates of the programme started joining the labour market in 2013 and the numbers have continued to increase in the labour market. Makerere University College of Agriculture and Environmental Sciences (CAES) has three masters' programmes that have been reviewed and/or revised to include better articulation of the value of biodiversity. They are Master of Science in Agricultural and Applied Economics (Reviewed); Master of Science in Environment and Natural Resources (Revised and approved); and the Master of Science in Forestry and Biodiversity Management (Revised and approved). Makerere University is also in the process of developing a new MSc. Natural Resource Economics programme. In new the National Environment Act No. 5 of 2019 consideration for integration of values of biodiversity have been strengthened. Biodiversity Offsets and Payment for Ecosystem services are included in the new Act.

Progress towards international cooperation and networking is effective enough to enhance communication of the value of biodiversity conservation and sustainable use

Ugandans actively participates in regional and global fora on biodiversity conservation. Uganda's participation in the international and regional fora is largely based on the focal points and the national institutions they represent. The national institutions with focal points for the CBD include; the National Environment Management Authority (NEMA), the Ministry of Finance Planning and Economic Development (MFPED), Makerere University, Uganda Wildlife Authority (UWA), Uganda National Council of Science and Technology (UNCST) and the National Agricultural Research Organisation (NARO). Uganda actively participates in international conventions and protocols on ABS (the Nagoya Protocol) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), and the Nagoya – Kuala Lumpur Supplementary Protocol to the Cartagena Protocol on Biosafety, among others.

Strategic Objective Six: To harness modern biotechnology for socio-economic development with adequate safety measures for human health and the environment

Progress towards public awareness, education and participation in biotechnology and biosafety are enhanced

Uganda passed the biotechnology and Biosafety policy in 2008, as a commitment to the Cartagena Protocol on Biosafety which was ratified on 30th November 2008. Uganda established the National Biosafety Committee (NBC) in 1996. The NBC provides an institutional framework to carefully manage the generation, development and application of biotechnologies because they biosafety implications. This means that the process and final products are safe for human consumption and the environment. Through the NBC, UNCST registers and permits confined field studies and ensures adherence to the guidelines and safety to humans and the environment. Since 2016, UNCST, the competent authority for biosafety in Uganda, adopted the concept of an annual Biosafety platform for the NBC, Institutional Biosafety Committees (IBCs), policy makers, media, civil society and researchers involved in genetic research. Participants convene to discuss scientific advances and biosafety regulations and their implications in Gene technology research developments in Uganda. The first Biosafety Forum (2016) took place between (February 1-2, 2016) in Kampala and has been held annually ever since.

Progress towards national capacity for biotechnology applications and use is adequate

Uganda has steadily built a human resource base that is actively engaged in biotechnology research and development. Currently, there are 24 PhD-level scientists, 50 MSc-level scientists, and more than 70 personnel with bachelor degrees or diploma certificate level training (Zawedde et al. 2018).

Several physical structures exist and/or have been improved for genomics (4 labs), tissue culture (7 facilities) and plant transformation (2 labs), microbiology and immunology (>10 labs), biochemical assay, and contained and confined testing facilities that follow established testing guidelines (3 sites). Biotechnology infrastructure and human capacity investments have supported the initiation and implementation of a number of active research programs focused on developing potential products that will meet Uganda's specific needs. Various biotechnology R&D activities using a number of tools are on-going for crop and livestock improvement as well as fisheries development. While Uganda has built critical capacity for research on modern biotechnology, other areas such as management support structures-intellectual property policy, resource planning, and quality assurance need attention.

Progress towards the national biotechnology and biosafety law in place

In November 2018 Parliament passed the Genetic Engineering Regulatory Bill 2018. The Bill is awaiting assent of the President. The Genetic Engineering Regulatory Bill 2018 provides for considerable capacity development needs for regulation of living modified organisms (LMOs).

Progress towards the Nagoya–Kuala Lumpur Supplementary Protocol on Liability and Redress under the Cartagena Protocol on Biosafety in operation and implemented

The Nagoya – Kuala Lumpur Supplementary Protocol to the Cartagena Protocol on Biosafety was adopted by the Conference of the Parties serving as the meeting of the Parties to the Cartagena Protocol on Biosafety on 15 October 2010. In accordance with its Article 17, the Supplementary Protocol was opened for signature on 7 March 2011 at the United Nations Headquarters in New York by Parties to the Cartagena Protocol on Biosafety. Uganda acceded to Supplementary Protocol in June 2014. Uganda is in advanced stages of establishing an institutional and operating framework for the Nagoya – Kuala Lumpur Supplementary Protocol to the Cartagena Protocol on Biosafety.

Progress towards widespread application and use of biotechnology and its products for national development

Since research and development of genetically engineered (GE) crops in Uganda was initiated in 2003, there has been strong progress. By 2018, the country had 17 approved field experiments for GE plants. The most outstanding application of biotechnology for national development includes; tissue culture is one of the most widely accepted plant biotechnology in the country; artificial insemination (AI) for livestock. Although availability of improved breeding services is key to sustained dairy development, access to AI in Uganda is reportedly low (Mugisha et al. 2014); there is wide use of gene discovery and characterisation in Uganda, examples include genome-wide characterization of selection signatures and runs of homozygosity in Ugandan goat breeds (Onzima et al. 2018) and selection of superior sesame lines based on genetic and phenotypic characterisation for Uganda (Okello-Anyanga et al. 2017); market assisted breed (MAB) is being used to improve the efficiency of breeding; in medical and health care applications, more than 250 biotech healthcare products, 400 biotech drugs are under clinical trial in Uganda. They include tests for HIV, cancer and malaria which are safer and more accurate (Afedraru 2018); and sex reversal techniques are actively used in aquaculture.

Strategic Objective Seven: Promote innovative and sustainable funding mechanisms to support NBSAP implementation

Progress towards a study is undertaken in respect of CBD Decision X/3 and guidelines for financing biodiversity in Uganda developed

In May 2015, the Government of Uganda through NEMA developed; "Guidelines and action plans for financing biodiversity in Uganda". These guidelines and action plans aim at establishing appropriate guidance to enable mobilization and proper use of financial resources for financing biodiversity conservation in Uganda. In March 2019, Uganda completed the development of its National Biodiversity Finance Plan (NBFP). The *vision* for Uganda's NBFP is *"*sustainable and innovative financing for biodiversity conservation and management attained by 2027/28*".* The *mission* of the NBFP is *"*to mobilise adequate additional resources to meet the biodiversity funding gap as well as ensure that funds are used efficiently and effectively to address the biodiversity and ecosystem challenges in biodiversity and ecosystem conservation and management." The goal of the plan is to achieve "optimal and sustainable financing for biodiversity conservation and management attained by

2027/28." Three objectives complement the goal of the NBFP. The objectives are: (i) to develop and implement a biodiversity and ecosystem index and payments for ecosystem services; (ii) enhance the use of economic instruments as incentives for biodiversity conservation and management; and (iii) scale up innovative biodiversity management and conservation actions that enhance livelihoods and increase national revenue.

The eight finance solutions are: (i) Implementing ecological fiscal transfers: Piloting forest landscape restoration; (ii) A national programme on payments for ecosystem services; (iii) Scaling up bottom-up enforcement for biodiversity and ecosystem management based on community regulatory systems and incentives model; (iv) Develop transport channel for transport and ecotourism for Lubigi wetland system with livelihoods incentives for wetland adjacent communities; (v) Upgrading the value chain for natural ingredient of Shea in Northern Uganda; (vi) Rationalise and implement revised charge systems for biodiversity and ecosystem conservation and management; (vii) A financing model for biodiversity conservation for central forest reserves; and (viii) Standardize and regulate implementation of biodiversity offsets.

Progress towards finance resources for effectively implementing NBSAPII is increased by at least 10% from the current level

In terms of percentage of the national budget, biodiversity expenditure declined from 1.4% in 2005/6 to 0.9% in 2014/15. Even though, the direct biodiversity expenditure increased in magnitude of biodiversity expenditure from UGX 51.2 to 145.95 billion between 2005/6 and 2014/15. Therefore, there is increased need to mobilise additional funds for biodiversity conservation and management.

Progress towards new financing mechanisms are operational and new funding mobilized for biodiversity conservation

There are three new outstanding windows of funding for biodiversity conservation that have emerged since 2014. The Green Climate Fund (GCF) towards wetland restoration and climate change adaptation, the East African Development Bank and KfW (Kreditanstalt für Wiederaufbau) a German Government development fund supported Biodiversity Investment Fund (BIF), and the European Union and other partners support to implementation of the Uganda Green Growth Development Strategy (UGGDS), the Uganda Biodiversity Trust Fund.

Financing mechanisms that have gained additional traction since 2014 include; biodiversity offsets for infrastructure projects as part of environmental compliance. Charge systems for forests, wetlands and other biodiversity related resources at the local Government level are being revitalised, and financing for water resources catchments is being strengthened through additional catchment management plans.

Other National Targets

Progress towards oil exploration and production are being guided by biodiversity friendly regulations

After Uganda discovered commercial volumes of oil and gas in the Albertine Graben, the Government developed the National Oil and Gas Policy (2008) to support coordination of oil and gas exploration and development activities in the country. The policy clearly delineated the importance of biodiversity and environmental management and the role of lead agencies including the National Environment Management Authority (NEMA), Uganda Wildlife Authority (UWA), the National Forestry Authority (NFA), and District Local Governments. In 2013, Government completed the Strategic Environment Assessment (SEA) for the Albertine Graben, Uganda's principal oil and gas production area. The specific risks to manage identified as impacts on water resources, on wildlife resources, on existing livelihoods, settlements, impacts on wetlands and agro-ecosystems.

In 2013, the Government passed two laws to support the oil and gas exploration and development activities in the country. The two laws are The Petroleum (Exploration, Development and Production) Act 2013; and The Petroleum (Refining, Conversion, Transmission and Midstream Storage) Act 2013. The two laws also delineate the roles of lead agencies in ensuring that biodiversity and ecosystem service damage is minimised and commitment that developers will undertake to ensure that environmental impacts are avoided, minimised, mitigated against and residual impacts offset for.

The Government has intensified on environmental compliance through Environmental Social Impact Assessments (ESIAs). Exploratory ESIAs were conducted for the first and second phases of oil and gas exploration between 2009 and 2015. In 2014, the National Environment (Oil Spill Prevention, Control and Management) Regulations was completed. The regulations cover among others; the prevention, control and monitoring of oil spill caused by oil and other harmful or dangerous substances in waters and on land under Ugandan jurisdiction and other matters and the establishment of basic principles to be observed in handling oil and other harmful or dangerous substances in facilities, platforms and vessels in Uganda. Uganda's oil and gas development phase was also initiated through ESIAs for the oil roads, infrastructure and the oil and gas value chain activities including ESIAs for the development phase - Tilenga, East African Crude Oil Pipeline (EACOP) and the Kingfisher Project.

Progress towards the development and use of biofuels are widespread in Uganda to complement hydrocarbon fuel sources

The development of biofuels was premised on the use of biofuels as part of the oil mix for the country, i.e. proportion of hydrocarbon fuel sources substituted by biofuels. The decision on whether to include biofuels into the mix for hydrocarbons fuel has not been made by the Government although it is under consideration.

Progress towards Uganda's biodiversity is reasonably protected from natural disasters

Uganda's National Policy for Disaster Preparedness and Management (2010) is to establish institutions and mechanisms that will reduce the vulnerability of people, livestock, plants and wildlife to disasters in Uganda. Implementation of all disaster activities is coordinated by the Office of the Prime Minister (OPM) in the Government if Uganda. The OPM hires environmental specialists and disaster risk specialists who support the integration of biodiversity values. Disaster preparedness and management in Uganda integrates core agencies for biodiversity management including; the Ministry of Water and Environment (MWE), NEMA, the Ministry of Lands, Housing and Urban Development (MLHUD), the National Forestry Authority (NFA) as part of planning and implementation of disaster strategies.

PART I. ASSESSMENT OF PROGRESS TOWARDS NATIONAL BIODIVERSITY TARGETS

1. INTRODUCTION

1.1 Background

National Reports are the official documents by which Parties report to the Conference of the Parties (COP) on the measures they have taken to implement the Convention in their respective countries, and the effectiveness of these measures in achieving the objectives of the Convention. Article 26 of the Convention states that the objective of national reporting is to provide information on measures taken for the implementation of the Convention and the effectiveness of these measures. An effective system of national reporting assists the COP to:

(i) consider the lessons learned by Parties in the implementation of the Convention;
(ii) identify gaps in capacity for policy research and analysis at the national, regional and global levels, including technical and financial requirements; and
(iii) formulate appropriate requests and guidance to Parties and to its subsidiary bodies, the Secretariat, the financial mechanism, and other organizations with expertise relevant to the implementation of the Convention.

Public availability of national reports assists relevant actors including (e.g. intergovernmental agencies, specialist non-governmental organizations and scientific bodies), to formulate focused strategies and programmes to assist Parties, individually or collectively, with implementation. This also assists individual Parties or groups of Parties to identify common issues to be addressed, thus facilitating the development of cost-effective and mutually-supportive regional initiatives for implementation (CBD website 2018).

Uganda has produced five national reports in 1998, 2001, 2006, 2009, and 2014 for the first, second, third, fourth and fifth national report. At the time of the first National Report in 1998, Uganda had not yet prepared its first National Biodiversity Strategy and Action Plan (NBSAP). Therefore, the national report served as the "interim NBSAP". The first national report had eight sections; the introduction, background information, national biodiversity strategy, collaborative and partnership, identification, monitoring and evaluation, sharing national experiences and measures to fulfil other requirements of the CBD. The measures proposed composed enhancement of protected areas (PAs), adoption and promotion of ex-situ conservation measures (Article 9), impact assessment and minimising of impacts (Article 14), access and transfer of technology (Article 16).

Part 1 of the report deals with status, trends, threats and implications of biodiversity loss consist of introduction, status trends, and threats to biodiversity, and implication of biodiversity loss to human well-being. Part II is on implementation of the National Biodiversity Strategy and Action Plan (NBSAP) comprising of the introduction, updating of the NBSAP and mainstreaming, implementation of NBSAP and CBD, and Part III deals with progress towards the Aichi Targets and the Sustainable Development Goals (SDGs).

Uganda has produced two NBSAPs in 2002 and 2016. The first NBSAP had five strategic objectives covering; (i) coordination frameworks for biodiversity management, (ii) research, information

management and exchange, (iii) reduce and manage negative impacts on biodiversity, (iv) promote the sustainable use and a fair sharing of costs and benefits of biodiversity, and (v) enhance awareness on biodiversity issues among the various stakeholders.

The second NBSAP, on the other hand, adopted seven strategic objectives of; (i) strengthening stakeholder coordination and frameworks for biodiversity management, (ii) to facilitate and enhance capacity for research, monitoring, information management and exchange on biodiversity; (iii) to put in place measures to reduce and manage negative impacts on biodiversity; (iv) to promote the sustainable and equitable sharing of costs and benefits of biodiversity; (v) to enhance awareness and education on biodiversity issues among the various stakeholder; (vi) to harness modern biotechnology for socio-economic development with adequate safety measures for human health and the environment; and, (vii) to promote innovative sustainable funding mechanisms for implementation of NBSAPII.

1.2 Objectives and tasks of the Sixth National Report

The overall objective of the assignment is to prepare the sixth national report to the Convention on Biological Diversity (CBD) for Uganda. Preparation of the sixth national report is based in the country's obligations as a Party to the Convention, under Article 26 of the CBD, which requires parties to submit periodic national reports to the COP that assess measures taken to implement the CBD and effectiveness of these actions in meeting the convention's objectives. The purpose of the sixth national report is to provide information that allows for:

(a) The assessment of progress towards each national biodiversity target established in line with the Strategic Plan for Biodiversity 2011-2020;
(b) An evaluation of the effectiveness of the measures taken, the identification of lessons learned, and of technical, scientific and capacity needs, as well as needs for implementation support; and
(c) A description of the national contribution towards the achievement of the Aichi Biodiversity Targets and the targets of the Global Strategy for Plant Conservation.

The following tasks were undertaken during the development of the sixth national report for Uganda

i) assessing progress towards each national biodiversity target in the NBSAP 2015-2025 established in line with the Strategic Plan for Biodiversity 2011-2020 and the relevant Sustainable Development Goals (SDGs) as indicated the NBSAP;
ii) identifying, analysing and presenting spatial biodiversity data including maps showing the status, trends and possible scenarios associated with (i) above;
iii) consulting relevant experts and institutions at the national and global level on specialized data sets especially those associated with essential ecosystem services;
iv) evaluating of the effectiveness of the measures taken, identify lessons learned; identify technical, scientific and capacity needs; identify needs for implementation support;
v) describing the national contribution towards the achievement of the global Aichi Biodiversity Targets and the targets of the Global Strategy for Plant Conservation (GSPC);
vi) identifying and including information on gender considerations (the 2015-2020 Gender Plan of Action, welcomed in decision XII/7 which contains possible actions for Parties to promote gender mainstreaming) as well as the contributions of indigenous peoples and local communities (IPLCs) in the sixth national report;
vii) reviewing the reports prepared under other Conventions and processes and consulting the focal points for these Conventions to contribute to the preparation of the sixth national report;

viii) Consulting relevant stakeholders from Government Ministries, Departments, Agencies as well as Civil Society Organizations, NGOs and representatives of IPLCs;

1.3 Scope

The information from the sixth national reports is primarily for the final review of the implementation of the Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets to be undertaken at the fifteenth meeting of the Conference of the Parties, in 2020, through the fifth edition of the *Global Biodiversity Outlook* and related analyses. Information from the sixth national reports will also be used to inform the development of the follow-up to the Strategic Plan for Biodiversity 2011-2020. In this light, the information presented in the sixth national reports should focus on changes to biodiversity and actions taken since the Strategic Plan for Biodiversity 2011-2020 was adopted, with a particular emphasis on the changes that have occurred since the last national report was submitted. The focus is on highlighting important biodiversity outcomes and the effectiveness of biodiversity policies and legislation as they relate to the Aichi Biodiversity Targets.

1.4 Methods and Tools

The sixth national report was designed as both an ex-post and an ex-ante evaluation. The national report represents a tool for reviewing progress in implementation of the convention at the national level and in particular, implementation of the national biodiversity strategy and action plan (CBD Annex 3 to complement COP Decision XIII/27). The national report also presents an opportunity to reflect on successes and/or obstacles, can be used as an outreach tool and should reflect national circumstances and priorities.

The sixth national report contains seven sections of: information on the targets being pursued at the national level; implementation measures taken, assessment of their effectiveness, associated obstacles and scientific and technical needs to achieve national targets; assessment of progress towards each national target; description of the national contribution to the achievement of each global Aichi Biodiversity Target; description of the national contribution to the achievement of the targets of the Global Strategy for Plant Conservation (completion of this section is optional); Additional information on the contribution of indigenous peoples and local communities to the achievement of the Aichi Biodiversity Targets if not captured in the sections above (completion of this section is optional); and updated biodiversity country profiles.

The assessment framework comprises literature review to clearly understand the information required in relation to the NBSAPII, and the reporting framework proposed. The 6NR reviewed existing reporting on biodiversity conservation and related activities at the sub-national and national level, including reporting on international obligations established and generated information on derived quantitative and qualitative indicators. The assessment process was based on stakeholder engagement through expert reviews at national report development meetings, key informant discussions with experts and data sources, as well as desk reviews.

Figure 1.1: Assessment framework

The first draft report and second draft report were subjected to stakeholder review through submission of comments and presentations and discussions, including collation of new data. The final report was reviewed and validated by stakeholders. It should be noted that the report was provided in two formats, a text format an excel sheet format based on the templates proposed by the CBD secretariat.

2. INFORMATION ON THE TARGETS BEING PURSUED AT THE NATIONAL LEVEL

Uganda's NBSAPII has seven strategic objectives and 33 targets. All national targets, the rationale, level of application, relevance to the Aichi biodiversity targets and relevant websites and sources of information are highlighted in sections 2.1 to 2.8.

2.1 Information on targets pursued under Strategic Objective I of the NBSAP II

The information under strategic objective I comprises targets and planned actions and outputs to mainstream biodiversity issues in the NDP; sectoral, district and local development plans, and putting in place a monitoring and evaluation framework (Table 2.1).

Table 2.1: Strengthen stakeholder coordination and frameworks for biodiversity management

National Target 1	**By 2020, biodiversity values integrated into the National Development Plan, Budget Framework Papers, Ministerial Policy Statements and District Development Plans**
Rationale for the national target	Mainstream biodiversity issues in the NDP, Sectoral, District and Local Development Plans
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	2. By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicator: 1**. Trends in allocation of financial resources to biodiversity conservation and management. **Strategy**: Mainstream biodiversity issues in the NDP, Sectoral and District Development Plans. **Output indicators**: i) Collaboration and information flow among stakeholders improved (NEMA, NPA, Local Governments) ii) A national Biodiversity policy framework in place (NEMA) iii) Stakeholders and stakeholder groups are identified and established (NEMA, MGLSD, Local Governments) iv) Gender disaggregated database of stakeholders (NEMA, MGLSD) v) Number of women and men trained (NEMA) vi) A coordinated mechanism put in place for enhanced information sharing across sectors (NEMA, Academia) vii) Integration of biodiversity issues in the NDP, sectoral and District Development Plans (NEMA) viii) Biodiversity issues planned and budgeted for at National and Local levels (NEMA) ix) Biodiversity issues planned and budgeted for at National and Local levels (NEMA and Local Governments) x) Number of maps produced and disseminated (UWA, NFA)
Key Implementing institutions and websites	**Institutions**: UWA, NFA, NEMA, MGLSD, NPA, Local Governments) **Websites**: http://www.nemaug.go.ug; http://www.nfa.org.ug; http://www.ugandawildlife.org; http://www.npa.ug
National Target 2	**By 2015, NBSAPI reviewed, updated and adopted and being effectively implemented**
Rationale for the national target	Initiate a participatory and inclusive process of implementation.
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	

Main related Aichi Biodiversity Targets	17: By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated NBSAP.
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicator**: Level of integration of biodiversity issues within NDP, sectoral and local government plans with respective budgetary allocations **Strategy**: Review, update and initiate a participatory and inclusive process of implementation of NBSAP **Output indicators** i) Gender-responsive guidelines and budgets in place (MGLSD, NEMA) ii) Number of stakeholders with NBSAPII; and Devise a monitoring and feedback mechanism on NBSAP information on consumption (NEMA) iii) Key issues in NBSAPII mainstreamed and budgeted for in national, sectoral and district plans and programmes; and Equitable and gender responsive budgets and allocation (NEMA, NPA and Local governments) iv) Revise strategies for implementation of NBSAP as appropriate (NEMA)
Key Implementing institutions and websites	**Institutions**: NEMA, NPA and Local governments **Websites**: http://www.nemaug.go.ug; http://www.npa.ug; http://www.molg.go.ug;
National Target 3	**By 2015 an effective Monitoring and Evaluation strategy for the implementation of NBSAP developed and is in operation**
Rationale for the national target	No specific M&E strategy for the NBSAP exists in the country. Poorly coordinated monitoring and reporting of progress on M&E targets and indicators
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	17. By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan (NBSAP)
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicators**: Monitoring and Evaluation Strategy used by stakeholders to report on progress of implementing NBSAPII **Strategy**: Put in place a monitoring and evaluation framework for NBSAP **Output indicators** i) A Monitoring and Evaluation Strategy in place; and Disaggregated data and gender-specific indicators exist as part of M&E (NEMA and MGLSD) ii) Periodic monitoring and evaluation of NBSAPII (NEMA and NPA)
Key Implementing institutions and websites	**Institutions**: NEMA, NPA and MGLSD **Websites**: http://www.nemaug.go.ug; http://www.npa.ug; http://www.mglsd.go.ug;

2.2 Information on targets pursued under Strategic Objective II of the NBSAP II

The information under strategic objective II comprises targets and planned actions and outputs to (Table 2.2); support research in strategic areas of biodiversity conservation and sustainable use, build capacity for information management and exchange in taxonomy and strengthen the role of indigenous peoples and local communities in biodiversity conservation and management, with particular respect to gender considerations.

Table 2.2: Facilitate and build capacity for research, monitoring and information management

National Target 4	**By 2020, knowledge, research and science base relating to biodiversity has been significantly improved, and relevant technologies have been improved, shared and applied**
Rationale for the national target	Support research in strategic areas of biodiversity conservation and sustainable use
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	

Main related Aichi Biodiversity Targets	19. By 2020, 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.
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicator**: Trends in investment and partnerships in biodiversity-related research, monitoring and information management **Strategy**: Support research in strategic areas of biodiversity conservation and sustainable use **Output indicators** i) Industrial development and commercialization of innovations and new biodiversity–based products (UNCST and NEMA) ii) Standards developed for new biodiversity – based products (UNBS, NCRI) iii) Number of research initiatives on underutilized taxa undertaken (Academia and NARO) iv) National biodiversity research agenda (guideline) in place; and Number of functional biodiversity research Institutions with identified priority research areas in biodiversity (UWA, NFA, MAAIF, MEMD, MTWA and MWE) v) Number of Discoveries of valuable natural products; and Number of innovations/ patents made (UNCST and NARO) vi) Infrastructure for biodiversity information management; and Human resource in place (UNCST and NEMA) vii) Number of research grants received; Number of programmes funded; and Level of funding and information exchange on biodiversity achieved (NEMA)
Key Implementing institutions and websites	**Institutions**: UWA, NFA, MAAIF, MEMD, MTWA and MWE **Websites**: http://www.nemaug.go.ug; http://www.nfa.org.ug; http://www.energyand minerals.go.ug; http://www.ugandawildlife.org; http://www.npa.ug; http://www.tourism.go.ug;
National Target 5	**By 2020, basic taxonomic information is packaged in user-friendly formats and widely disseminated, including use of school systems**
Rationale for the national target	Build capacity for information management and exchange in taxonomy
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	19. By 2020, 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
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicators**: - Taxonomic information in appropriate formats deposited in Uganda's Clearing House Mechanism (CHM); and - Taxonomic data and information used to guide decision making **Strategy**: Build capacity for information management and exchange in taxonomy **Output indicators** i) Role of taxonomy in biodiversity conservation well understood in relevant institutions Academia ii) National Agricultural Research Organization (NARO) iii) Number of production sectors beginning to use taxonomic information Academia iv) Mechanisms for taxonomic data acquisition and sharing are in place and being used Academia v) Number of women taxonomists or para-taxonomists trained Academia, NARO vi) Number of kits distributed to women and men Academia vii) Improved taxonomic infrastructure and tools in place in relevant institutions Academia viii) A centre of excellence for taxonomy established Academia ix) Increased number of taxonomists in the country Academia x) Number of women and men graduates employed NEMA.
Key Implementing institutions and websites	Institutions: NARO, NEMA, Academia Websites: http://www.naro.go.ug; http://www.nemaug.go.ug;
National Target 6	**By 2019, traditional knowledge and practices of indigenous peoples and local communities integrated into biodiversity conservation and sustainable use at all levels**

Rationale for the national target	Strengthen the role of indigenous peoples and local communities in biodiversity conservation and management, with particular respect to gender considerations
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	18. By 2020, 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.
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicators: 1**. System(s) in place to document traditional knowledge as a basis for research and development of commercial biodiversity products 2. Traditional knowledge and practices integrated biodiversity conservation and management Strategy: Strengthen the role of indigenous peoples and local communities in biodiversity conservation and management including gender considerations **Output indicators** i) Indigenous knowledge and practices are being widely applied in biodiversity conservation (NCRI and Academia) ii) Number of groups and communities whose IK and TK, respectively, have been integrated during NBSAP implementation (Academia, NCRI, MGLSD and Local governments) iii) Number of sector-based Community Action Plans for biodiversity conservation (NEMA and Local governments) iv) Number of access and benefit sharing arrangements with indigenous and local communities; and Number of MTAs and MOUs signed with local communities, IPLCs, women and women's groups (UNCST)
Key Implementing institutions and websites	**Institutions**: Academia, NCRI, MGLSD and Local governments **Websites**: http://www.mglsd.go.ug; http://www.molg.go.ug; http://www.naccri.go.ug;

2.3 Information on targets pursued under Strategic Objective III of the NBSAP II

The focus of the third strategic objective of the NBSAP II is to (Table 2.3); improve management effectiveness of Protected Areas (PAs), improve and support management of fragile and degraded ecosystems outside PAs, identify and put in place measures for protection of threatened and vulnerable species, improve management of agricultural practices, forests and aquaculture for biodiversity conservation and sustainable use, monitor and support management of pollution and waste in vulnerable ecosystems, put in place eradication and control measures for alien invasive species and introduce appropriate incentives for conservation and sustainable use of biodiversity.

Table 2.3: Reduce and manage negative impacts while enhancing positive impacts on biodiversity

National Target 7	**By 2020, at least 17% of terrestrial and inland water ecosystems in Uganda are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas for socio-economic benefit of the population**
Rationale for the national target	Improve management effectiveness of Protected Areas
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	11. By 2020, at least 17 per cent of terrestrial and inland water areas, 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.
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicator**: 1. Trends in coverage of protected areas; and 2. Trends in the coverage connectivity/corridors of protected areas **Strategy**: Improve management effectiveness of Protected Areas **Output indicators** i) Number of PA management developed and implemented (UWA, NFA, local governments) ii) Number of visitors to protected areas; Tourism revenue generated form protected areas; and -Tourism related infrastructure in place (UWA and NFA) iii) number of wildlife/biodiversity corridors established through community-government dialogue (UWA, NFA and Local Governments) iv) Number of women and men with livelihood improvement initiatives in place; and Trends in revenue shared with communities (UWA, NFA, MGLSD) v) Number of PA networks with well-protected ecosystems, species and genetic resources (UWA, NFA and Local Governments) vi) Number of incidences of human wildlife conflicts in previously vulnerable areas; and Number of human wildlife mitigation initiatives in place (UWA) vii) Number of partnerships with community groups (FSSD)
Key Implementing institutions and websites	**Institutions**: UWA, NFA, MGLSD, Local Governments **Websites**: http://www.nfa.org.ug; http://www.ugandawildlife.org; http://www.mglsd.go.ug; http://www.molg.go.ug;
National Target 8	**By 2020,ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15% of degraded ecosystems**
Rationale for the national target	Improve management of agricultural practices, forests and aquaculture for biodiversity conservation and sustainable use
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	15. By 2020, 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.
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicators**: 1. Status and trends in extent and condition of habitats that provide carbon storage 2. Trends in coverage of protected areas **Strategy**: Implement climate change mitigation and adaptation for biodiversity conservation including disaster risk reduction from climate change impacts **Output indicators** i) Reduced emissions from deforestation; -Reduced emissions from forest degradation; -Conservation of forest carbon stocks; -Sustainable management of forests; -Enhancement of forest carbon stocks; and Improved livelihoods of adjacent communities (NFA, UWA and Local governments) ii) Guidelines developed and Numbers of beneficiaries of REDD+ trained (FSSD) iii) Number of sector policies and plans that have mainstreamed climate change (FSSD) iv) Acreage afforested; and Plant a least 200,000 ha trees annually to contribute to national target in Vision 2040 (FSSD, NFA and Local Governments) v) Wetland areas restored; and Restore at least 11,250 ha annually to contribute to the achievement of the national target in Vision 2040 (WMD, NEMA and Local Governments) vi) Number of Policy makers, technocrats and local communities appreciate the linkage between biodiversity conservation and climate change (FSSD)

	vii) Number of protected areas with buffers; and Area under Buffers (UWA, NFA and Local Governments) viii) Number of fire control mechanisms put in place; and Trends in acreage affected by fires (Local Governments, UWA and NFA) ix) Number of accessions of drought resistant crop varieties in adequate quantities in gene banks/seed banks (NARO)
Key Implementing institutions and websites	**Institutions**: UWA, NFA, NARO and Local Governments **Websites**: http://www.nfa.org.ug; http://www.ugandawildlife.org; http://www.molg.go.ug; http://www.naro.go.ug;
National Target 9	**By 2020, the extinction of known threatened species plants and animals inside and outside protected areas has been prevented and their conservation status improved**
Rationale for the national target	Identify and put in place measures for protection of threatened and vulnerable species
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	12. By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicators**: 1. Trends in abundance of selected species **Strategy**: Identify and implement measures for protection of threatened and vulnerable species **Output indicators** i) Reduction in the number nationally extinct, threatened and vulnerable species; Number of Species Management Plans under implementation; Number of previously extinct species re-introduced (UWA, NEMA, NFA, Local Governments) ii) Number of functional ex situ institutions (NARO) iii) Number of strategies developed and implemented; and Number of women and men participating enforcement measures (Local governments) iv) Deterrent laws in place; Number of points of entry and exit controlled; Number of cases reported and successfully prosecuted; and Number of well trained, motivated, equipped and coordinated law enforcement personnel (UWA and MTWA) v) Number of cases reported and successfully prosecuted; and Number of trophies confiscated at border points (MTWA) vi) Availability of up to date data on wildlife species trends (UWA)
Key Implementing institutions and websites	**Institution**: UWA, NARO, Local government and MTWA **Website**: http://www.ugandawildlife.org; http://www.molg.go.ug; http://www.naro.go.ug; http://www.tourism.go.ug;
National Target 10	By 2020, The genetic diversity of cultivated plants and domesticated animals including their wild relatives and other socio-economically valuable species conserved.
Rationale for the national target	Introduce appropriate incentives for conservation and sustainable use of biodiversity
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	13. By 2020, 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
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicator**: 1. Collection of at least 20% of the genetic diversity of important crops and animals in Uganda together with their wild relatives undertaken and conserved after estimating their baseline; and 2. Trends in genetic diversity of selected species **Strategy**: Put in place measures for protection of genetic diversity cultivated plants and domesticated animals

	Output indicators i) Information on germplasm documented (NARO, MAAIF) ii) Fully functional national and local repositories for plant and animal genetic resources (NARO and MAAIF) iii) Important species and varieties are adequately conserved (NARO and MAAIF) iv) Number of germplasm reintroduced (NARO, MAAIF) v) Genetic resources conservation and management is effective (NARO, MAAIF) vi) Number of local community groups, women, men and youth trained on issue, risks and benefits of genetic diversity (NARO, MAAIF)
Key Implementing institutions and websites	**Institutions**: NARO and MAAIF **Websites**: http://www.ugandawildlife.org; http://www.naro.go.ug;
National Target 11	**By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero to reduce degradation**
Rationale for the national target	Improve and support management of fragile and degraded ecosystems outside PAs
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	5. By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.
Other related Aichi Biodiversity Targets	14. By 2020, 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 vulnerable
Other relevant information	**Key Outcome Indicator**: 1. Restoration programmes for critical fragile and degraded/threatened ecosystems in place and implemented; 2. Trends in proportion of degraded/threatened habitats; and 3. Trends in proportion/coverage of land affected by degradation **Strategy**: Institute and implement measures to stop further loss of natural habitats **Output indicators**: i) Trends in extent of selected forests and wetlands (FSSD, NFA, WMD, NEMA, Local governments) ii) Trends in the proportion of natural habitats converted (NFA, FSSD, NEMA) iii) Trends in primary productivity (Academia) iv) Trends in the proportion of land affected by desertification (Academia and MAAIF) v) Increased awareness of laws and regulations regarding the protection of fragile ecosystems (NEMA and Local governments) vi) Number of policy makers advocating for protection of ecosystems (NEMA, NFA, UWA, WMD, FSSD) vii) Extinction risk trends of habitat dependent species (UWA, NFA and Local governments) viii) Vulnerable areas restored and protected (NEMA, NFA, UWA, WMD and Local governments) ix) Number of cost and benefit sharing mechanisms implemented (NEMA and WMD)
Key Implementing institutions and websites	Institutions: NEMA, NFA, UWA, WMD, FSSD, Local government Websites: http://www.mwe.go.ug; http://www.nfa.org.ug; http://www.ugandawildlife.org; http://www.molg.go.ug;
National Target 12	**By 2020, management plans are in place and implemented for areas under agriculture, aquaculture and forestry**
Rationale for the national target	Improve management of agricultural practices, forests and aquaculture for biodiversity conservation and sustainable use
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	7. By 2020, areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity

Other relevant information	**Key Outcome Indicator**: Trends in area and productivity of agricultural land, forests under sustainable management **Strategy**: Improve management of agricultural practices, and forests for biodiversity conservation and sustainable use **Output indicators**: i) Measures put in place to ensure a win-win situation for agricultural production and biodiversity conservation (NARO, MAAIF and Local governments) ii) Significant increase in area and distribution of agro-forestry practices in the country; and Number of women and men engaged in agroforestry practices (NARO, FSSD, MAAIF and Local Governments) iii) Significant increase in area and distribution of SLM practices in the country (NARO, MAAIF and MGLSD) iv) Mechanisms put in place to protect biodiversity in forests (NFA, FSSD and Local governments) v) Livelihoods initiatives put in place (MTIC, MGLSD and Local Governments) vi) Number of women's enterprises promoted (MGLSD, UEPB and MTIC) vii) Reduced emissions from deforestation; Reduced emissions from forest degradation; and Conservation of forest carbon stocks (NFA and FSSD)
Key Implementing institutions and websites	**Institutions**: MTIC, MGLSD and Local Governments **Websites**: http://www.mtic.go.ug; http://www.mglsd.go.ug; http://www.molg.go.ug;
National Target 13	**By 2020, pollution levels in critical urban ecosystems has been brought to levels that are not detrimental to ecosystem function and biodiversity**
Rationale for the national target	Monitor and support management of pollution and waste in vulnerable ecosystems
Level of application	National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	8. By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity
Other related Aichi Biodiversity Targets	
Other relevant information	Key Outcome Indicators: 1. Pollution standards in place and enforced; 2. Pollution levels due to various anthropogenic practices such agriculture, waste water, oil and gas, development activities are compliant with national and international standards; 3. Trends in water quality in aquatic ecosystems; 4. Trends in sediment transfer rates; and 5. Trends in proportion of wastewater discharged after treatment Strategy: Monitor and support management of pollution levels and waste in vulnerable ecosystems Output indicators i) Trend in pollution levels; Management; and Enhanced capacity (infrastructure, human resources and financial) to detect and manage pollution in place (WQMD, WRMD, Municipalities authorities, and City Authorities) ii) More data is available on the impact of agrochemicals on pollinators (NARO and MAAIF) Effective and efficient options for managing all forms of waste are under implementation; Increased number of waste management/ recycling options being adopted; and Number of new facilities operating (or planned) (NEMA)
Key Implementing institutions and websites	Institutions: NARO, NEMA and MAAIF Websites: http://www.naro.go.ug; http://www.nemaug.go.ug; http://www.agriculture.go.ug;
National Target 14	**By 2020, invasive alien species harmful to biodiversity, socio-economic development and human health are managed to prevent their introduction and establishment**
Rationale for the national target	Put in place eradication and control measures for alien invasive species
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	

Main related Aichi Biodiversity Targets	9. By 2020, 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
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicator**: 1. Management Plans in place to control most threatening invasive alien species; 2. Trends in the economic impacts of selected invasive alien species; and 3. Trends in area covered invasive alien species **Strategy**: Put in place eradication and control measures for alien invasive species **Output indicators**: i) National guidelines on invasive species in place; Adequate measures to contain alien invasive species in vulnerable ecosystems are in place; An inventory of alien invasive species; and Management plans developed and implemented (NARO, NEMA, MAAIF, WMD, NFA and Local governments) ii) Capacity (personnel, equipment and human resource) built for monitoring alien invasive species; and Trends in alien invasive species (NARO, NEMA, MAAIF, NFA and Local Governments)
Key Implementing institutions and websites	**Institutions**: NARO, NEMA, MAAIF, NFA and Local Governments **Websites**: http://www.naro.go.ug; http://www.nemaug.go.ug; http://www.agriculture.go.ug; http://www.nfa.org; http://www.molg.go.ug;
National Target 15	**By 2020, the impacts of fisheries activities on fish stocks, species and ecosystems are within safe ecological limits**
Rationale for the national target	Monitor and support management of pollution and waste in vulnerable ecosystems
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	6. By 2020, 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
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicators**: 1. trends in catch per unit effort; and 2. Trends in area, frequency, or intensity of destructive fishing practices **Output indicators** i) Trends in fish catch; and Measures put in place to control alien fish species (MAAIF) ii) Reduced surface area under Water Hyacinth, congress weed and *Salvinia molesta* (MAAIF and Local Governments) iii) Trends in farmers (women and men) and local community groups engaged in aquaculture; and Trends in catch (MAAIF and Local Governments) iv) All key projects and programmes are subjected to SEA/EIA (NEMA) v) Number of mitigation Measures put in place to restore degraded open water habitats; and Number of alternative livelihood options identified and promoted (MAAIF, MWE and Local Governments) vi) Trends in private sector investment in aquatic biodiversity conservation (MAAIF) vii) Harmonized fisheries legislations and management practices; and Transboundary fisheries management initiatives in place (MAAIF and Local Governments)
Key Implementing institutions and websites	**Institutions**: MAAIF, MWE, NEMA and Local Governments **Websites**: http://www.agriculture.go.ug; http://www.mwe.go.ug; http://www.nemaug.go.ug; http://www.molg.go.ug;
National Target 16	**By 2020, fish are managed and harvested sustainably, legally, overfishing is avoided and recovery plans and measures are in place for all depleted species**
Rationale for the national target	Identify and put in place measures for protection of threatened and vulnerable species
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	

Main related Aichi Biodiversity Targets	6. By 2020, 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
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicators**: 1-Trends in fish stocks; 2-Trends in fish species abundance and diversity; 3-Trends in fish catch rates (Catch per Unit Effort); and 4-Trends in the use of destructive fishing methods and gears **Strategies**: Promote sustainable harvesting of fish and invertebrate stocks **Output indicators** i) Number of fishing community's groups including women and men in landing sites actively participating in fisheries management; and Documentation of gender-differentiated roles (MAAIF and Local Governments) (MAAIF and Local Governments) ii) Number of reported and successfully prosecuted cases; and Trends in fish population structure (MAAIF and Local Governments) iii) Number of reported and successfully prosecuted cases; and Trends in fish population structure (MAAIF, MGLSD and Local governments) iv) Number of community fisheries management plans; and Number of women and men participating in the plan development and implementation; Number of BMUs supported (MAAIF and Local Governments).
Key Implementing institutions and websites	Institutions: MAAIF, MGLSD and Local governments Websites: http://www.agriculture.go.ug; http://www.mglsd.go.ug; http://www.molg.go.ug;

2.4 Information on targets pursued under Strategic Objective IV of the NBSAPII

The fourth strategic objective comprises targets and planned actions and outputs on the benefits of biodiversity conservation and sustainable use that flow back to the local communities, women and men whose livelihoods are affected, and who are often the real stewards of a natural resource (Table 2.4). Access and benefit sharing (ABS)[6] is considered a key instrument to ensure local communities, women and men benefit from the commercialization and use of their natural resources. Institutional structures; increased funding and mechanisms for research and development; and increased awareness are all necessary so that the potential of ABS can be harnessed. These are elaborated in the strategies and action plans outlined below:

Table 2.4: Promote sustainable use and equitable sharing of cost and benefit of biodiversity

National Target 17	**By 2020, appropriate incentives for biodiversity conservation and sustainable use are in place and applied**
Rationale for the national target	Introduce appropriate incentives for conservation and sustainable use of biodiversity
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	3. By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and 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 socioeconomic conditions.
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicator: 1**. Trends in the number and value of incentives, including subsidies, harmful to biodiversity, removed, reformed or phased out

	Strategies: Introduce incentives for conservation and sustainable use of biodiversity **Output indicators** i) Number of economic instruments supporting biodiversity conservation and sustainable use (NEMA) ii) Number of women's alternative strategies identified and promoted; and Number of alternative practices adopted/promoted by women (MGLSD, and Local governments) iii) Effective taxes and other instruments to manage biodiversity are under implementation (MFPED) iv) Green procurement is being widely used to protect biodiversity and its sustainable use (PPDA) v) Number of EIAs completed for policies, programmes and projects (NEMA) vi) Number of EIA processes that include community participation; and Biodiversity accounting reflected national accounting and reporting processes (NEMA and NPA)
Key Implementing institutions and websites	**Institutions**: MGLSD, MFPED and Local governments **Websites**: http://www.mglsd.go.ug; http://www.finance.go.ug; http://www.molg.go.ug;
National Target 18	**By 2020 at least 2 partnerships established to ensure that wild harvested plant-based products are sourced sustainably**
Rationale for the national target	Improve management of agricultural practices, forests and aquaculture for biodiversity conservation and sustainable use
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	13. By 2020, 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
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicator**: Partnerships with the private sector developed **Strategy**: Promote Public Private Partnership (PPP) for sustainable use of biodiversity **Output indicators** i) Evidence of collaborative ventures between the private sector and public institutions (UNCST and NARO) ii) Private sector and local communities engaged in processing for value addition on plant based products (MTIC, UEPB, NEMA and Local governments)
Key Implementing institutions and websites	Institutions: MTIC, UEPB, NEMA UNCST, NARO, and Local governments Websites: http://www.mtic.go.ug; http://www.ugandaexports.go.ug; http://www.nemaug.go.ug; http://www.uncst.go.ug; http://www,naro.go.ug; http://www.molg.go.ug;
National Target 19	**By 2020, a well-established framework for implementing the Multilateral System of accessing and sharing of benefits arising from access to PGR in place**
Rationale for the national target	Promote synergies in the implementation of ITPGRFA, CBD and the Nagoya Protocol on ABS
Level of application	Multilateral
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	13. By 2020, 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
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicators**: A framework in place for sharing the benefits from access to PGR in the country; Documents prepared on indigenous knowledge on PGR for food, agriculture and medicine; and Several community based PGR management initiatives in place. **Strategy**: Promote synergies in the implementation of ITPGRFA, CBD and the Nagoya

	Protocol on ABS **Output indicators**: i) Effective documented mechanisms for sharing benefits from access to PGR put in place and are being implemented (NARO, NEMA and UNCST) ii) Detailed documentation of traditional knowledge, innovations and practices in PGR available (MDAs, Local governments; NARO) iii) Documents on indigenous knowledge distributed to relevant stakeholders (NCRI) iv) Some PGR management activities initiated in some parts of the country (NARO and Local governments
Key Implementing institutions and websites	Institutions: NARO, NCRI, NEMA and UNCST Websites: http://www.naro.go.ug; http://www.pgrc.go.ug; http://www.nemaug.go.ug; http://www.uncst.go.ug;
National Target 20	**By 2016, the Nagoya Protocol on Access to Genetic Resources and Benefit Sharing in force**
Rationale for the national target	Domesticate the Nagoya Protocol on ABS, with particular consideration of social safeguards
Level of application	Multilateral
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	16. By 2015, 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.
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicators**: Improved regulatory framework for ABS in Uganda enforced with involvement of IPLCs **Strategy**: Domesticate the Nagoya Protocol on ABS, with particular consideration of social safeguards **Output indicators** i) Instrument of accession (NEMA) ii) ABS Regulations reviewed incorporating elements of the Nagoya Protocol (NEMA) iii) Number of institutions trained (NEMA) iv) Both bio-prospecting and bio-trade are regulated for the benefit of the local communities (UNCST) v) Joint ownership of patents and other IP rights reserved (UNCST)
Key Implementing institutions and websites	Institutions: NEMA and UNCST Websites: http://www.nemaug.go.ug; http://www.uncst.go.ug;

2.5 Information on targets pursued under Strategic Objective V of the NBSAP II

Comprehensive and targeted communication, education and public awareness (CEPA)/Information, Education and Communication (IEC) strategy is one of the key priorities of NBSAPII. Table 2.5 highlights the targets, actions and outputs planned under the fifth strategic objective of the NBSAP II.

Table 2.5: Enhance public awareness and education on biodiversity issues among the various stakeholders

National Target 21	**By 2020 people are aware of the meaning and values of biodiversity and the steps they can take to use it sustainably**
Rationale for the national target	Develop and implement stakeholder awareness and education programmes on biodiversity and its values
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	**1.** By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.
Other related Aichi Biodiversity Targets	

Other relevant information	**Key Outcome Indicator:** 1. Trends in behavioural change particularly among decision makers and the general public towards biodiversity conservation and sustainable use; and 2. Trends in communication programmes and actions promoting social corporate responsibility **Strategies**: Promote awareness of NBSAPII among key stakeholders Policy makers, professionals, private sector, general public **Output indicators** Number of stakeholders at all levels are aware of NBSAPII (NEMA and Local governments) **Strategies**: Develop stakeholder /public awareness programmes on biodiversity and its values **Output indicators** i) Number and types of IEC materials produced; Number of institutions/ districts where IEC materials disseminated; Responses and feedback from IEC users; and Number of women's organizations/ mechanisms engaged (MGLSD and NEMA) ii) Number of IPLCs and community groups sensitized on biodiversity conservation (Local governments) iii) Regular surveys; Attitude and behavioural change among communities; Increased participation in biodiversity conservation; and Number and type of IEC materials
Key Implementing institutions and websites	Institutions: MGLSD, NEMA and Local governments Websites: http://www.mglsd.go.ug; http://www.nemaug.go.ug; http://www.molg;
National Target 22	**By 2020 at the latest, students and teaching staff are aware of the values of biodiversity**
Rationale for the national target	Mainstream biodiversity into school curricula at all levels
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	**1.** By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicator**: 1. Positive attitude and behavioural change among students and teachers in educational institutions; and 2. Biodiversity integrated into the National School Curriculum **Strategy**: Develop and implement educational programs on biodiversity issues relevant to Uganda **Output indicators**: i) Biodiversity incorporated in school curricula at various levels (NEMA) ii) Biodiversity incorporated in environmental activities in educational institutions at all levels, including clubs and competitions (NEMA) iii) A variety of educational materials developed, produced, accessed, used, and appreciated (NEMA and MGLSD)
Key Implementing institutions and websites	**Institutions**: NEMA and MGLSD **Websites**: http://www.nemaug.go.ug; http://www.mglsd.go.ug;
National Target 23	**By 2020, international cooperation and networking is effective enough to enhance communication of the value of biodiversity conservation and sustainable use**
Rationale for the national target	Participate in regional and international cooperation programs and activities on biological diversity
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	1. By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicator**: 1. Adequate and active participation in regional and global fora by Ugandans **Strategies**: Support equitable participation in regional and international cooperation programs on biological diversity

	Output indicators i) Number of women and men at international conferences and workshops on biodiversity and related areas; -Number of biodiversity regional and international workshops organized and held in Uganda; and -Number of Reports (NEMA) **Strategies**: Mobilize support and financial resources at international level for biodiversity programs **Output indicators** i) Mobilize support and financial resources at international level for biodiversity programs (MFPED, MDAs and Local governments)
Key Implementing institutions and websites	Institutions: MFPED, MDAs, NEMA and Local governments Websites: http://www.finance.go.ug; http://www.nemaug.go.ug; http://www.molg.go.ug;

2.6 Information on targets pursued under Strategic Objective VI of NBSAP II

The targets, actions and outputs included in the sixth objective of the NBSAP II include, among others, assessing national capacities in biotechnology and biosafety, enhancing availability and exchange of information on biotechnology and biosafety, establishing mechanism(s) for continuous human and infrastructural resource capacity development, deployment and retention, a fully functional National Biosafety System, enhancing regulatory performance of the National Biosafety Committee and the Institutional Biosafety Committees, establishing a national repository for plant and animal genetic resources, and promoting research in medical, agricultural, environmental and other areas of biotechnology and Biosafety. The specific targets, actions and outputs are highlighted in Table 2.6.

Table 2.6: Harness modern biotechnology for socioeconomic development with adequate safety measures for human health and the environment

National Target 24	**By 2018, public awareness, education and participation in biotechnology and biosafety are enhanced**
Rationale for the national target	Enhance the availability and exchange of information on Biotechnology and Biosafety
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	19. By 2020, 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
Other related Aichi Biodiversity Targets	
Other relevant information	Key Outcome Indicators: - Increased participation and support of biotechnology by policy makers and the general public Strategies: CEPA strategy implemented for biotechnology and Biosafety Output indicators i) Increased stakeholder involvement in biotechnology and Biosafety practices UNCST, NEMA ii) NARO iii) A National Biosafety Clearing House Mechanism or similar entity in place UNCST iv) Increased number of trained Technical Personnel in biotechnology and Biosafety UNCST v) Balanced and informed reporting by the media on Biotechnology and Biosafety UNCST vi) Increased levels of appreciation on Biotechnology and Biosafety in communities UNCST
Key Implementing institutions and websites	**Institutions**: UNCST and NEMA **Websites**: http://www.uncst.go.ug; http://www.nemaug.go.ug;
National Target 25	**By 2020, national capacity for biotechnology applications and use is adequate**

Rationale for the national target	Establish a strong and effective monitoring system for biotechnology use and application
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	19. By 2020, 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
Other related Aichi Biodiversity Targets	
Other relevant information	Strategies Support capacity building for biotechnology and Biosafety Output indicators i) National capacity for biotechnology and Biosafety assessed UNCST ii) Number of scientists trained in Biotechnology and Biosafety UNCST iii) Accredited Biotechnology and Biosafety infrastructure developed UNCST iv) Adequate tools developed for identification, characterization and conservation of biodiversity UNCST and NARO
Key Implementing institutions and websites	**Institutions**: UNCST **Websites**: http://www.uncst.go.ug
National Target 26	**By 2018, the national biotechnology and biosafety law in place**
Rationale for the national target	Promote integration of biotechnology values into macroeconomic frameworks
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	19. By 2020, 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
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicators**: National Biotechnology and Biosafety Bill 2012 passed into law -National Biosafety Committee effectively supported to perform its functions **Strategies**: Support the passing into law of the Biotechnology and Biosafety Bill 2012 **Output indicators** i) Increased appreciation of biotechnological developments (UNCST) ii) Increased Awareness and knowledge on Biotechnology and Biosafety policy (UNCST) iii) A Biotechnology and Biosafety law in place (UNCST) iv) Stakeholders and the general population develop a positive attitude towards the law (UNCST) v) Guidance on Biosafety compliance in place (UNCST) vi) The NBC and IBCs are adequately remunerated and perform their duties diligently (UNCST) vii) Vibrant public-private partnerships in biotechnology development (UNCST)
Key Implementing institutions and websites	**Institutions**: UNCST **Websites**: http://www.uncst.go.ug
National Target 27	**By 2018, the Nagoya–Kuala Lumpur Supplementary Protocol on Liability and Redress under the Cartagena Protocol on Biosafety in operation and implemented**
Rationale for the national target	Promote integration of biotechnology values into macroeconomic frameworks
Level of application	multilateral
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	19. By 2020, 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
Other related Aichi Biodiversity Targets	
Other relevant information	Key Outcome Indicators: Increased compliance with national and international requirements

	Strategy: Domestic the Nagoya- Kuala Lumpur Supplementary Protocol on liability and redress Output indicators: i) Accession Instruments (NEMA) ii) Increased understanding of ABS issues by the Government and communities (UNCST, NEMA and Local governments) iii) Increased capacity to support scientific research and development in genetic resources (UNCST) iv) The Protocol on Liability and Redress is enforced (UNCST)
Key Implementing institutions and websites	**Institutions**: UNCST, NEMA and Local governments **Websites**: http://www.uncst.go.ug; http://www.nemaug.go.ug; http://www.molg.go.ug;
National Target 28	**By 2020, there is widespread application and use of biotechnology and its products for national development**
Rationale for the national target	Develop and disseminate biotechnology awareness materials
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	19. By 2020, 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.
Other related Aichi Biodiversity Targets	
Other relevant information	Key Outcome Indicator: - Biotechnology applications and use widely accepted by the Ugandan public Strategies: Support biotechnology applications and use for National development Output indicators i) Vibrant biotechnology and Biosafety research applied in the fields of medicine, agriculture and Industry UNCST ii) ESIAs conducted and complied with by developers in biotechnology NEMA iii) A strong monitoring system in place for biotechnology use and applications NEMA iv) Effective mechanisms in place for sharing costs and benefits of biotechnology UNCST v) Biotechnology applications mainstreamed in national macroeconomic programmes NPA
Key Implementing institutions and websites	**Institutions**: UNCST and NEMA **Websites**: http://www.uncst.go.ug; http://www.nemaug.go.ug

2.7 Information on targets pursued under Strategic Objective VII of NBSAP II

Uganda is committed through NBSAPII to mobilise additional resources for biodiversity management. The measures were proposed included (Table 2.7); (i) identifying and seeking funding support from diverse sources including regional and international donor agencies, foundations and, as appropriate, through private-sector involvement, (ii) establishing strategic partnerships with other Parties and other Governments and with various organizations, regional bodies or centres of excellence with a view to pooling resources and/or widening opportunities and possibilities for mobilizing resources from various sources, (iii) identifying and maximising opportunities for technical cooperation with regional and international organizations, institutions and development assistance agencies, and ensuring efficient use of available resources and adopt cost-effective approaches to capacity-building.

Table 2.7: Promote innovative and sustainable financing mechanisms to support NBSAP implementation

National Target 29	**By 2015, a study is undertaken in respect of CBD Decision X/3 and guidelines for**

	financing biodiversity in Uganda developed
Rationale for the national target	Ensure efficient use of available resources and adopt cost-effective approaches to capacity-building
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	20. By 2020, 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.
Other related Aichi Biodiversity Targets	
Other relevant information	Key Outcome Indicator: 1. Guidelines and action plans for financing biodiversity in Uganda developed and implemented; 2. Trends in financial resources mobilized; and 3. Biodiversity Finance Plan for resource mobilization developed and implemented. Strategy: Put in place measures for sustainable biodiversity financing Output indicators i) Study undertaken and information collected to use in the development of guidelines NEMA ii) Guidelines developed NEMA iii) Biodiversity Finance Plan NEMA
Key Implementing institutions and websites	**Institutions**: NEMA **Websites**: http://www.nemaug.go.ug
National Target 30	**By 2017, finance resources for effectively implementing NBSAPII is increased by at least 10% from the current level**
Rationale for the national target	Establish strategic partnerships with other Parties and other Governments and with various organizations, regional bodies or centres of excellence with a view to pooling resources and/or widening opportunities and possibilities for mobilizing resources from various sources
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	20. By 2020, 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.
Other related Aichi Biodiversity Targets	
Other relevant information	Key Outcome Indicator: Trends in National financial resource allocation for biodiversity conservation Strategy: Mobilise financial resources for biodiversity conservation Output indicators i) Increased funding from diverse sources mobilized NEMA ii) Capacity built for writing project proposals NEMA iii) Number of project proposals submitted and Number of projects approved NEMA iv) Mobilize additional resources through partnership with the other Conventions NEMA v) Proportion of funds annually budgeted for by line ministries for biodiversity activities and Gender-responsive allocation for activities NEMA, MDAs and Local governments vi) Biodiversity projects which incorporate aspects of accountability, transparency, gender mainstreaming NEMA
Key Implementing institutions and websites	**Institution:** NEMA, MDAs and Local governments **Websites:** http://www,nemaug.go.ug; http://www.molg.go.ug;
National Target 31	**By 2018, new financing mechanisms are operational and new funding mobilized for biodiversity conservation**
Rationale for the national target	Identify and seek funding support from diverse sources including regional and international donor agencies, foundations and, as appropriate, through private-sector involvement

Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	20. By 2020, 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.
Other related Aichi Biodiversity Targets	
Other relevant information	**Key Outcome Indicators**: - Trends in funding for biodiversity conservation **Strategies**: Promote innovative financing mechanism **Output indicators** i) A policy or regulations in place NEMA ii) Environment bonds issued and bought NEMA iii) Incentives to promote purchase of green goods identified and provided PPDA iv) Pricing mechanisms put in place for biodiversity goods and services MFPED v) The concept of green marathon promoted and supported NEMA vi) Clear mechanisms identified to promote green products and technologies NEMA and NPA vii) Number of sensitization and capacity building undertaken NEMA viii) Increased level of payments for ecosystems services and application of biodiversity offsets NEMA
Key Implementing institutions and websites	Institution: NEMA and NPA Websites: http://www.nemaug.go.ug; http://wwww.npa.ug;

2.8 Information on targets pursued in new and emerging issues

Table 2.8 highlights that oil exploration and production, development and use of biofuels and natural disasters and the impacts of biodiversity. The targets, actions and outputs included in the new and emerging issues for the NBSAP II are highlighted

Table 2.8: Other considerations beyond the strategic objectives

National Target 32	**By 2016, oil exploration and production are being guided by biodiversity friendly regulations**
Rationale for the national target	support ecosystem conservation in oil rich regions of Uganda
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	8. By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity
Other related Aichi Biodiversity Targets	
Other relevant information	Key Outcome Indicator: Biodiversity conservation and ecosystem resilience are being maintained adjacent to oil exploration and production areas Strategies: Support ecosystem conservation in oil rich regions of Uganda Output indicators i) Ensure that all the required standards have been formulated (NEMA) ii) All oil and gas activities are being subjected to EIA and Communities are aware of EIA results (NEMA) iii) Affected degraded ecosystem put under restoration activities and special species are protected (NEMA and UWA) iv) The Atlas is routinely updated (NEMA) v) Awareness and information flow is adequately managed (NEMA) vi) Resources allocated to DEO/MEOs (NEMA) vii) Biodiversity offset trust fund is available for use when needed (NEMA) viii) Translocation to other areas effected where necessary (UWA)

Key Implementing institutions and websites	**Institutions:** NEMA and UWA **Websites**: http://www.nemaug.go.ug; http://www.ugandawildlife.org;
National Target 33	**By 2018, the development and use of biofuels are widespread in Uganda to complement hydrocarbon fuel sources**
Rationale for the national target	Promote sustainable use of biofuels in Uganda
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	7. By 2020, areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity
Other related Aichi Biodiversity Targets	
Other relevant information	Key Outcome Indicator: Proportion of hydrocarbon fuel sources substituted by biofuels Strategies: Promote sustainable use of biofuels in Uganda Output indicators: i) Increased area allocated to biofuel crops NEMA ii) A policy framework in place for production and use of biofuels MEMD iii) Measures in place MAAIF, Local governments iv) Suitable and inappropriate areas for biofuel production identified and mapped NEMA, Local governments v) Most biofuel production areas are subjected to EIAs NEMA, Local governments vi) More research on biofuels being undertaken Academia, and NARO vii) Environmentally-sound technologies have been identified and are being widely used NARO and Academia
Key Implementing institutions and websites	Institutions: NARO and NEMA Website: http://www.naro.go.ug; http://www.nemaug.go.ug
National Target 34	**By 2020, Uganda's biodiversity is reasonably protected from natural disasters**
Rationale for the national target	Minimize the impact of natural disasters on biodiversity
Level of application	National and Sub-National
Relevance of the national targets to the Aichi Biodiversity Targets	
Main related Aichi Biodiversity Targets	14. By 2020, 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 vulnerable
Other related Aichi Biodiversity Targets	15. By 2020, 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
Other relevant information	**Key Outcome Indicator**: Disaster Risk management strategy in place to address potential biodiversity risks and hazards **Strategies**: Minimise the impact of natural disasters on biodiversity **Output indicators** i) Appropriate measures to protect biodiversity in place (OPM) ii) Biodiversity Risk Management Plan in place (OPM) iii) Disaster Preparedness Plan to protect biodiversity mainstreamed in key national, sectoral and district planning frameworks (OPM) iv) Reliable early warning systems put in place for dissemination to stakeholders; and Number of women and men seeking relief services pre/post-disaster (OPM) v) Active participatory valuation and management of ecosystem services in place in disaster prone areas (NEMA) vi) Effective capacity built in the Disaster Reduction and Management Committees at all levels (NEMA)
Key Implementing institutions and websites	**Institutions**: NEMA **Websites**: http://www.nemaug.go.ug

3. ASSESSMENT OF PROGRESS TOWARDS EACH NATIONAL TARGET

3.1 Progress towards strengthening stakeholder co-ordination and frameworks for biodiversity management

3.1.1 Progress towards integrating biodiversity values into National Development Plan, Budget Framework Papers, Ministerial Policy Statements and District Development Plans

The progress towards integrating biodiversity values into the National Development Plan (NDP), Budget Framework Papers (BFPs), Ministerial Policy Statements (MPSs) and District Development Plans (DDPs) by 2020 was based on the trends in allocation of financial resources to biodiversity conservation and management.

3.1.1.1 Biodiversity budget allocations in Uganda 2005/6-2014/15

Biodiversity expenditure in Uganda increased when measured in nominal terms (Figure 3.2). Biodiversity expenditure review (BER) showed that Central Government appropriations for biodiversity increased from UGX 57.2 to 145.95 billion, between FY 2005/6 and 2014/15. Whereas the magnitude of biodiversity expenditure increased in proportionate terms, biodiversity expenditure, a proportion of the national budgetary expenditure decreased from 1.4% in 2005/6 to 0.9% in 2014/15 (NEMA et al. 2017b).

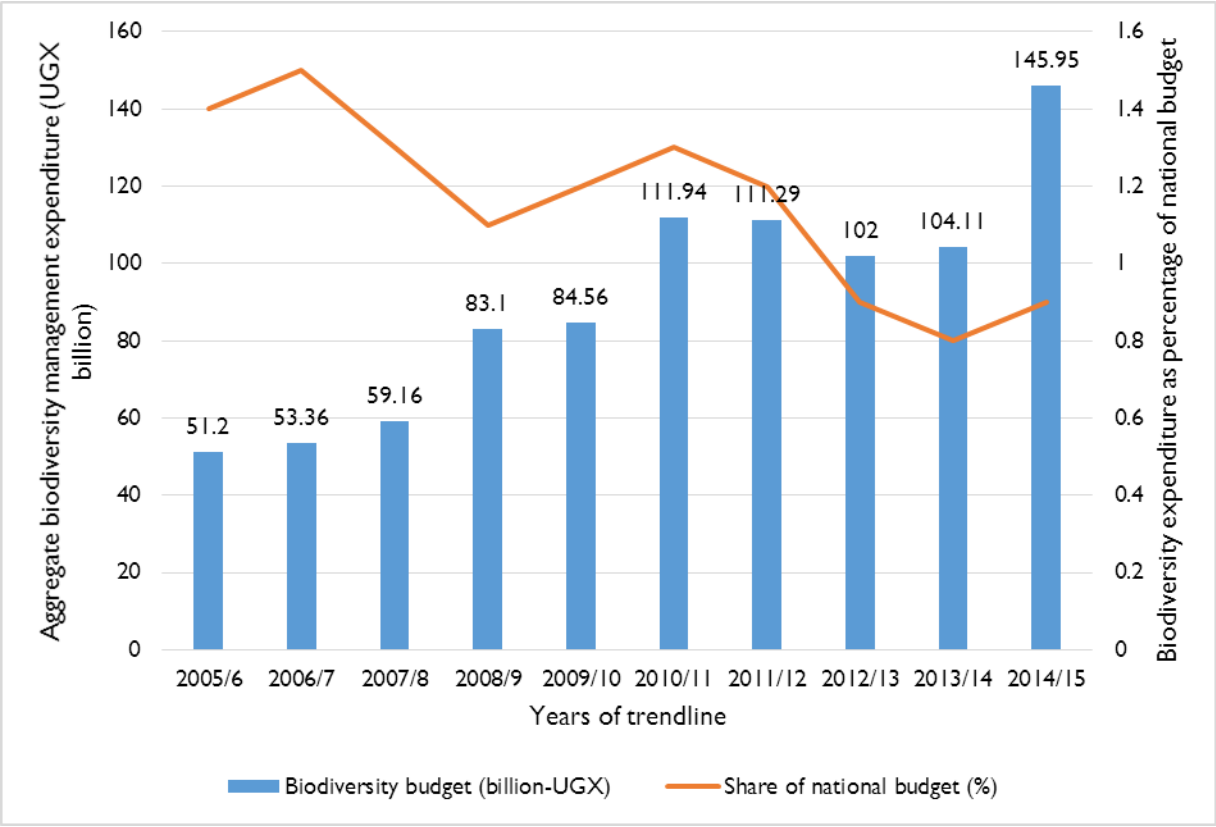


Figure 3.1: Biodiversity expenditure percent of national expenditure FY2005/6 – 2014/15
Source: adapted from NEMA et al. 2017b

Whereas the national budget expanded by 3.82 times between 2005/6 and 2013/14, the expenditure on biodiversity increased by 2.0 times. The decline in biodiversity expenditure is inconsistent with increased government expenditure into energy projects and transport infrastructure, and agricultural expansion, where heavy biodiversity loss occurred and thus restoration, mitigation and offset actions are required.

3.1.2 Level of integration of biodiversity issues within NDP, sectoral and local government plans with respective budgetary allocations

3.1.2.1 Integration into NDP

In terms of NBSAPII integration, the NDPII focused on: i) protecting, restoring, and maintaining the integrity of degraded fragile ecosystems; ii) increasing sustainable use of environment and natural resources; iii) increasing national forest cover and economic productivity of forests; and iv) increasing the national wetland coverage. Furthermore, Government prioritized implementation of the national biodiversity and bio-safety targets in NBSAPII. A key strength of biodiversity implementation at the overarching level is the integrated implementation of the multilateral environmental agreements (MEAs). The NDPII has integrated the biodiversity conservation with sustainable land management (SLM), climate change mitigation and adaptation, and pollution management (Table 3.1).

Table 3.1: Objectives and Interventions

Objective	Interventions
1. Restore and maintain the integrity and functionality of degraded fragile ecosystems.	i. Enforce compliance with environmental and natural resources legislation and standards at all levels. ii. Develop and implement a program on integrated ecosystems assessments. iii. Develop and implement ecosystem management and restoration plans. iv. Restore the degraded fragile ecosystems (river banks, bare hills, range lands and lake shores). v. Promote ecosystem based adaptation to climate change in order to increase the resilience of ecosystems and communities to the impacts of climate change. vi. Promote Payment for Ecosystem Services (PES) and other benefit sharing schemes.
2. Increase the sustainable use of Environment and Natural Resources.	i. Promote value addition to ENR goods and services. ii. Develop a database system for ENR for integration in the national accounting system. iii. Implement the green economy initiatives including integration of environmental sustainability into planning and implementation of development processes. iv. Expand research on economic, ecological and socio-cultural values of ecosystems and biodiversity. v. Promote sound management of hazardous chemicals and e-wastes including the establishment of modern waste management infrastructure. vi. Develop and strengthen national, regional and international partnerships and networks in environmental and natural resources management. vii. Strengthen management of environmental aspects of oil and gas and other finite resources such as water and land. viii. **Implement national biodiversity and bio-safety targets.** ix. Increase public awareness on ENR opportunities, green economy and sustainable consumption and production practices. x. Support the decentralized environment management function at the Local Government level including enforcement of the bye-laws on wild fires.
3. Increase wetland coverage and reduce wetland degradation.	i. Demarcate, restore and gazette wetland eco-systems country wide ii. Develop wetland management plans for equitable utilisation of wetland resources country wide. iii. Expand knowledge base of ecological and socioeconomic value of wetlands among stakeholders. iv. Develop markets for wetland products and services. v. Build the institutional and technical capacity at the centre and Local Governments in wetland management.

Objective	Interventions
	vi. Develop and operationlise legal and governance mechanisms for sustainable wetlands management.
6. Increase afforestation, reforestation, adaptation and mitigate deforestation for sustainable forestry	i. Develop countrywide community based and institutional tree planting initiatives. ii. Promote sustainable development of commercial forest plantations and industry including value addition. iii. Promote implementation of sustainable management of forests through restoration of natural forests on protected and private land iv. Promote forestry research and development. v. Develop markets for forest products and services. vi. Develop a National REDD+ Strategy and costed action plan. vii. Develop a Forest Emissions Reference Level and a Forest Reference Level (FERL/FRL). vii. Develop a robust and functional National Forest Monitoring System (NFMS) for the monitoring and reporting of the REDD+ activities included in the REDD+ Strategy. viii. Promote forestry in urban development planning. ix. Scale up agroforestry-based alternative livelihood systems.

Source: GOU/NPA (2015)

3.1.2.2 Integration into sectoral plans with respective budgetary allocations

Uganda's biodiversity expenditures are concentrated in four sectors of agriculture; water and environment; tourism wildlife and antiquities; energy and mineral development. In Table 3.2 agriculture has the most significance in terms of percent Gross Domestic Product (GDP) contribution for percentage budget expenditure. The energy sector is a multiple and facilitating sector for economic growth, and water is needed for welfare and industrial development (GoU/NPA 2015)

Table 3.2: Budget share and GDP share

Sectors	% GDP	% Budget	%GDP/%Budget
Agriculture	2.4	3.3	7.3
Energy and Mineral Development	2.2	10.4	0.2
Tourism, Wildlife and Antiquities	2.7	0.51	5.2
Water and Environment	2.5	3.1	0.8

Source (MFPED 2016)

Biodiversity investments in the main GDP contributing sectors of agriculture and tourism were proportionately higher when compared to those for energy and mineral development and for water and environment. The biodiversity expenditures in agriculture and tourism contribute significantly to maintenance of the revenue streams in those sectors. Financing biodiversity conservation in the water and environment and energy sectors, aside from designated budgets for conservation is not clearly aligned with the production activities. The financing is limited to environmental compliance for energy and mineral development, and water infrastructure. The effort needed to ensure maintenance, and restoration of degraded ecosystems has not been articulated in the business/development model as is the case for tourism and agriculture alone, even though inadequacies also exist in the agriculture development model, as biodiversity conservation is sparsely included in the result and outcome areas (NEMA et al. 2017b).

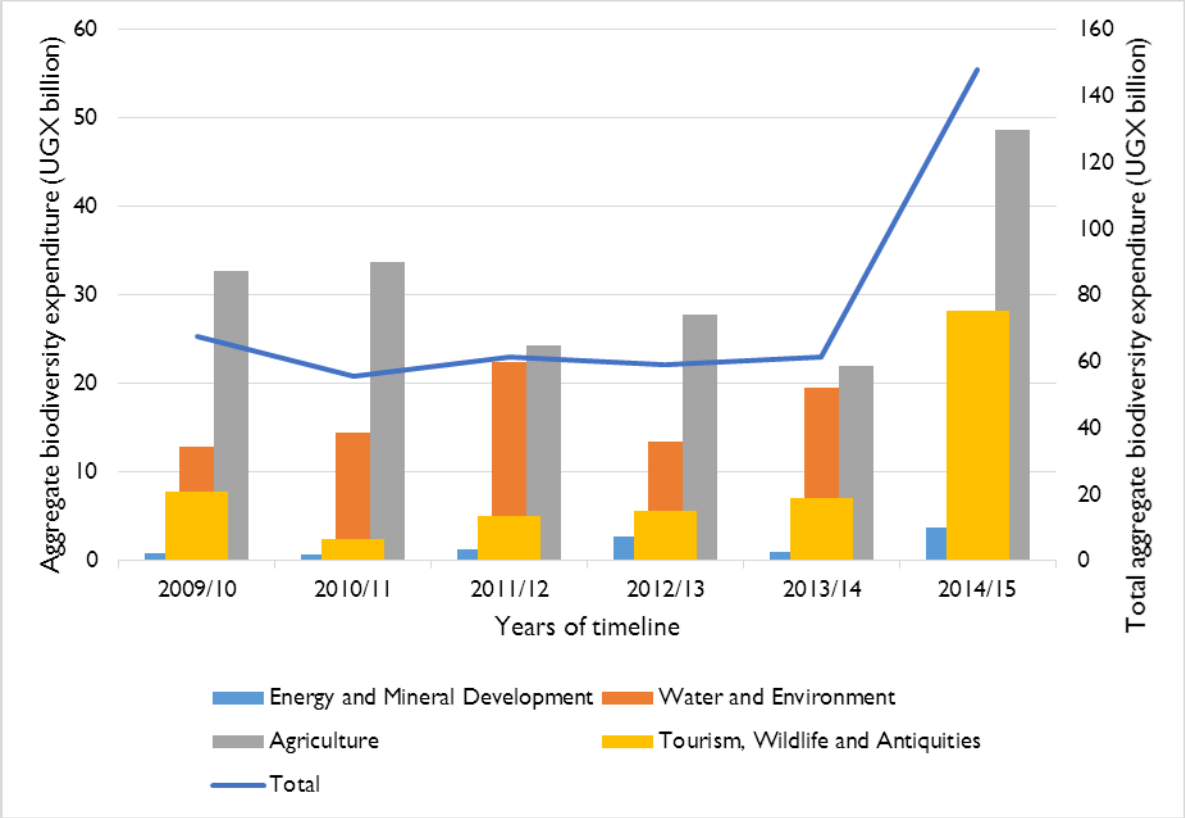


Figure 3.2: Expenditure on biodiversity by core Government ministries, 2005/6 – 2014/15
Source: adapted from NEMA et al. 2017b

3.1.2.3 Integration into local government plans

Central Government grants to local governments (LGs) contribute over 85% of financing to LG budgets with more than 90% of this funding coming in form of conditional grants. This heavy reliance on Central Governments (CGs) for financing has left LGs with very marginal opportunity for local fiscal autonomy and discretion in resource allocation decisions (OAG 2016). The allocation of Conditional grants to the Local Government by the sector is not in accordance with the formulae agreed upon with LGs and the Local Government Finance Commission (LGFC). Consequently, Local governments have not had the expected increments in conditional grants to match the increase in the cost of delivering services in LGs and the growing needs. There is a mismatch between development and recurrent expenditure allocations to LGs. Development expenditure received on average 14% of total allocations to LGs compared to 58% allocation at national level. Sectors retained the biggest proportions of their allocations despite devolving the responsibility of service delivery to LGs. The key service sectors of water, works, agriculture and health retained on average more than 80% of sector allocations at the centre (GOU/MFPED 2018; OAG 2016).

The potential of LGs to raise local revenue is limited. LGs have not fully exploited their potential to generate local revenue. For the three years 2012/13, 2013/14 and 2014/15, financial statements showed that the local governments were not able to tap into key revenue sources and also had revenue shortfalls of UGX 83.6 billion representing 17.6% of projected revenues. The low revenue performance was attributed to: (i) The existing laws and regulations governing local revenue management (domestic business registration, regulation and licensing) have not been updated to reflect current operations and

thus are complicated, hard to administer and to comply with, and do not represent best practices; (ii) LGs have not done adequate enumeration, assessment, and registration in order to expand their local revenue base; (iii) LGs were not carrying out adequate mobilisation and sensitization for local revenue to improve tax compliance; (iv) Weak collection and enforcement mechanisms that resulted into uncollected/untapped revenues (GOU/MFPED 2018).

Local Governments receive a grant from the MWE as recurrent expenditure for wetland management planning and monitoring. The funds received ranged between UGX 1.0 and 1.29 billion between 2014/15 and 2017/18 (Table 3.3). A larger fund from the ministry is used for water infrastructure development and management activities. However, given that the number of local governments had increased to 220 by July 2018, the funds are very small and are often used by the Natural Resource Departments to complement environmental planning (MWE SPR 2015, 2016, 2017, 2018).

Table 3.3: Trends of biodiversity related local government grants from MWE

Financial years	Description	Budget (Bn UGX)	Released (Bn UGX)	Spent (Bn UGX)	Released %	% release spent
2014/15	Conditional grants to LG	67.729	67.729	67.729	100.0	100.0
	Vote for wetlands	1.0.	1.0.	1.0.	100.0	100.0
2015/16	Total vote to LGs	68.20	68.20	58.83	100.0	86.3
	Vote for wetlands	1.20	1.20	1.20	100.0	100.0
2016/17	Total vote to LGs	58.73	58.64	51.37	99.8	87.6
	Vote for wetlands	1.29	1.20	1.20	93.0	100.0
2017/18	Total vote to LGs	58.55	58.55	53.89	100.0	92.0
	Vote for wetlands	1.29	1.29	1.29	100.0	100.0

3.1.3 Monitoring and evaluation strategy used by stakeholders to report on progress of implementing NBSAPII

Uganda does not have a comprehensive strategy for stakeholders to report on progress of implementing the NBSAPII. However, in November 2018, a first draft concept on strengthening institutional capacity to implement the NBSAP was developed. The two main objectives of strengthening institutional capacity for implementing the National Biodiversity Strategy and Action Plan (NBSAP) in Uganda are: (i) to develop and operationalize an effective Monitoring and Evaluation strategy for the implementing NBSAP developed and is in operation; and (ii) to develop and implement a standardized national monitoring, reporting and verification (MRV) system for biodiversity and ecosystems in Uganda to support both reporting with regard to implementation of the NBSAP II, as well as integration into national and international reporting on biodiversity.

Currently, monitoring and evaluation of the NBSAP II relies on annual reports of institutions, contributions to the National Reports to the Convention on Biological Diversity (CBD), annual self-assessment reporting by the National Environment Management Authority (NEMA) and contributions to the CHM, as well as the biennial reporting on the State of Uganda's Biodiversity. Even though some reporting exists, many of the available reports are limited in scope and do not adequately address the objectives, targets, outcome and output indicators of the NBSAPII. Uganda has a strong database based on environmental compliance through EIAs and environmental audits that d present an opportunity to aggregate information, albeit at project level, but the quantitative and qualitative data generated is not standardised and it would be difficult to use this for monitoring and evaluation, and/or verification. The weak MRV system for biodiversity was indicated in the NBFP as one of the major limiting factors to

achieving progress on the biodiversity targets set both in the NBSAPII as well as the integrated national development strategies such as the Uganda Green Growth Development Strategy (UGGDS), the second National Development Plan (NDP II), and the long-term development strategy, Vision 2040.

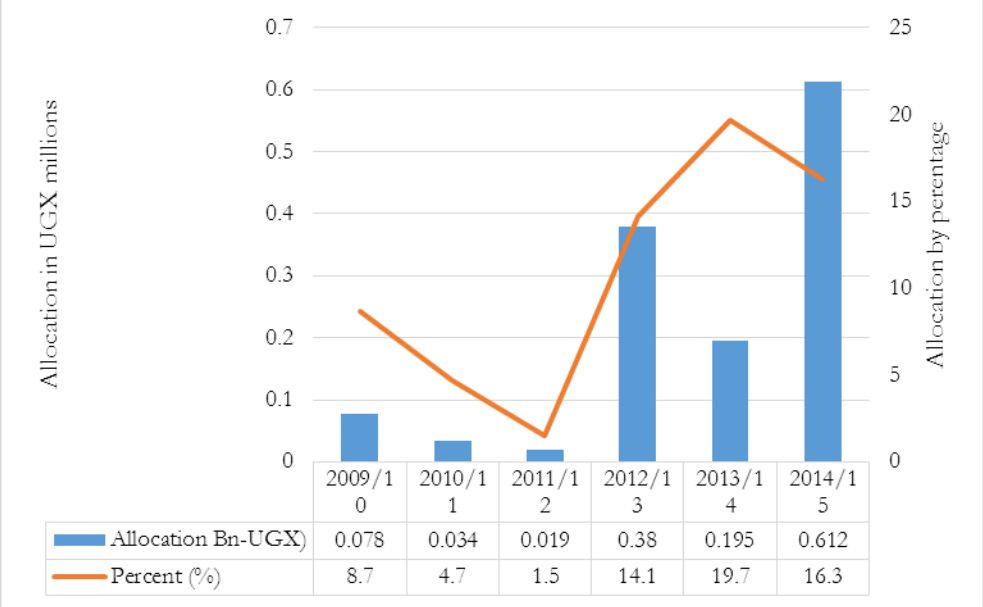
An effective monitoring and evaluation strategy, and an MRV system would boost reporting on biodiversity management in the country, and boost the efforts to monitor the state of biodiversity and ecosystems in the country. Also, the monitoring and evaluation strategy and MRV would allow for integration of the contribution of biodiversity management and conservation to livelihoods and the economy into national reporting. The draft concept of monitoring and evaluation strategy is in advanced stages of discussion among stakeholders. A completed strategy has been ear marked as an output by July 2019.

3.2 Progress towards facilitating and building capacity for research, monitoring and information management on biodiversity

3.2.1 By 2020, knowledge, research and science base relating to biodiversity significantly improved, and relevant technologies improved, shared and applied

3.2.1.1 Trends biodiversity-related research, monitoring and information management investment for Ministry of Energy and Mineral Development (MEMD)

Figure 3.3 shows the trends in magnitude of investment in biodiversity-related research, monitoring and information management, and percentage allocation as a proportion the total biodiversity-related expenditure of the MEMD. There was at first a decline in investment between 2009/10 and 2011/12 towards biodiversity-related research, monitoring and information in the Ministry of Energy and Mineral Development (MEMD). The biodiversity-related research, monitoring and information expenditure increased from 2011/12 and 2012/13 and increased in percentage in 2013/14 as well even though the magnitude declined. Conversely, between 2013/14 and 2014/15, the percentage allocation declined.

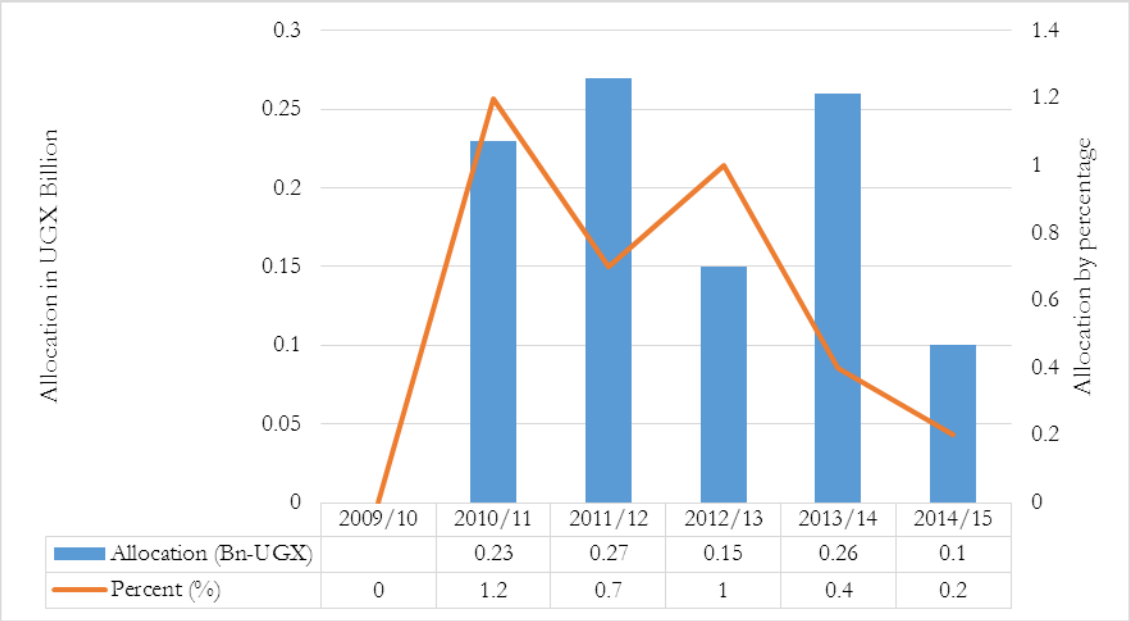


	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Allocation Bn-UGX)	0.078	0.034	0.019	0.38	0.195	0.612
Percent (%)	8.7	4.7	1.5	14.1	19.7	16.3

Figure 3.3: Trends in investment towards research, monitoring and information for MEMD

3.2.1.2 Trends biodiversity-related research, monitoring and information management investment for Ministry of Water and Environment (MWE)

Figure 3.4 shows the trends in magnitude of investment in biodiversity-related research, monitoring and information management, and percentage allocation as a proportion the total biodiversity-related expenditure of the MWE. No expenditure was recorded in 2009/10 and increased in magnitude in 2010/11, 2011/12, declined in 2012/13, increased again in 2013/14 and declined in 2014/15. In percentage terms, the investment in research, monitoring and information for the MWE in 2010/11, declined in 2011/12 and increase again 2012/13 and between 2012/13 and 2014/15 continued to decline.



	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Allocation (Bn-UGX)		0.23	0.27	0.15	0.26	0.1
Percent (%)	0	1.2	0.7	1	0.4	0.2

Figure 3.4: Trends in investment towards research, monitoring and information for MWE

3.2.1.3 Trends biodiversity-related research, monitoring and information management investment for the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)

Figure 3.5 shows the trends in magnitude of investment in biodiversity-related research, monitoring and information management, and percentage allocation as a proportion the total biodiversity-related expenditure of the MAAIF. MAAIF had a relatively high allocation of biodiversity-related expenditure towards research, monitoring and information ranging between 20 and 32% of the entire allocation towards biodiversity expenditure. The expenditure is linked to the many research agencies within the agriculture sector, particularly the National Agriculture Research Organisation (NARO) and its affiliate research agencies.

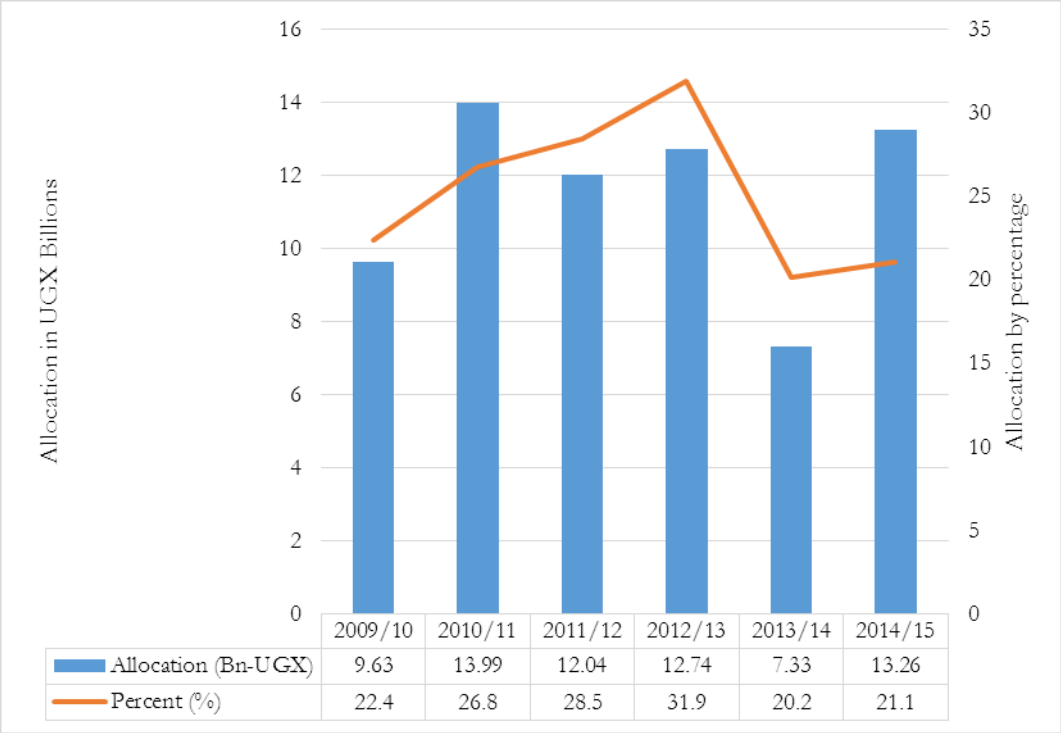


Figure 3.5: Trends in investment towards research, monitoring and information for MAAIF

3.2.1.4 Trends biodiversity-related research, monitoring and information management investment for the Ministry of Tourism Wildlife and Antiquities (MTWA)

Figure 3.6 shows the trends in magnitude of investment in biodiversity-related research, monitoring and information management, and percentage allocation as a proportion the total biodiversity-related expenditure of the MTWA. The magnitude of investment in research, monitoring and information management generally increased over the timeline of 2009/10 to 2014/15. However, in terms of percentage allocation the increase generally occurred in the first three financial years and was in general decline in the last three years except for the increase observed in 2013/14.

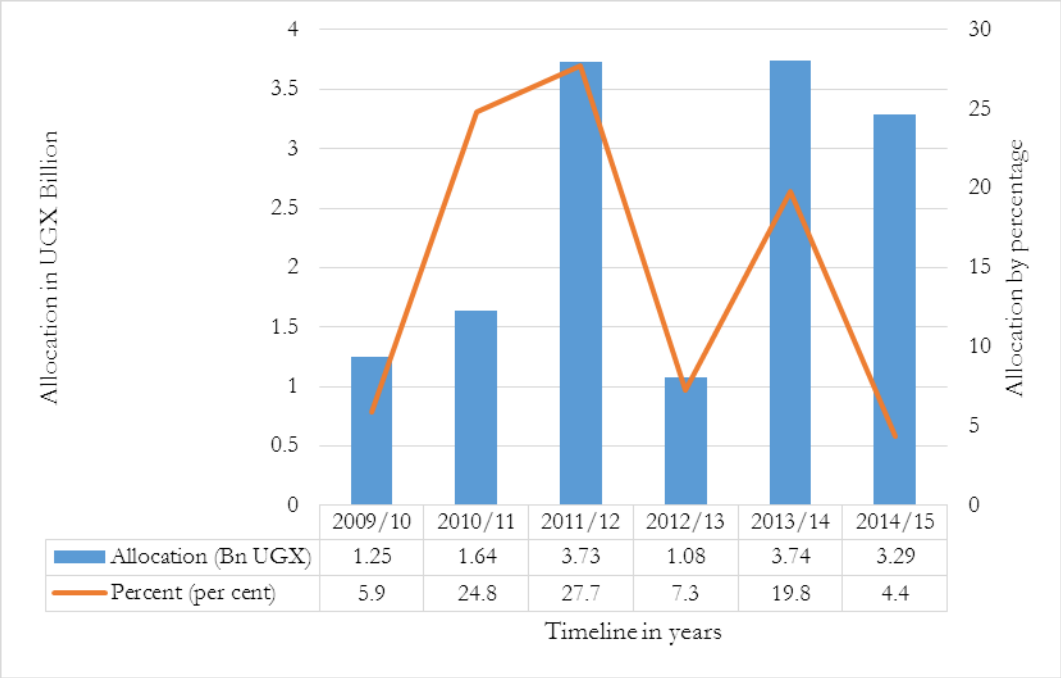


Figure 3.6: Trends in investment towards research, monitoring, information for MTWA

3.2.1.4 Overall trends in biodiversity-related research, monitoring and information management investment

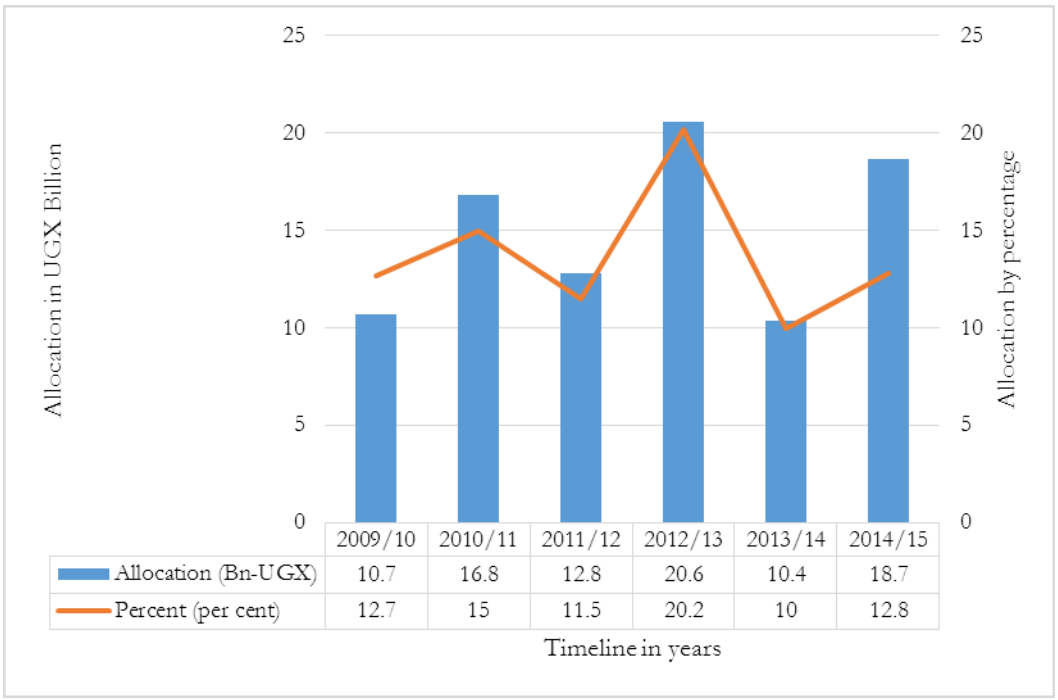


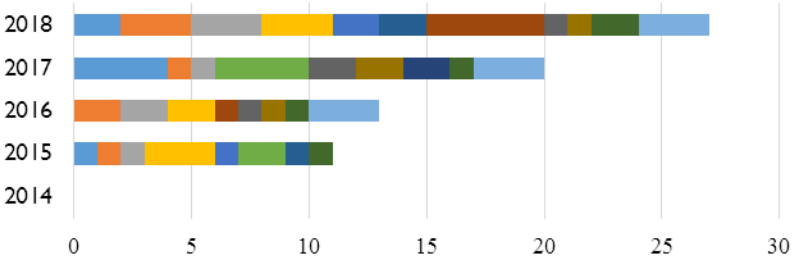
Figure 3.7: Trends in investment towards research, monitoring and information for MAAIF

Overall, the was an increase in magnitude of biodiversity-related expenditure for the four core ministries charges with biodiversity management in the country, the ministries of energy and mineral development (MEMD), water and environment (MWE), agriculture, animal industry and fisheries (MAAIF) and tourism wildlife and antiquities ((MTWA). When the oscillation between the high and low amongst, are considered the peak increase ranged between UGX 18.7 and 20.6 billion, while the lower end was UGX 10.4 to 10.6 billion (Figure 3.7). The percentage overall allocation for the biodiversity-related budgets that went to research, monitoring and information management ranged from 10 to 20%.

3.2.1.2 Trends in investment in biodiversity-related research, monitoring and information management

Documented research undertakings in forestry, wetlands and water resources (Figure 3.8) increased by 18%, 54% and 35% from 2015 to 2016, 2016 to 2017, 2017 to 2018 (MWE 2015; 2016; 2017; 2018). Overall the documented research undertakings increased by 245% from only 11 in 2015 to 2017. The Ministry of Water and Environment (MWE), NEMA and the National Forestry Authority (NFA) and civil society stakeholders were engaged in a research activities documented in the Sector Performance Reports (SPR).

There was no specific area of concentration for research activities. However, there was an increased intensity of research on biotechnology, policy and economic analyses. There was continuous research focus on data generation, collection and sharing, food security and livelihoods and pollution management. However, only a few research activities are documented.

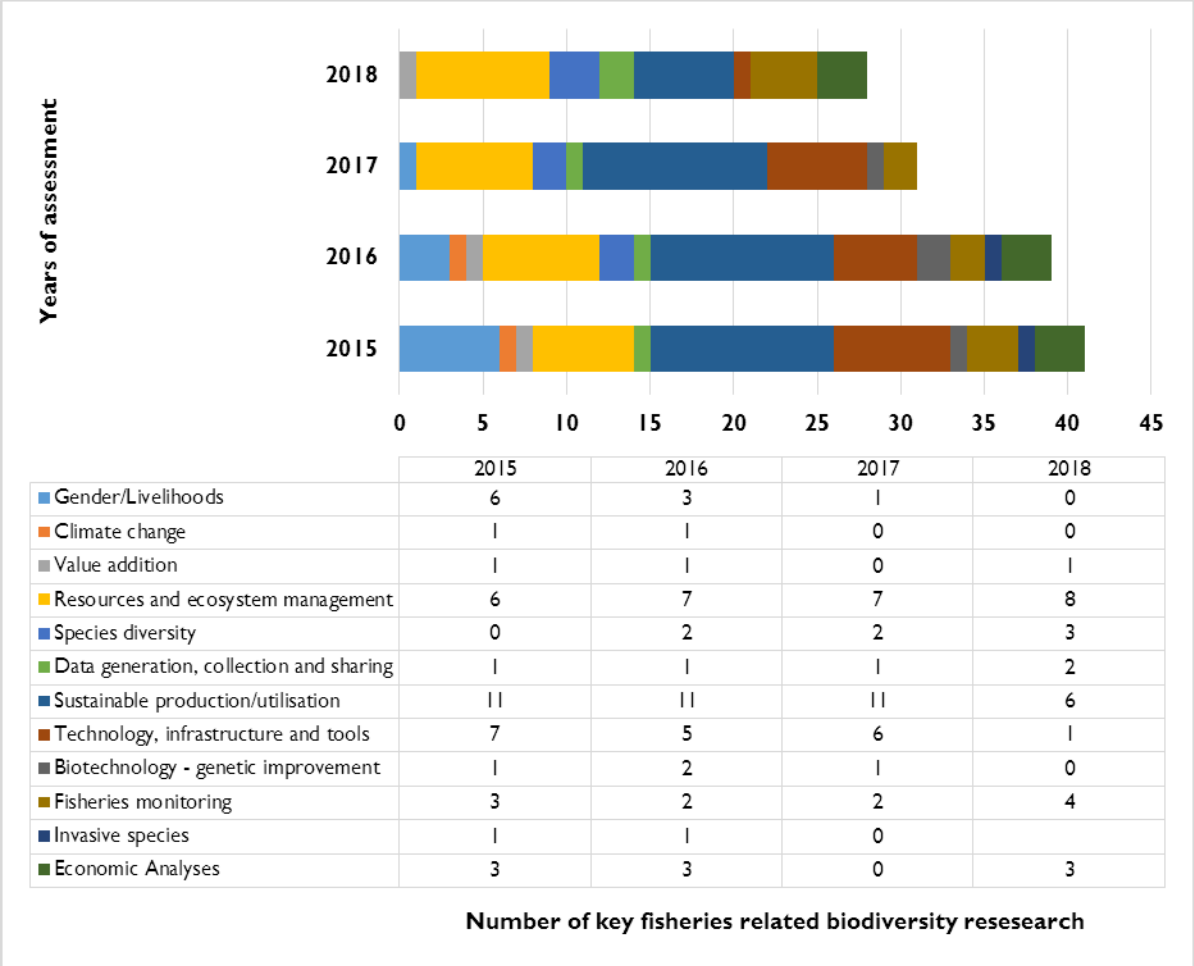


	2014	2015	2016	2017	2018
Species diversity		1		4	2
Data generation, collection and sharing		1	2	1	3
Food security, livelihoods and benefit sharing		1	2	1	3
Land tenure, forestry rights and governance		3	2		3
Climate change and other MEAs		1			2
Marketing and value addition		2		4	
Ecosystem management and monitoring		1			2
Policy analysis and economic analyses			1		5
Biological control for pests and diseases			1	2	1
Improved forage production			1	2	1
Biomass energy, technologies and biofuels				2	
Pollution management		1	1	1	2
Biotechnology: breeding, seed improvement			3	3	3

Figure 3.8: Trends of biodiversity related research, monitoring and information management for the Water and Environment sector

There was a gradual decline in research activities documented under the fisheries sub-sector. Documented research activities declined from 41 in 2015 to 28 in 2015, a 46% decline over the four-year period (figure 3.9). Year on year, the declines were smaller than with an average reduction by three undertakings per year. Therefore, the research activity level was still higher than that documented for forestry, wetlands and water resources.

The highest concentration of research is in the areas of sustainable production and utilisation and resource and ecosystem management. Technology, infrastructure and tools attracted high research focus in 2015, 2016 and 2017, and much less in 2018. The research undertaken in the fisheries sub-sector is documented by the National Fisheries Resources Research institute (NaFIRRI) and the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) (NaFIRRI 2015;2016;2017;2018).

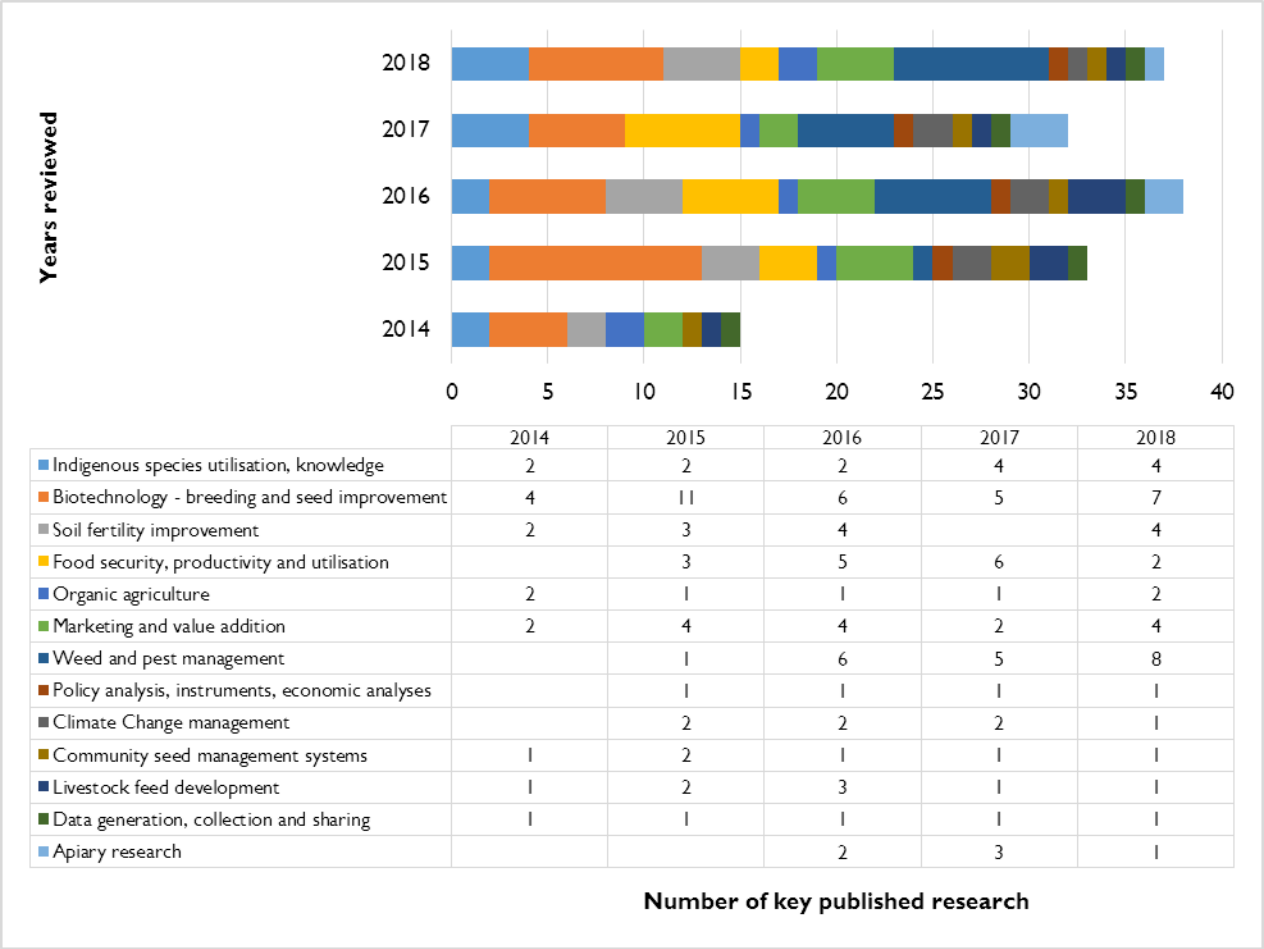


	2015	2016	2017	2018
Gender/Livelihoods	6	3	1	0
Climate change	1	1	0	0
Value addition	1	1	0	1
Resources and ecosystem management	6	7	7	8
Species diversity	0	2	2	3
Data generation, collection and sharing	1	1	1	2
Sustainable production/utilisation	11	11	11	6
Technology, infrastructure and tools	7	5	6	1
Biotechnology - genetic improvement	1	2	1	0
Fisheries monitoring	3	2	2	4
Invasive species	1	1	0	
Economic Analyses	3	3	0	3

Figure 3.9: Trends of biodiversity related research, monitoring and information management for fisheries

Considerable agriculture is conducted. The review in Figure 3.10 is based on published research reported by the Makerere University Colleague of Agricultural and Environmental Sciences (CAES), The African Crop Science Journal, the Uganda Journal of Agricultural Sciences and international journal articles reported by the NARO research institutes, with the exception of forestry and fisheries (by NAFORRI and NAFIRRI, respectively), already acknowledged above.

Biotechnology, food security and utilisation, and pest and disease control had the highest concentration of effort. Policy instruments and economic analyses have limited focus conversely value chain development research draws a relatively stronger research interest. The focus on ecosystem services such as pollinator services, organic agriculture and soil fertility improvement as related to biodiversity conservation/ management was found to be limited. Develop of data collection protocols was not a specific focus of research articles. Even though the partnerships assessment shows strong focus on data collection and collation and database development.



	2014	2015	2016	2017	2018
Indigenous species utilisation, knowledge	2	2	2	4	4
Biotechnology - breeding and seed improvement	4	11	6	5	7
Soil fertility improvement	2	3	4		4
Food security, productivity and utilisation		3	5	6	2
Organic agriculture	2	1	1	1	2
Marketing and value addition	2	4	4	2	4
Weed and pest management		1	6	5	8
Policy analysis, instruments, economic analyses		1	1	1	1
Climate Change management		2	2	2	1
Community seed management systems	1	2	1	1	1
Livestock feed development	1	2	3	1	1
Data generation, collection and sharing	1	1	1	1	1
Apiary research			2	3	1

Figure 3.10: Trends of biodiversity related research, monitoring and information management for crop and livestock

The assessment was based on review of available journals and other reporting platforms. It is likely that some research activities have not been well publicised. There is a strong likelihood that a large volume of research is not available on shared platforms and may not be acknowledged and not reflected in the body of knowledge used for biodiversity management and policy processes. Processes such as the CHM and the CONNECT will contribute to collating and creating awareness about research and new knowledge in institutions within the country and outside that can contribute to biodiversity conservation and management.

3.2.1.3 Partnerships in biodiversity-related research, monitoring and information management

There are about four groupings of research activity that occur in the country. These research groupings are fully or partially formalised through legislation and coordination arrangements. The most organised and formalised research system is that under the agriculture sector.

1. Agricultural research partnerships

Formalised under the National Agricultural Research Act (2005), the National Agricultural Research System (NARS) was developed to address challenges presented in the Plan for Modernisation of Agriculture (PMA) strategy and National Agricultural Research Policy (NARP) principles to provide research services that address in a sustainable manner, the needs and opportunities of the majority poor. NARS means a cross section of stakeholders whether in public or private sector; and comprises of the organisation, public agricultural research institutes, universities and other tertiary institutions, farmer groups, civil society organisation, private sector and any other entity engaged in the provision of agricultural research services.

At the centre of NARS is the largest research institution in the country the National Agricultural Research Organisation (NARO). NARO not only serves as the secretariat for the NARS, it also seven fully fledged national research institutes and nine zonal agricultural research institutes. The seven national research institutes under NARO are; (i) the National Agricultural Research Laboratories (NARL) – Kawanda (Central Uganda), (ii) the National Crop Resources Research Institute (NACCRI) at Namulonge (Central Uganda), (iii) the National Fisheries Resources Research Institute (NaFIRRI), head quartered in Jinja (Eastern Uganda), (iv) the National Forestry Resources Research Institute (NaFORRI) with headquarters in Mukono (Central Uganda), (v) National Livestock Resources Research Institute (NaLIRRI), with headquarters in Tororo (Eastern Uganda), (vi) National Semi Arid Agricultural Research Institute (NaSAARI) with headquarters in Serere District (North Eastern Uganda) and the National Coffee Research Institute (NaCORI) in Kituza, Mukono Municipality (Central Uganda).

The partnerships for agricultural research under NARS also cover public universities including Makerere University, Gulu University, Busitema University, Muni, Soroti, Lira and Kabale University, among others. Several private companies participate in the research such as Agro-Genetic Technologies which participates in tissue culture research for bananas, and several seed companies including; Victoria seeds, East African seeds, FICA seeds and Pearl seeds, among others. Uganda Seed Traders Association has 25 members and there are several other seed companies that are not associated. Farmer Associations include the Uganda National Federation of Farmer Federation (UNFFE), National Union of Coffee Agro-enterprises Farmer Enterprises (NUCAFE), Farmer cooperatives (e.g. Bugisu Cooperative Union – BCU), and the National Organic Agriculture Movement of Uganda (NOGAMU), among others.

Several regional research organisations are collaborating with Ugandan universities and/or NARO. The most prominent include Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) a sub-regional organization of the National Agricultural Research Systems (NARS) of 11 member countries, namely: Burundi, the Democratic Republic of the Congo, Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, South Sudan, Sudan, Tanzania and Uganda. ASARECA brings together scientists from the national agricultural research institutions of the member countries, national agricultural extension service providers and other strategic development oriented partners to generate, share and

promote knowledge and innovations to solve common challenges facing agriculture in the member countries.

Alliance for a Green Revolution in Africa (AGRA)'s strategy leverages current private and public sector investments by prioritizing initiatives that complement the work of other actors to significantly increase smallholder farmers' income, food security and nutrition by driving productivity, strengthening linkages between market and production systems, supporting government to deliver on its priorities and supporting development of an improved enabling environment.

Consultative Group on International Agricultural Research (CGIAR). CGIAR is a global research partnership for a food secure future dedicated to reducing poverty, enhancing food and nutrition security, and improving natural resources. The 15 CGIAR Research Centres are independent, non-profit research organizations, conducting innovative research. The CGIAR centres prominent in Uganda are: International Institute for Tropical Agriculture (IITA), International Centre for Tropical Agriculture (CIAT), Bioversity International, formerly International Plant Genetic Resources Institute (IPGRI), World Agroforestry Centre (ICRAF), Centre for International Forestry Research (CIFOR), International Food Policy Research Institute (IFPRI), International Livestock Research Institute (ILRI), and International Potato Centre (CIP). The other centres have limited activities in the country and they include; The Africa Rice Centre, International Centre for Agricultural Research in the Dry Areas (ICARDA), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Maize and Wheat Improvement Centre (CIMMYT), International Rice Research Institute (IRRI), International Water Management Institute (IWMI) and World Fish

The African Agricultural Technology Foundation (AATF) is about farmers in Sub-Saharan Africa and providing them with practical technology solutions capable of addressing their farm productivity constraints and improving their livelihoods. Investors to the AATF, the Rockefeller Foundation, United Kingdom Department for International Development (DFID) through UK aid, and the USAID were the original funders of AATF. Additional investors include: The Bill & Melinda Gates Foundation,

The Forum for Agricultural Research in Africa (FARA) is the apex continental organization responsible for coordinating and advocating for agricultural research for development (AR4D). FARA serves as the technical arm of the Africa Union Commission on matters concerning agriculture science, technology and innovation. FARA works through collaboration with its partners, an approach driven by the principle of Subsidiarity, which devolves the implementation of programmes to the Sub-regional organizations and the National Agricultural Research Institutes NARIs. FARA mobilizes stakeholders around a portfolio of continent-wide programmes and projects jointly developed with the stakeholders, to address specific challenges or opportunities.

The Regional Universities Forum for Capacity Building in Agriculture (RUFORUM). RUFORUM was established by ten Vice Chancellors in 2004, is a consortium of 105 African universities operating within 37 countries spanning the African continent. RUFORUM is coordinated by a Secretariat hosted by Makerere University in Kampala, Uganda. The organisation evolved from its predecessor, the Forum on Agricultural Resource Husbandry (FORUM) program of the Rockefeller Foundation. RUFORUM supports universities to address the important and largely unfulfilled role that universities play in contributing to the well-being of small-scale farmers and economic development of countries throughout the sub- Saharan Africa region.

Agricultural research and development in Uganda also benefits from partnerships with multilateral and such as the World Bank, the European Union, the International Fund for Agricultural Development and the United Nations Food and Agriculture Organisation (FAO), and bilateral partners such as individual American, Japanese and European countries and/or funding mechanisms such as the United States Agency for International Development (USAID), the Department for International Development (DFID) of the United Kingdom, the Japan International Cooperation Agency (JICA),

2. Biotechnology research

Biotechnology research in Uganda is also generally centred on agriculture and medical research, and therefore the research partnerships benefit from similar institutional arrangements including medical research consortiums carrying out biotechnology and genetic engineering research. Uganda National Council for Science and Technology (UNCST), the Competent Authority for Biosafety in Uganda, has adopted the concept of an annual Biosafety platform for the National Biosafety Committee (NBC), Institutional Biosafety Committees (IBCs), Policy Makers, Media, Civil Society and researchers involved in Gene Technology research.

Uganda Biotechnology and Biosafety Consortium (UBBC) is a coalition of different stakeholders ranging from policy makers, scientists, private sector leaders, civil society organisation leaders and government officers in their individual capacities as well as stakeholder agencies both public and private united for a common cause of advancing the role of biotechnology in improving livelihoods of the people in Uganda.

The Consortium was born out of the need to have a harmonised and multi-stakeholder approach to public engagement, understanding and strategic policy advocacy for the science of biotechnology. The first General Assembly of UBBC was held on 18th April 2011 in Kampala where the leadership, the Executive Committee was elected. Executive Committee of the Consortium is chaired by private sector while other Executive Committee members include a member of parliament, the Uganda National Farmers' Federation (UNFFE); and a representative of NARO, the Head of the National Biotechnology Centre in Uganda, UNCST among others.

In 2016, the government of Uganda created a new ministry for science, technology and innovation to guide and support advancement of science. The government also established an innovation fund—capitalized initially with about USD 10 million for the first year—to support scientific research and development activities. The new science ministry has been instrumental in leading efforts toward an evidence-based biosafety framework in Uganda. Regulatory capacity in Uganda has largely developed in tandem with research progress. Genetically engineered (GE) crops approved elsewhere have been proven to be safe using appropriate risk assessment systems (Zawedde et al. 2018). Some of the biotechnology partnerships with the strongest opportunity for promoting genetic engineering in Ugandan include national and international initiatives such as the African Biosafety Network of Expertise of the New Partnership for Africa's Development (NEPAD); Program for Biosafety Systems (PBS); International Centre for Genetic Engineering and Biotechnology (ICGEB); the International Plant Biotechnology Outreach program of the University of Ghent; Uganda Biotechnology and Biosafety Consortium (UBBC) and Uganda Bioscience Information Centre (UBIC) under NARO.

3. Research in water and environment resources management

Since the early 2000s, there has been a flurry of applied research to support water resources management, environmental management and climate change research linked to biodiversity management. In 1999, the Government of Uganda passed the National Water Policy(NWP) whose overall objective is to manage and develop the water resources of Uganda in an integrated and sustainable manner, so as to secure and provide water of adequate quantity and quality for all social and economic needs of the present and future generations and with the full participation of all stakeholders. In line with NWP, the Government undertook a Water Resources Management Reform (WRM) study from 2003 to 2005. The reform study led to preparation of a WRM reform strategy paradigm shift in WRM from centralised to Catchment/Basin (MWE/SPR 2016). The Ministry responsible for water resources agreed in the 2006 JSR to pilot participatory IWRM in at least one catchment. A pilot was undertaken in the Rwizi Catchment and based on this experience and the lessons learned, the strategy to roll out IWRM at the catchment level was developed. The process evolved into the creation of four regional units called Water Management Zones (WMZs) whose operations started in 2011 (Figure 3.11).

Figure 3.11: Uganda's four Water Management Zones
Source; MWE (2012):

Implementation of catchment-based water resources management is ongoing in 4 Water Management zones and 15 catchments. 15 Catchment Management Organisations (CMOs) were formally established and are operational. Implementation of some interventions in 11 catchments (Rwizi, Mpanga, Semliki, Aswa, Albert Nile, Awoja, Maziba, Katonga, Lokok, Lokere and Mpologoma) is ongoing (MWE/SPR 2018). There is on-going support from the Nile Equatorial Subsidiary Action Program (NELSAP) one of the two investment programmes under the Nile Basin Initiative (NBI) that has since 2018 supporting the development of catchment management plans for three catchments under the Rivers Muzizi, Nyamwamba and Nkuse (MWE 2019).

Applied research conducted by the Ministry and Water and Environment (MWE) with support of the United Nations Development Programme (UNDP) and the UN Environment between 2014 and 2017 led to the production of the Uganda Wetlands Atlas Volume I and Volume II. Volume I was focused on wetlands in Wakiso, Mukono and Kampala, while Volume II covered the whole country. The Wetlands Atlas Volume I was used as a basis for the Cabinet Decision in 2014, to cancel all land titles wetlands acquired in wetlands in Kampala, Wakiso and Mukono. The Volume II Wetland Atlas is being used to inform implementation of the Green Climate Fund Project FP034 – "Building Resilient Communities, Wetlands Ecosystems and Associated catchments" in Uganda.

4. Economic instruments for environment and natural resources management

Between 2015 and 2019, NEMA on behalf of the Government of Uganda implemented a series of applied research activities under the Biodiversity Finance Initiative (BIOFIN). The result were four report outputs; the Biodiversity Policy and Institutional Review (PIR), the Biodiversity Expenditure Review (BER), the Biodiversity Finance Needs Assessment (FNA), and the Biodiversity Finance Plan for Uganda (BFP). The information generated out of the BIOFIN process provides a perspective of biodiversity expenditure for Uganda between 2005/6 and 2014/15. The information also provides description of the evolution of biodiversity related policy and the status of biodiversity economic and financing instruments in Uganda and finance plan indicates the priorities for biodiversity financing in Uganda.

Some of the important partnerships for the both the water and environment sector and on economic instruments include the work being done under the Lake Victoria Environment Management Programme (LVEMP). LVEMP is a comprehensive program aimed at rehabilitation of the lake ecosystem for the benefit of the people who live in the catchment, the national economies are a part and the global community (World Bank 2002). LVEMP is an East African Community Project coordinated by the Lake Victoria Basin Commission and implemented by National Project Implementing offices in the 5 partner states. The project is principally funded by the World Bank. The core components include strengthening Institutional capacity for management of shared water and fisheries resources where project activities include: water hyacinth coverage monitoring, fish disease surveillance and control strategies, and socioeconomic aspects of fish disease on the environment of Lake Victoria, and go-referenced maps of fish breeding and nursery grounds, development of draft fish Breeding Areas statutory instrument. The implementation of LVEMP in Uganda is a shared responsibility by the MWE, NaFIRRI, the Ministry of Agriculture (MAAIF), the Ministry of Works and Transport (MoWT), the National Water and Sewerage Corporation (NWSC), Makerere University, and District Local Governments (of Mubende, Masaka, Kalangala, Namayingo, Mityana, Gomba, Rakai, Mpigi and Kalungu).

3.2.2 By 2020, basic taxonomic information is packaged in user-friendly formats and widely disseminated, including use of school systems

3.2.2.1 Taxonomic information in appropriate formats deposited in Uganda's Clearing House Mechanism (CHM)

Uganda's Clearing House Mechanism was launched in December 2013 when NEMA on behalf of the government of Uganda received financial support from Global Environmental Facility(GEF) through United Nations Environment Program (UNEP) for the development of a national Clearing House Mechanism (CHM). The Uganda Clearing House Mechanism (UG-CHM) is a web-based portal designed to facilitate information exchange and utilization amongst all stakeholders in Uganda on Biodiversity. The Uganda Clearing House Mechanism (UG-CHM) will bring together a huge network of institutions and organisations working on biodiversity. The UG-CHM through the focal point for Uganda will be administered by a dedicated team supported by the various strategic committees established by the national focal institution for technical back-stopping and guidance. A global clearing-house mechanism was established under the CBD to promote and facilitate technical and scientific cooperation globally. In the context of the CBD, the CHM designates a network of parties and partners working together to facilitate implementation of the Convention as well as access to and exchange of information on biodiversity around the world.

3.2.2.2 Taxonomic information in Uganda's National Biodiversity Data Bank

The National Biodiversity Data Bank (NBDB) was established in 1990 at Makerere University with the aim of having a central repository for biodiversity data and information for Uganda. Since its establishment, a number of datasets have been computerised - mainly species checklists (higher plants, insects, fish, amphibians, reptiles, birds and mammals) and georeferenced occurrence records for these taxa. These data are analysed to produce regular State of Uganda's Biodiversity reports and other biodiversity reports and publications.

According to the 2017 National State of Biodiversity Report (Pomeroy et al. 2017), there are only seven taxa included in the NBDB: plants, birds, mammals, amphibians, reptiles, insects and fishes. The data come from various sources including the Uganda Wildlife Authority (UWA), using their extensive data sets of large mammal counts, and many more are from a variety of activities of the National Biodiversity Data Bank. Other important contributors were the Wildlife Conservation Society (WCS) and Nature Uganda. Some data came from published journals or theses, whilst some came directly from individual researchers.

Currently we have 298 lines of time-series data, covering a period between 1960 and 2016, with most lines having data from at least two years, and those years separated by at least three years from each other, so that trends can be detected (but for 15 of these lines, there are as yet only data for one year, since further data are expected). Data can consist of numbers of plants or animals, or other repeatable numbers such as number of tree stems per hectare, numbers of moth species or areas of land that are forested. Taxonomically, the current data set is heavily biased towards birds and mammals. There are only seven data sets for plants – and all of those are trees – whilst invertebrates are represented only by ten sets of butterfly and moth counts. There is one line for fish (estimated species numbers in Lake Victoria), one for reptiles (Nile Crocodiles in Murchison Falls NP), but 104 for birds and 161 for mammals. There are 18 data lines for habitat extents.

3.2.2.3 Taxonomic data and information used to guide decision making

During the development of Uganda's NBSAP II stakeholders defined the process by which biodiversity information is transformed for use to guide national decision making. The overall national planning and decision making process is based on a comprehensive National Development Planning Framework (CNDPF) which provides for the development of a 30-year Vision (2010-2040) that will be implemented through: three 10-year plans; six 5-year National Development Plans (NDPs); Sector Investment Plans (SIPs); Local Government Development Plans (LGDPs); Annual work plans; and Budgets (Figure 3.6). The standard process therefore is to ensure that the biodiversity priorities are highlighted in the national planning process and this continually helps to remind of the Government of its commitment. Therefore, public biodiversity management and conservation institutions transform their management actions into annual work plans and budgetary information to be integrated into the Government's fiscal processes.

The second route through which taxonomic data and information is used to guide decision making is the environmental regulatory process. By implementing the National Environmental Impact Assessment (EIA) and Environmental Audit and Monitoring Regulations, the Government support by NEMA as the lead regulator, the lead agencies (Ministries, Departments and Agencies – MDAs of Government and District Local Governments, supported by non-governmental organisations (NGOs), civil society and the general public rely on taxonomic information to decide which project developments are undertaken. The EIA and environmental audit and monitoring system aims to ensure that development projects implement a mitigation hierarchy to avoid, minimise and/or mitigate adverse impact on the environmental including biodiversity. The EIA and audit processes rely on the competence of environmental practitioners who are vetted and licensed NEMA. The practititioners are hired by project developers to undertake EIA or environmental audit on their behalf. The regulator also has technical support who review and support the EIA process. Lead agencies and District Local Governments are also required to have strong competence to ensure that impacts on biodiversity are minimised. The pre-requisite of the competences for conducting EIAs and audits are qualified and licensed taxonomists.

A further entry point through which taxonomic data and information is used to guide decision-making is through the development of management plans. Government agencies involved in biodiversity management like the National Forestry Authority (NFA), the Uganda Wildlife Authority (UWA) and the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) have statutory requirements to develop management plans on how to manage biodiversity.

Uganda acknowledges the gaps in biodiversity information, and basic taxonomic information. Therefore, to strengthen the flow of biodiversity information, including taxonomic information, Uganda along with Ghana and Mozambique in 2017 received financial support from the Global Environment Facility (GEF) through the UN Environment World Conservation and Monitoring Centre (UNEP-WCMC) for project called Connect: Mainstreaming biodiversity into the heart of government decision making. The project objective is to ensure biodiversity is taken into account in decision making across government sectors by improving development decision makers' access to and use of biodiversity information and embedding biodiversity information within national development decision-making processes. The Connect project will support attainment of (i) a clear understanding of the in-country demands for, and the barriers to using, biodiversity information within government decision making including clarifying the format, timing and packaging required; (ii) mobilise and repackage existing biodiversity data and information from a range of sources (national and international) to meet a number of the above demands; and (iii)

strengthen the connection between government decision makers and biodiversity and ecosystem services data providers in order to sustainably provide policy-relevant, spatially explicit information to meet ongoing national needs. At this stage the Political Economy Analysis (PEA) and the National Biodiversity Information Landscape (NBIL) were completed and the progress of mobilising and repackage existing biodiversity data and information from a range of sources (national and international) to meet a number of demands is ongoing. The focus is on the agriculture sector and this was reached after vigorous selection process on which sector to focus on during the PEA process.

Regarding freshwater biodiversity, the Global Biodiversity Information Facility (GBIF) supported the NaFIRRI to mobilise and publish fish species occurrences in friendly formats. The project published two datasets, increasing the fish species occurrences available for Uganda through GBIF by >68%. By integrating the data with the IUCN conservation status, better information is now available on where threatened (Vulnerable-VU, Endangered-EN and Critically endangered-CE) and near threatened (NT) fish species of Uganda are located (Figure 3.1.2). This gives more capacity to assess potential impact of development projects such as hydroelectric power dams on fish species of conservation concern. The efforts to mobilise freshwater biodiversity data and transform it into biodiversity information has been scaled up to cover more taxa such as aquatic macro-invertebrates with support from the JRS Foundation (http://jrsbiodiversity.org/grants/nafirri-2018/).

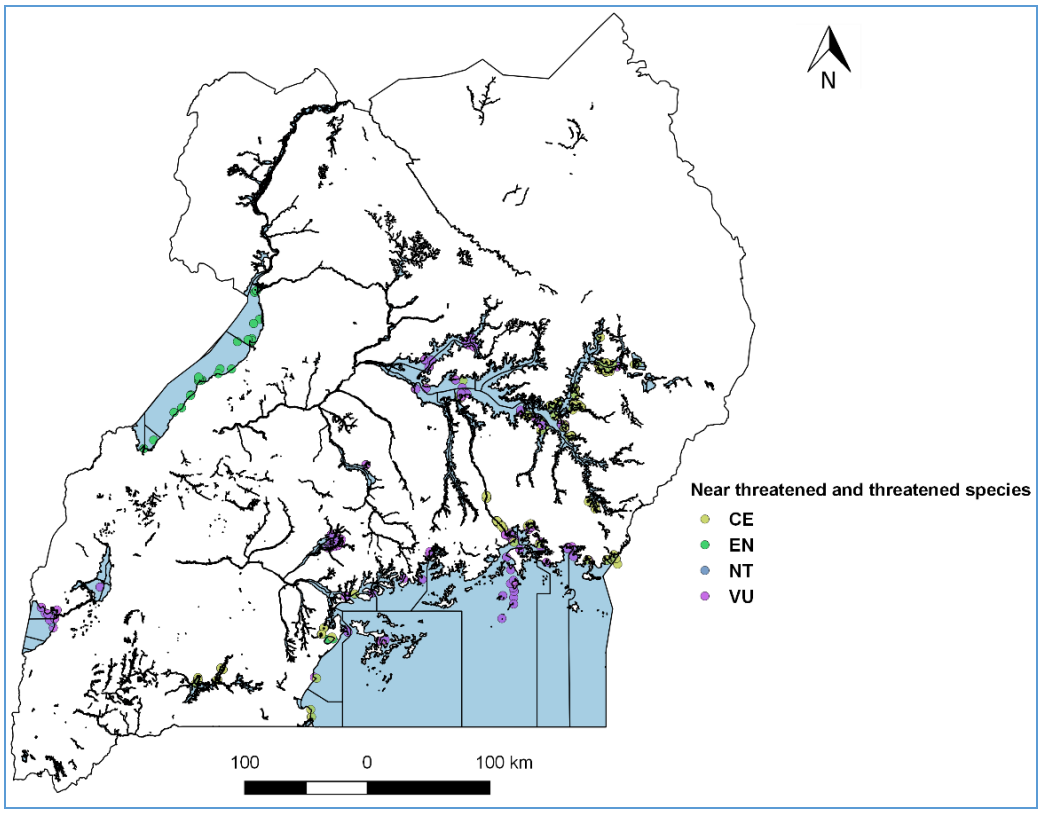


Figure 3.1.2: Localities of near threatened and threatened fish species in Uganda, based on occurrences available through GBIF (Musinguzi et al 2019)

3.2.3 By 2019, traditional knowledge and practices of indigenous peoples and local communities integrated into biodiversity conservation and sustainable use at all levels

3.2.3.1 System(s) in place to document traditional knowledge as a basis for research and development of commercial biodiversity products.

The Constitution of Uganda provides for the promotion of culture. Objective XXIV of the Constitution states that cultural and customary values that are consistent with the fundamental human rights and freedoms, human dignity and democracy and with the Constitution of Uganda may be developed and incorporated in all aspects of Ugandan life. In addition, Objective XXV mandates the State and citizens to preserve and promote public property and Uganda's heritage. Further, the Constitution (Amendment) Act 2005, Article 6 provides for use of any other language as medium of instruction in schools, and Article 3 of the Constitution (Amendment) (No.2) Act 2005 mandates Regional Assemblies under the Regional tier system of governance to handle cultural matters relating to the traditional or cultural leader, clan and sub clan leadership, cultural and traditional practices (cultural funeral rites) and cultural institutions by establishing specialized committees for them.

The National Culture Policy (2006) defines culture as the sum total of the ways in which a society preserves, identifies, organises, sustains and expresses itself. Uganda is endowed with a rich and diverse cultural heritage, which includes sixty-five indigenous communities with unique characteristics. The National Culture Policy has addressed this challenge by providing strategies to enhance the integration of culture into development. These strategies include; advocating for culture, ensuring capacity building, ensuring research and documentation, promoting collaboration with stakeholders and mobilizing resources for culture.

Indigenous knowledge (IK) is the traditional local knowledge existing within and developed around the specific conditions of a community indigenous to a particular geographical area. IK is commonly used in agriculture, traditional medicine, health care, food preparation, education, natural resource management and a host of other activities in rural communities. IK is also characteristically relevant for women who use it to perform their traditional roles and responsibilities. Although IK is useful to people, limited research has been done. Uganda has 65 indigenous communities (The Constitution of Uganda- Schedule 3) representing Uganda's diverse cultural heritage. The diversity contributes to a wealth of indigenous knowledge, languages, folklore, customs and traditions and products that can be harnessed for development. The interrelationships as a result of interactions in educational institutions, at work places, intermarriages enhance understanding of other cultures and enhances harmony and social cohesion. However, a lot still needs to be done to document IK in Uganda.

3.2.3.2 Traditional knowledge and practices integrated biodiversity conservation and management

The policy objective on traditional and complementary medicine under the National Medicines Policy (2015) seeks to maximise the benefits of Traditional and Complementary Medicines (TCM) where possible and desirable and to protect the public against their possible negative effects. Nearly 80% of Uganda's populations in Uganda use TCM for their primary health care needs due to its wide availability and accessibility. IK has for long been an integral part for maintaining and strengthening sustainable livelihood opportunities in rural communities. Indigenous Knowledge is socio-economically affordable, sustainable, involves minimum risk to rural farmers and producers, and it is better for conserving natural

resources. Indigenous Knowledge in rural agricultural communities has supported agricultural practices be productive and environmentally sustainable even under extremely challenging conditions.

In this reporting period the concept of Agricultural Indigenous Knowledge (AIK) focusing on how the AgShare methodology is promoting the documentation and dissemination of AIK and how the AIK is promoting sustainable food security and improving livelihoods among rural communities has been examined. It also highlights the achievements of the project as well as challenges in the protection and preservation of IK in the selected rural communities in Uganda. Data were collected using focus group discussions. Field visits were also made to the three districts to observe activities and events while taking videos and audio information recorded through the use of smart-phones. Pictures and documents were reviewed.

From the study findings, three forms of AIK were revealed namely: (i) pest and disease management, (ii) food/grain storage and preservation, and (iii) soil fertility management. IK has remained un-documented pausing a threat to its consistency and sustained utilization. Limited access to relevant and usable AIK among diverse stakeholders is a major constraint to its utilization. Based on the experience from the AgShare methodology implementation, it is hoped that development partners, rural farmers, universities and researchers will leapfrog in the utilisation of IK as well as rejuvenate the discourse on its preservation (The Cross Cultural Foundation of Uganda 2014).

Medicinal plants are of special importance to Uganda because of their wide application in traditional medicine by both the rural and urban population. It is estimated that approximately 80% of Ugandans depend on indigenous medicine. There are various plants associated with medicinal value in Uganda including Moringa, *Aloe vera*, *Prunus africana*, *African tulip* and *African tonic* among others (NEMA 2016). Recent ethno botanical research has identified more than 300 plants (trees, shrubs, flowers and weeds) growing wild across the country associated with medicinal value. Some of these crops have gained value in the pharmaceutical industry and are now grown on a commercial value while others are harvested by herbalists at zero price.

3.3 Progress towards reducing and managing negative impacts while enhancing positive impacts on biodiversity

3.3.1 By 2020, at least 17% of terrestrial and inland water ecosystems in Uganda are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas for socio-economic benefit of the population

3.3.1.1 Trends in coverage of protected areas

The protected area systems in Uganda consist of 10 National Parks with an area of 11,180 sq. km., 10 wildlife reserves measuring 8,764 sq. km, seven Wildlife Sanctuaries covering about 850 sq. km and 13 Community Wildlife Areas of approximately 27,604 sq. km, making up 14% of the total land area of the country (Figure 3.12). The National Forestry and Tree Planting Act (2003) facilitated the creation of 192 Local Forest Reserves (LFRs) totaling just below 5,000 ha, and 506 Central Forest Reserves (CFRs) totaling about 1.2 million hectares (Kamugisha-Ruhombe, 2007). Together the gazetted protected wildlife protected areas and the forest reserves cover about 18.87% of land cover which is above the 17% global Aichi target.

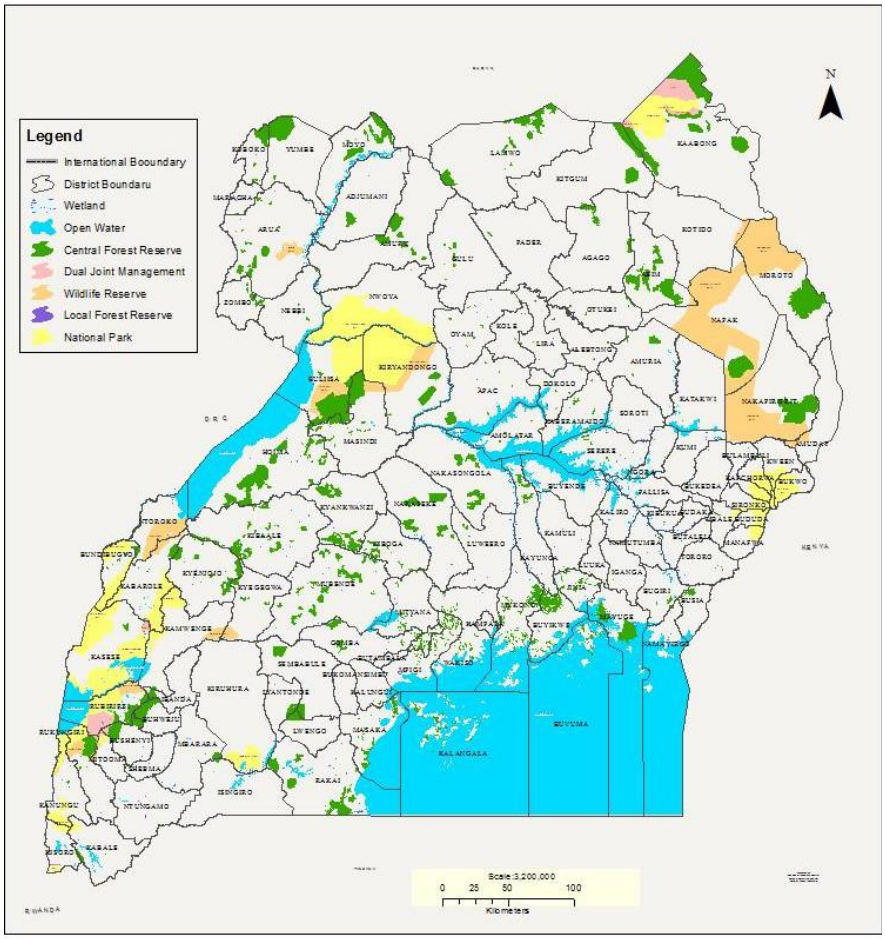
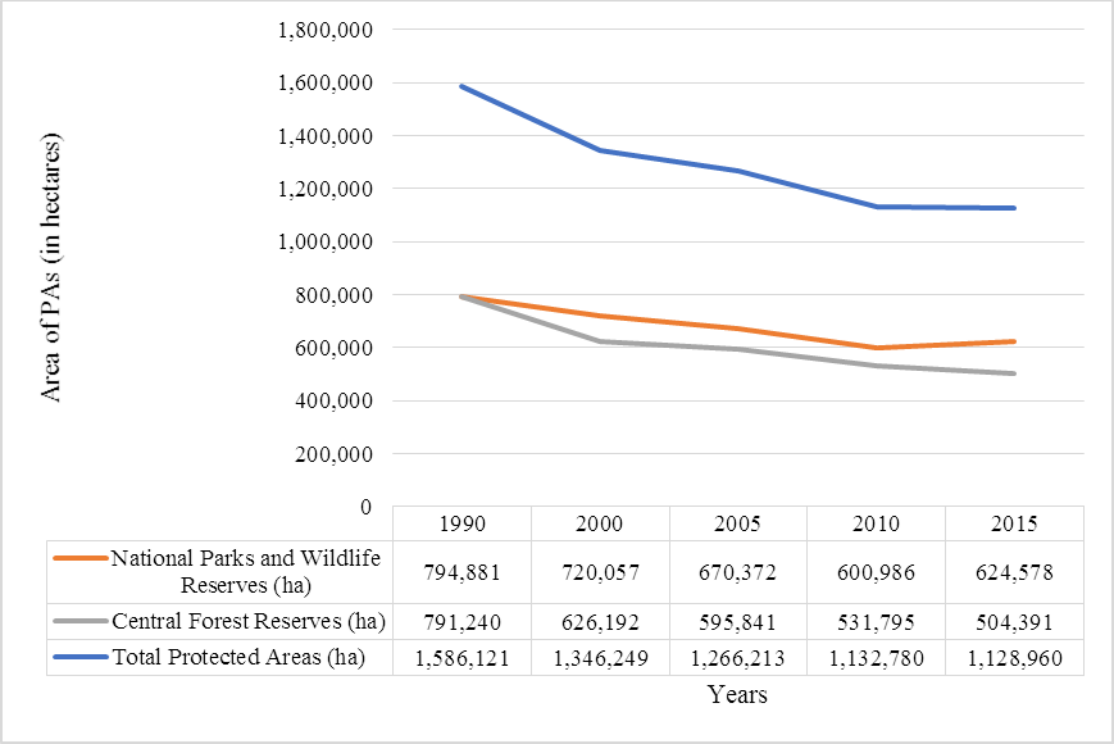


Figure 3.12: Protected Areas in Uganda 2015
Source: MWE 2016

In 2018, the Government embarked on a process of gazetting and declaring some of Uganda's wetland cover as a protected area. The process of gazetting and converting some wetlands to protected areas is expected to be completed in the 2019/20 Financial Year. According to the 2016 Uganda Wetland Atlas Volume II, Uganda's wetlands cover an area of 11% of the land area; seasonal wetlands (7.7%), permanent (3.4%) and swamp forests (<0.1%) (MWE, 2016). Once this is done the overall protected area systems in Uganda is expected to increase to about 29% of land cover.

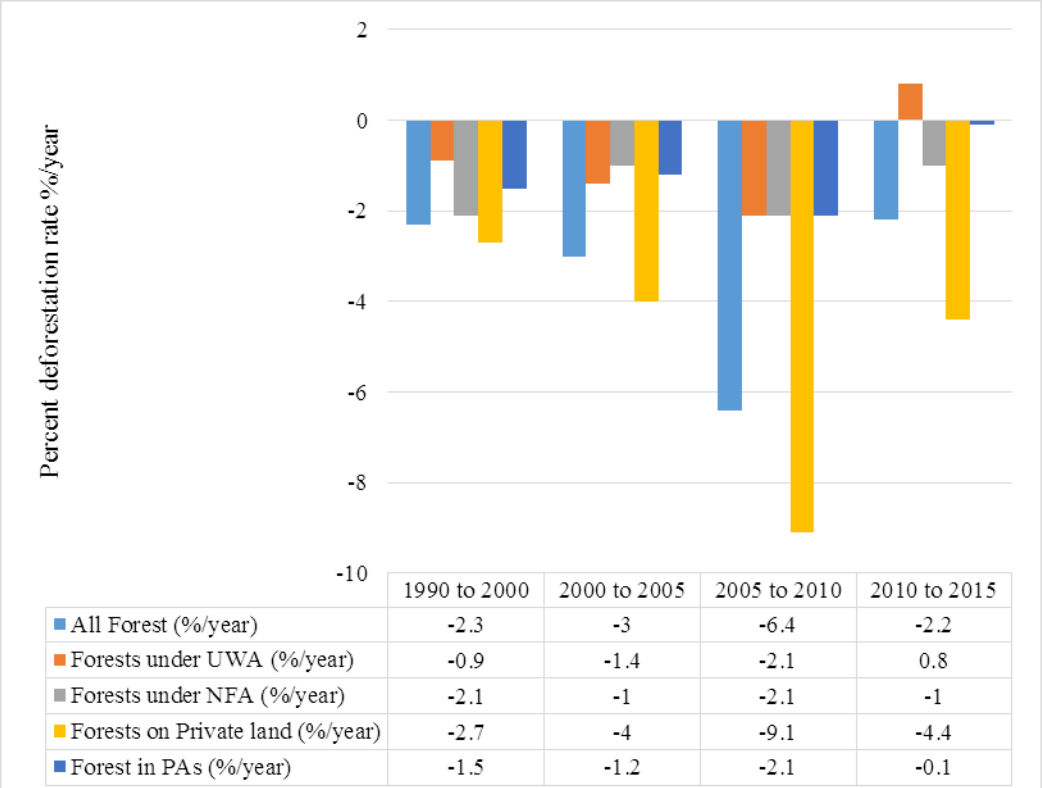
One of the major trends for protected areas in Uganda is the reduction of forested areas in protected areas in national parks and wildlife reserves and central forest reserves. The forest cover declined from 1.59 million ha in 1990 to 1.13 million ha in 2015 (Figure 3.13).



	1990	2000	2005	2010	2015
National Parks and Wildlife Reserves (ha)	794,881	720,057	670,372	600,986	624,578
Central Forest Reserves (ha)	791,240	626,192	595,841	531,795	504,391
Total Protected Areas (ha)	1,586,121	1,346,249	1,266,213	1,132,780	1,128,960

Figure 3.13: Trends of Forest Cover in Uganda's Protected Areas

Over the last 25 years, the highest rate of deforestation occurred between 2005 and 2010 (Figure 3.14). With deforestation in protected areas at 2.1%/ year while that on private land was at 9.1%/year. Since the high deforestation rate of the late 2000s, forest cover has increased in national parks and wildlife reserves, while deforestation in central forest reserves has reduced from 2.1% to 1.0%/year compared to the deforestation on private land which is still high at 4.4%/year (Diisi 2017).



	1990 to 2000	2000 to 2005	2005 to 2010	2010 to 2015
All Forest (%/year)	-2.3	-3	-6.4	-2.2
Forests under UWA (%/year)	-0.9	-1.4	-2.1	0.8
Forests under NFA (%/year)	-2.1	-1	-2.1	-1
Forests on Private land (%/year)	-2.7	-4	-9.1	-4.4
Forest in PAs (%/year)	-1.5	-1.2	-2.1	-0.1

Figure 3.14: Average annual rate of deforestation
Source: Diisi (2017)

3.3.1.2 Trends in the coverage connectivity/corridors of protected areas

Corridors provide habitats for wildlife to move from one area to another. Often, these corridors are not under any protection and with increasing demand for land such areas are slowly taken over for human activities especially agriculture and thus the connectivity of corridors to protected areas have been affected. The corridors are largely fragmented and this is contributing to increase in human-wildlife conflict. With the increase in human populations, it is becoming increasingly clear that the existing land area has to be properly planned for human activity and for conservation (Nangendo et al. 2010).

3.3.1.2.1 Protected area corridors of the Albertine Rift

From the perspective of the national landscapes, the Albertine Rift largely overlaps with the Afro-Montane landscape and Western Mid-Altitude farmlands. The difference in characterisation is largely the species diversity compared with the forest and agricultural ecosystems described in the national landscapes context. Therefore, alternative land uses lie side by side with the conservation zone that is the Albertine. Due to increased human population and high demand for natural resources, the areas that species can use for movement have gradually been lost as people convert them to agricultural land. Species have then been restricted to protected areas, which are sometimes too small to maintain a viable population. This has resulted in the need to deliberately create and/or maintain existing corridors connecting the protected areas (Figure 3.15). Corridors are essential for enabling the species access to resources necessary for their survival and for migration (Nangendo et al. 2010).

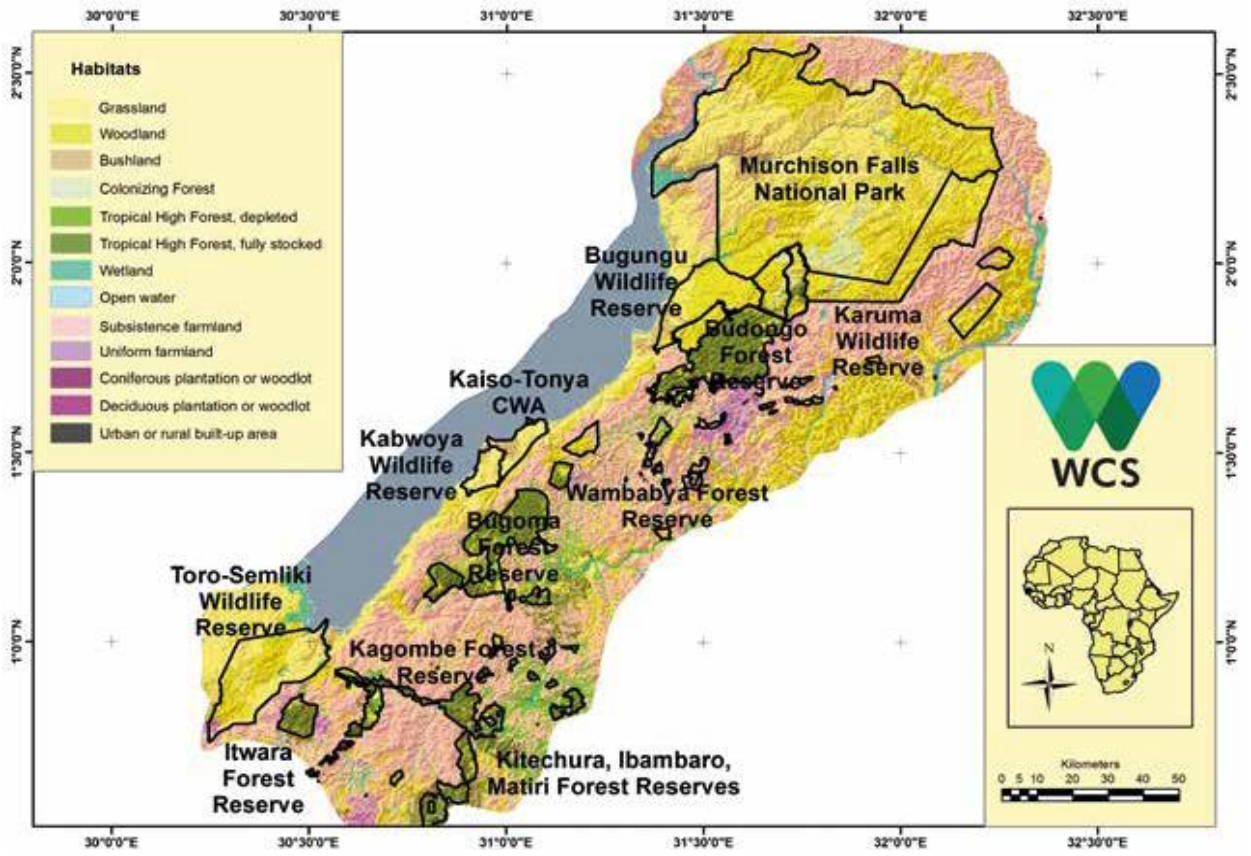


Figure 3.15: Habitats of the Murchison-Semliki landscape
Source: Plumptre et al., WCS 2017

The Albertine Rift consists of six landscapes, two of which are located in the Uganda. The Uganda landscapes are the Murchison-Semliki Landscape in western Uganda (the northern rift) and the Greater Virunga Landscape (the southern rift), straddling the borders of south-west Uganda, northern Rwanda and eastern DRC. The Murchison-Semliki landscape encompasses the natural and human modified habitats from the Murchison Falls National Park (NP) in the north along the eastern shores of Lake Albert to the Semliki Wildlife Reserve in the south (Figure 3.16). Some key species of conservation concern in this landscape include the Rothschild giraffe (*Giraffa camelopardalis rothschildi*), (Uganda Mango bay (*Lophocebus ugandae*), and Nahan's Francolin (*Francolinus nahani*), as this landscape holds significant global percentages of these three species. It is also an important landscape for the conservation of elephants, chimpanzees (*Pan troglodytes*), lions (*Panthera leo*), and spotted hyaenas (*Crocuta crocuta*) nationally in Uganda.

The second major landscape within the Albertine Rift is the Greater Virunga landscape. This landscape straddles the international boundaries of the DRC, Rwanda and Uganda and includes three World Heritage Sites (Rwenzori Mountains NP, Bwindi Impenetrable NP and Virunga NP), a man and biosphere reserve (Queen Elizabeth NP), and a Ramsar Site (Lake George and Kazinga Channel). This landscape is one of the most diverse landscapes in the World and contains 1,462 terrestrial vertebrate species and 3,105 plant species. Some key species which are only found in this landscape include the mountain gorilla (*Gorilla beringei beringei*); golden monkey (*Cercopithecus kandti*), Rwenzori duiker (*Cephalophus rubidus*), Matthew's or Virunga buffalo (*Syncerus mathewsi*), Strange-nosed chameleon (*Kinyongia*

xenhorrina) and Carpenter's chameleon (*Kinyongia carpenteri*). Several plant and amphibian species are also confined to this landscape. Endemic species number 107 terrestrial vertebrates and 145 plant species; and 74 terrestrial vertebrates together with 41 plant species are globally threatened.

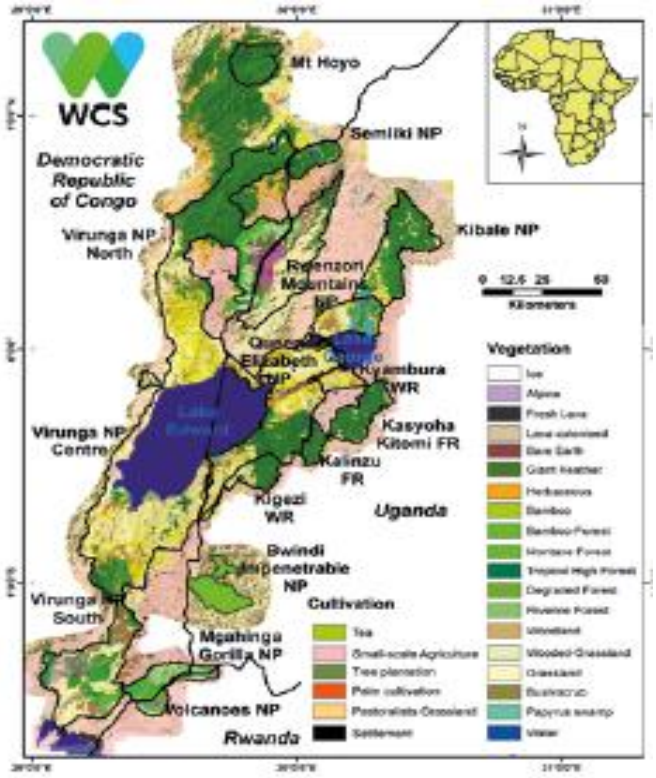


Figure 3.16: Vegetation Map for the Greater Virunga Landscape
Source: Plumptre et al., WCS 2017

Much of the forest area in the northern Rift remains under private ownership (legally documented or customary tenure). In the early 2000s it was estimated that 70% of the forest in the Rift is on private land (UNDP-GEF 2007). However, estimates of deforestation rates made in 2010 indicate that all such private forests will have been cleared in some districts by 2014 and in all districts by 2025 (WWF, WCS, JGI & CSWCT 2010). With this in mind, a priority for the strategic planning process has been the identification of forest and woodland savannah connections (corridors) through the landscape to retain migration routes and support gene flow among populations of vulnerable species.

As part of the Strategic Plan for the Northern Albertine Rift, the Government of Uganda identified at least 20 central forest reserves, wildlife reserves and community wildlife areas (CWAs) that could serve as wildlife corridors for the Murchison-Semliki landscape (Figure 3.17). Notable species of conservation concern using these corridors included both threatened species such as Chimpanzee, Golden cat, and White-naped Pigeon, as well as corridor species including Side-striped Jackal, Great Blue Tauraco, Black-billed Tauraco, Ross's Tauraco, Black and White Casqued Hornbill, White-thighed Hornbill, African Goshawk, African Crowned Eagle, and Little Sparrow hawk. However, none of the understorey species identified as possibly needing the corridors were found in the corridor forests, although Nahan's Francolin and Green-breasted Pitta were recorded from Bugoma Forest Reserve.

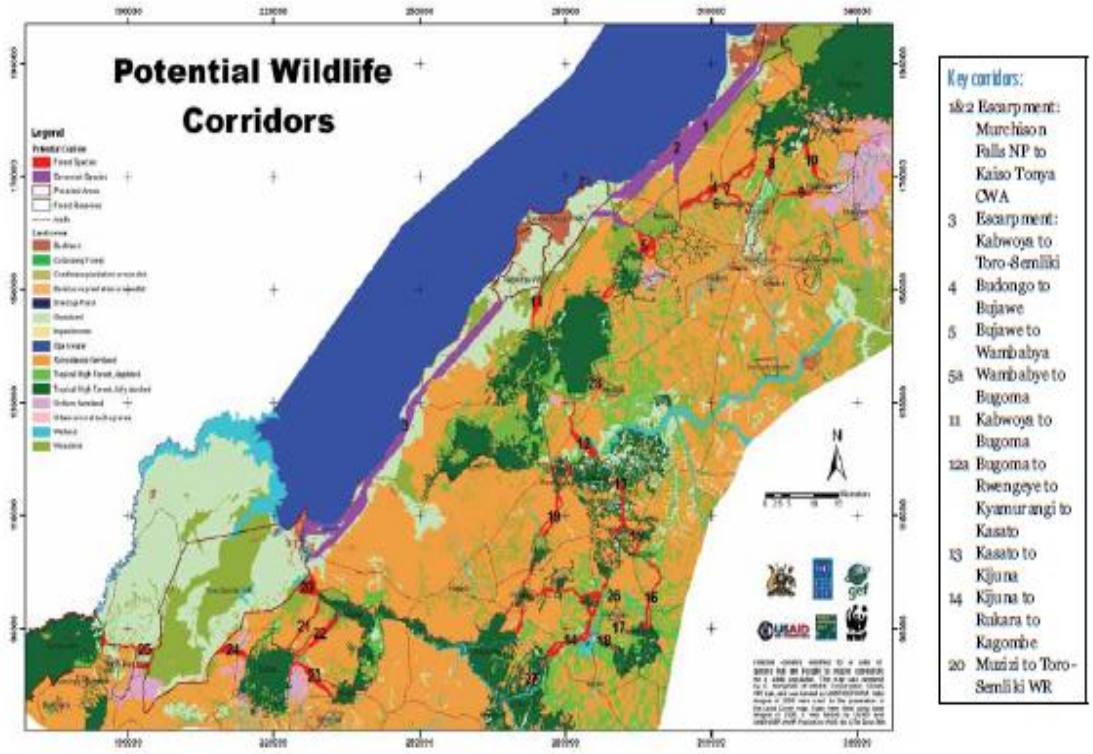


Figure 3.17: Critical corridors for maintaining connectivity for landscape species in the Murchison-Semliki landscape (Source: MWE 2012)

3.3.1.2.2 Protected area corridors of the Karamoja Critical Landscape

In Uganda, many protected areas (PAs) are rapidly becoming isolated due to growing human population, new settlement in previously unpopulated areas, land use changes towards agriculture and changing infrastructure. The fragmentation of habitat into small patches is a major threat to terrestrial biodiversity as it can inhibit dispersal, reduce gene flow, decrease food availability, and increase the amount of edge effects. Fragmentation can impede range shifts, especially in those species that have trouble crossing gaps between patches to move to new habitats in the landscape. Yet the long term viability of PAs depends on watersheds outside the protected areas, on the ability of animals to disperse and return to their original habitat on an annual basis and on a flow of animals from other PAs. However, the opportunities for establishing, maintaining or managing corridors between PAs are rapidly diminishing, endangering the future of the ecosystem services and the biodiversity provided by PAs.

The Government of Uganda recognizes the fact that its people depend increasingly on PAs for the ecosystem services they provide such as clean and abundant water, revenues from tourism, and traditional and future medical products. It is important therefore, that vegetation remnants and vegetated corridors are maintained and enhanced as a network across all lands both private and public. In this way private landscapes can contribute to wider landscape conservation efforts by enhancing and linking existing reserves and conservation networks. A holistic approach is required across both public and private lands to protect and manage natural ecosystems and ensure connectivity between remaining habitats (Figure 3.18).

The wildlife corridors in the Kidepo Critical Landscape (KCL) are important migratory routes for wildlife, especially the big mammals such as elephants and buffaloes. This is particularly critical during the dry seasons when there is a shortage of both food and water in the KVNP. This forces the animals to move southward eastwards to Karenga community wildlife corridor or further down south to areas as far as Otuke and Abim districts while others move south-westwards to Kitgum and Agago districts (Figure 3.13). In addition to the big mammals, there are also a number of small animals such as monkeys, warthogs, wild pigs, antelopes, duikers, wild rabbits, baboons, edible rats, bats, squirrels (Appendix 3, 4 and 5). There are also different types of birds including the rare ones such as ostriches. Whereas some of these animals come and return to the park (seasonally) when rains return, others are permanently resident in these areas. It is estimated that about 150 elephants live within this corridor permanently. With the support from the Global Environment Facility (GEF) through the United Nations Development Programnme (UNDP) government developed management plan for the wildlife dispersal corridors/block for the KCL in figure 3.18 below. This is the first of its kind in Uganda to support management of biodiversity outside protected areas. Lessons learnt from its implementation will be used for upscaling to other parts of the country.

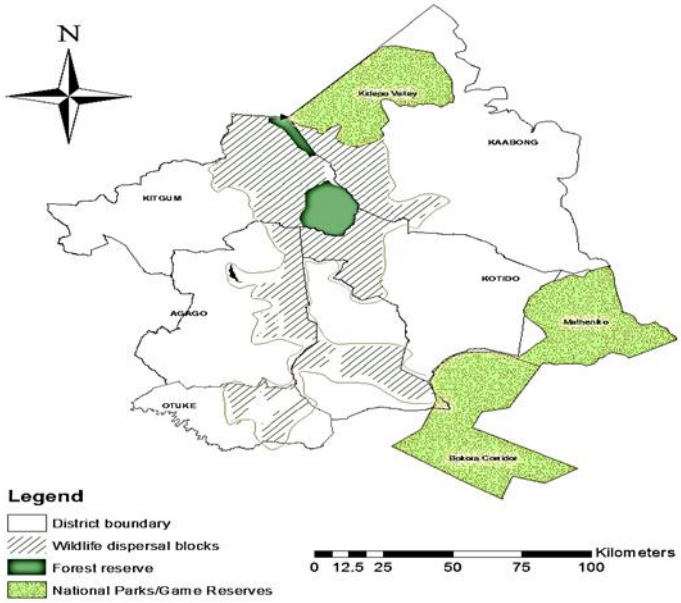


Figure 3.18: Extent of wildlife dispersal blocks/corridors in Kidepo Critical Landscape
Source: NEMA et al. (2018)

The corridors also consist of one of the biggest belts of shea (*Vitellaria paradoxa*) trees in Uganda especially in the districts of Agago, Abim, Kitgum and Otuke. This belt supports other forms of wildlife that depend on shea for food and other purposes. In itself, shea tree products, especially the fruits and oil have significant ecological and economic potential for improvement of the livelihoods of the local people. Apart from the income earned from the sale of shea oil extracted from the seeds, the fruits have enormous nutritional values hence making this shea belt a safety net during times of famine. However, the shea trees are threatened species due to the destruction it is facing mainly for charcoal production.

3.3.2 By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15%of degraded ecosystems

3.3.2.1 Status and trends in extent and condition of habitats that provide carbon storage

In Figure 3.19 below the carbon storage in Uganda is characterised by above biomass and soil organic carbon in 2018. The highest storage of for both above ground and soil carbon occurs in the montane areas of Elgon and Rwenzori. For above ground carbon, the high carbon storage in the montane areas is followed by the storage in a stretch of area along the Eastern border, the Lake Kyoga Basin and south-western Uganda.

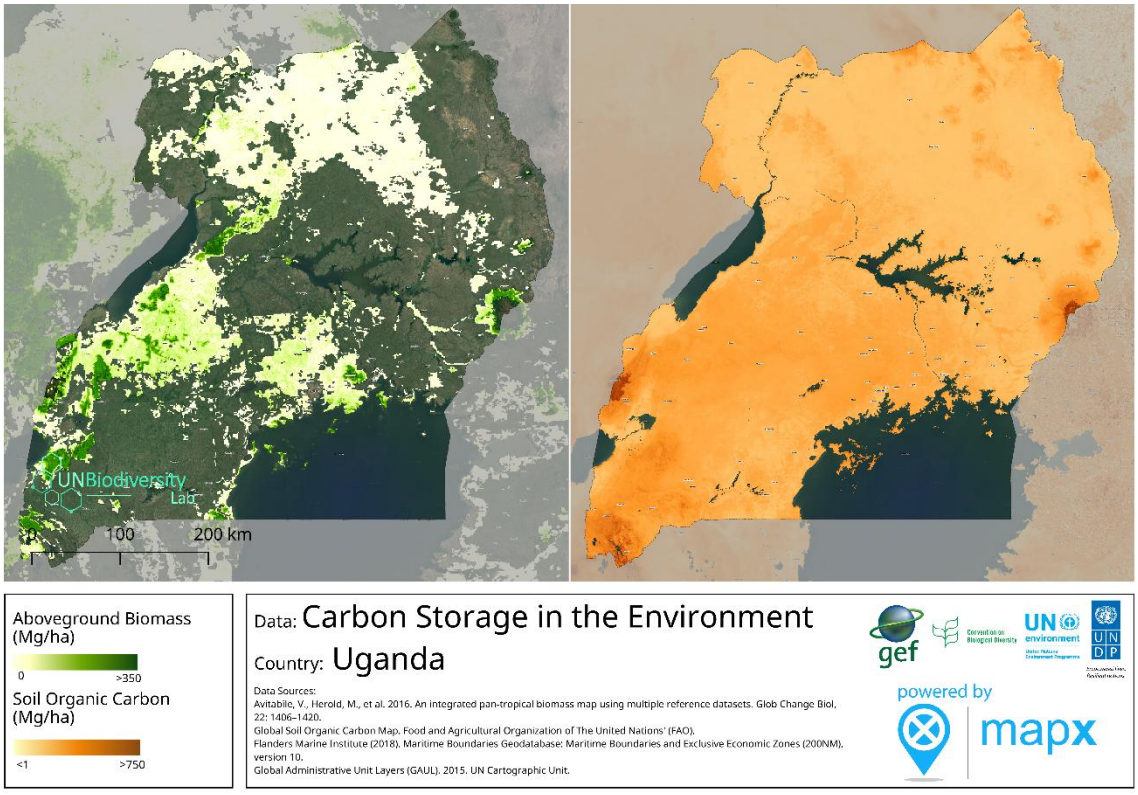


Figure 3.19: Carbon storage potential in the Environment
Source: UN Environment 2018

An assessment soil carbon stocks (Soil organic carbon) distribution in Uganda in 2010 showed that the Rwenzori region has the highest SOC (250-300 t/ha) followed by the Mt Elgon region and the Kisoro area (200-250 t/ha). The northern and eastern regions including the Karamoja region have the lowest soil organic carbon content in the country (100-200 t/ha). The rest of the country has an SOC content of 150-200 t/ha (GOU 2018) (Figure 3.20).

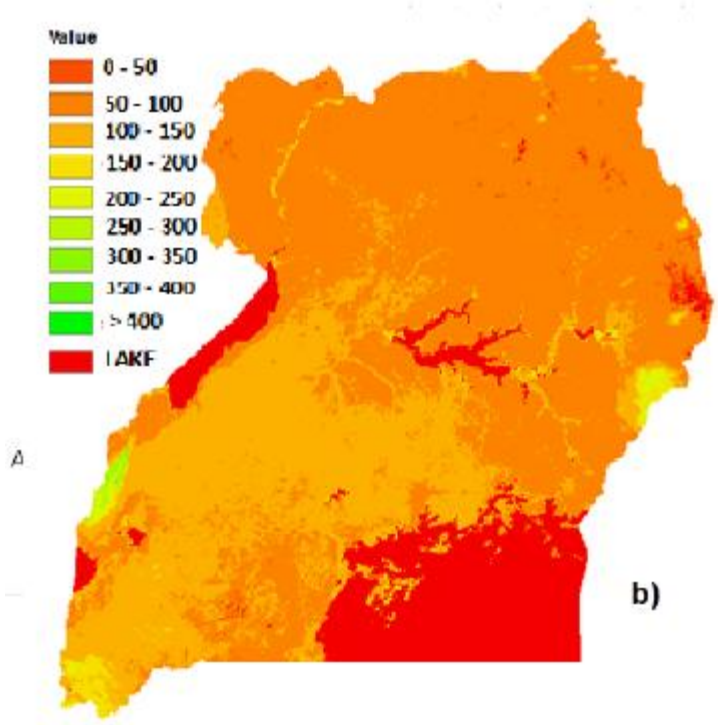


Figure 3.20: Land cover change (a) and soil organic carbon (b) t/ha) distribution in Uganda
Source: GOU 2018

The highest SOC was observed under the forest followed by crop land and shrubs, herbs and other vegetation. Between 2000 and 2010, 59 km^2 of forest were converted into cropland and 78 km^2 into shrub-grassland and sparsely vegetation. This induced a change of 0.01% of total soil carbon stock in the top 30 cm of soil. The area of 130 km^2 initially under forest which has been converted into cropland, grassland and sparse vegetation is associated with a net loss of 146,961 tons of SOC that represents 0.01 % of the total Soil carbon stocks (GOU 2018).

A comparison of carbon stock changes for protected areas shows that the area-weighted mean annual carbon changes in PAs of Uganda for the period 2000–2012 was 0.22 ± 1.36 t/ha, estimated to a total carbon gain of 0.70 mega tonnes (Mt) per year (Figure 3.21). With an annual carbon loss and gain ranging from −16 t/ha to 13 t/ha, on average, National Parks and Wildlife Reserves gained carbon, while the Central Forest Reserves (CFRs), Local Forest Reserves (LFRs) and Dual Joint Management (DJMs) lost carbon. In terms of numbers of PAs, 63% of the PAs lost carbon during the period and the majority (70%) of these were CFRs. Although, PA area sizes varied considerably, the rate of carbon loss or gain did not appear to depend on PA size (Gizachew et al. 2018).

At the level of protection categories, on average, forest reserves (CFR and LFR) lost carbon while National parks and wildlife reserves have gained carbon during the monitoring period. On a PA by PA basis, and in terms of absolute carbon gain and loss, it is perhaps not surprising to find forest reserves at the top since forest reserves are located in areas of high carbon density and that each unit of deforested area translates into high carbon loss. Yet, LFR and CFR as a major source of carbon loss are an indication to the ineffectiveness of the PA management in high carbon forest areas in Uganda.

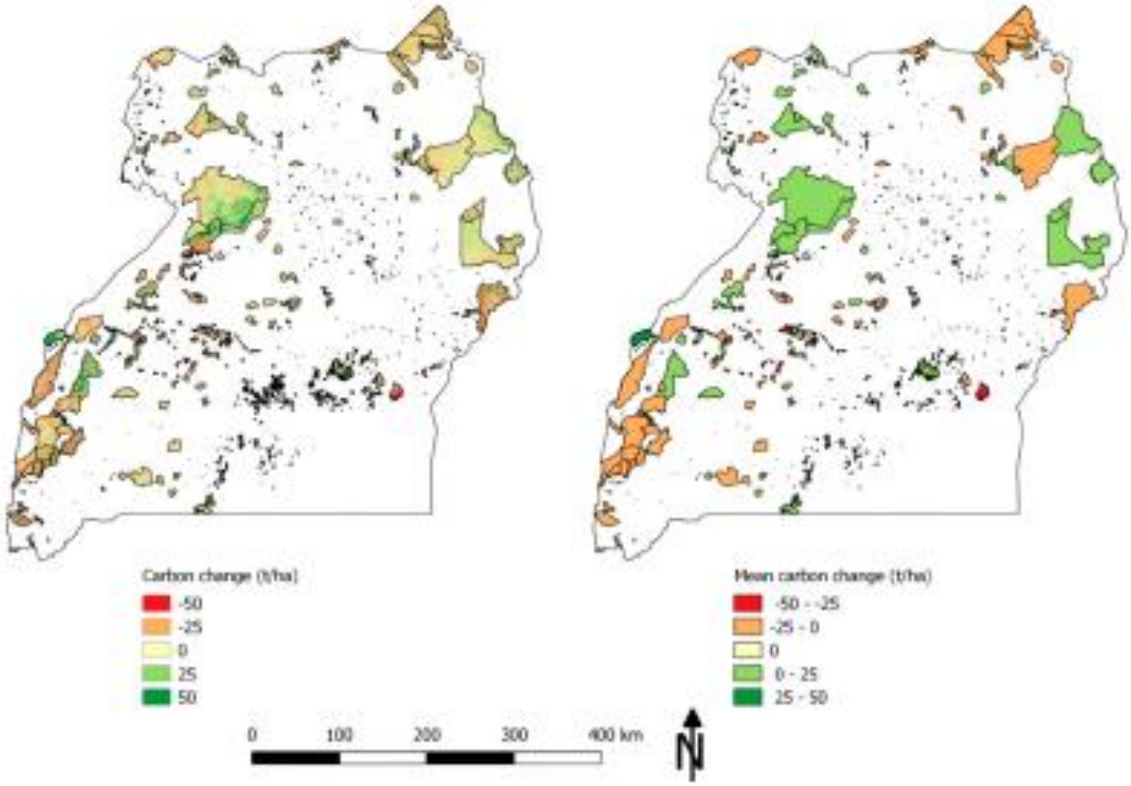


Figure 3.21: Carbon gain (green) and loss (red) range in PAs of Uganda
Source: Gizachew et al. 2018

Forest protection in Uganda has historically been intended, primarily for habitat, biodiversity conservation and protection of water catchments. The net carbon gain estimated from PAs suggest that the PAs are an effective policy tools to reduce carbon emissions. Nevertheless, a large number and size of PAs in Uganda have lost a substantial amount of carbon. Most of the carbon rich PAs designated as forest reserves (CFR and LFR) appeared either ineffective or are associated with local leakage, when effective. Therefore, whether Pas in Uganda have been effective at conserving carbon remain inconclusive, making the climate benefits of PAs uncertain.

3.3.3 By 2020, extinction of known threatened species plants and animals inside and outside protected areas prevented and their conservation status improved

3.3.3.1 Trends in abundance of selected species

3.3.3.1.1 Wildlife population estimates over the years

Wildlife populations are steadily building up in National Parks and Wildlife Reserves. Comprehensive surveys to determine the status of wildlife (medium - large mammals) in Uganda's savanna areas were carried out from the air courtesy of the Protected Area Assessment Programme in 1995 – 1996 and the results from these surveys provide baseline information for most protected areas. Populations have increased for some species for instance mountain Gorilla population increased from 292 in 1995 to over 400 in 2015, the Elephant population increased by over 1000% from 550 in 1995 to over 5,000 in 2014, Buffaloes increased from 7,000 in 1995 to over 36,953 in 2014, the Giraffe population increased from 153 individuals in 1995 to over 1064 in 2014 and the Chimpanzee population increased from 3, 300 in

1997 to 5,000 in 2003. However, for certain species such as Burchell's zebra, Hartebeest, Topi and Eland the increase has not been remarkable while Roan antelope and Bright's gazelle have declined. The population of Beisa Oryx, Eastern Black rhino, and Northern White rhino declined to extinction (Table 3.4).

Table 3.4. Population estimates of selected Medium to large mammals in Uganda

Species	1960s	1982-1983	1995-1996	1999-2003	2004-2006	2007-2010	2011-2014	2015-2017
Buffalo	60,000	25,000	18,000	17,800	30,308	21,565	36,953	36,900
Burchell's Zebra	10,000	5,500	3,200	2,800	6,062	11,814	11,888	11,900
Elephant	30,000	2,000	1,900	2,400	4,322	4,393	5,739	5,700
Rothschild's Giraffe	2,500	350	250	240	259	984	880	880
Hartebeest	25,000	18,000	2,600	3,400	4,439	4,099	9,667	9,700
Hippopotamus	26,000	13,000	4,500	5,300	7,542	6,580	5,838	6,000
Impala	12,000	19,000	6,000	3,000	4,705	33,565	33,565	33,600
Topi	15,000	6,000	600	450	1,669	845	2,222	492
Ugandan Kob	70,000	40,000	30,000	44,000	34,461	54,861	77,759	80,000
Waterbuck	10,000	8,000	3,500	6,000	6,493	12,925	12,222	13,000
Common Eland	4,500	1,500	500	450	309	1,409	1,351	1,800
Grant's Gazelle	1,800	1,400	100	50	0	0	57	60
Roan Antelope -Sub-species-langheldi	700	300	15	7	0	5	118	150
Beisa Oryx (Sub-species-beisa)	2,000	200	0	0	0	0	0	0
Black Rhino	400	150	0	0	0	0	0	0
Lord Derby's Eland	300	0	0	0	0	0	0	0
Northern White Rhino	300	20	0	0	0	0	0	0
Eastern Black Rhino	400	150	0	0	0	0	0	0
Southern White Rhino					8	11	17	22
Lion						408	493	493
Gorilla				320	302		400	400
Chimpanzee				4,950	4,950	4,950	4,950	5,000

Gorilla numbers are records for Bwindi only

Source: MTWA 2017

3.3.3.1.2 Population of some other key animal species

The present status of lions in Uganda is in isolated meta populations existing only in three of the ten national parks; Kidepo Valley, Queen Elizabeth and Murchison Falls National Parks.The population estimates by researchers and park staff in protected areas from 1977 to 2013 is shown Table 3.5. Population surveys were conducted using total counts and audio calls following Ogutu and Dublin (1987) and Sutherland, (1996) in selected areas of Queen Elizabeth national park from 1997-1999 (Driciru, 1999), in Murchison Falls National Park from 2000 to 2002 (Driciru, 2003), and in Kidepo Valley national park from 2002 to 2004. Monitoring of the known groups of lions was done in Queen Elizabeth National Park from 2001 to 2004 (Siefert, 2003), and in Murchison Falls National Park from 2003 to 2004 (Okecha, 2004). Individual lions were identified following the methods of Pennyquick and Rudnai (1970), and Schaller, (1972), and identification cards and photo albums were made for coded individuals.

The lion population has experienced a steady decline due to indiscriminate killing by the local communities especially pastoralists, road accidents, habitat loss and diseases. Sensitivity analysis revealed

that small lion populations are fragile to the above risk factors, and if not controlled, can lead to very dramatic decline of the population or even extinction. The population estimates may also vary depending on the method used in the survey.

Table 3.5. Lion population estimates in Uganda's wildlife protected areas

Protected Area	1977-1981[a]	1994-1996	1997-1999[b]	2000-2002[c]	2004[d]	2005	2010[e]	2013
QENP	400		185	206	200		144	
MFNP				181-467	350	263	132	215
KVNP				35-60	25		132	
LMNP		7		2				1
Toro-Semliki				5-15				1

Data sources; [a] Din (1978) and Van Orsdol (1981); [b] (Driciru 1999, 2005; Driciru, Siefert & Mapesa, (2005); [c]Uganda Large Predator Program (2000–2002); [d]Bauer & Van Der Merwe (2004); [e]Okot Omoya et al (2010) Tutilo Mudumba & Sophia Jingo (2013)

The number of Nile crocodiles has drastically declined since the last century. In Uganda, the Nile Crocodile was transferred to appendix 2 of CITES to allow ranching and restocking in the wildlife. The latest survey of crocodile population in MFNP was conducted in 2013 on the south bank, north bank and delta areas. Currently, there are 497 Nile crocodiles in MFNP. Most of the crocodiles are found on the Northern bank of River Nile. The survey undertaken in 2013 revealed that the juveniles accounted for 32% of all the crocodile population (Table 6). It is anticipated that the adult population will increase when the juveniles are sexually mature and are under proper monitoring and management.

Table 3.6. Population trend for the Nile crocodiles from 1969 to 2013 in MFNP

Year	Population Estimate	Data source
1969	595	Parker and Watson (1970)
1991	10 fold reduction (61)	Hutton (1991)
1995	230	Uganda Institute of Ecology (UIE) et al.(1995)
1996	316	Kaijaet al.(1996)
2002	180	Isabirye – Basutaet al.(2002)
2013	659	Wanyama. F. and Ogwang. P. et al.(2013)

Studies to document mountain Gorilla population trends in Bwindi Impenetrable National Park commenced in 1987 with 280 individuals being recorded. The population has continued to increase to a minimum of 400 individuals in 2011(Figure 3.22). Gorilla census is done every after five years. So Gorilla census in BINP commenced in March this year 2018 and the first sweep has been concluded (MTWA 2017).

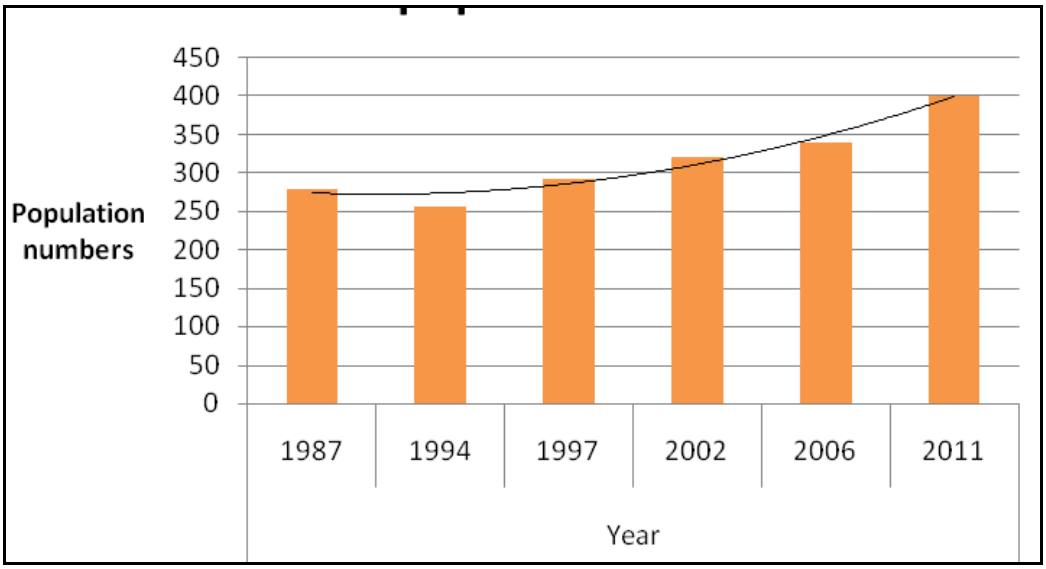


Figure 3.22: Mt. gorilla population trends of in Bwindi Impenetrable National Park

Data sources;Vedder & Aveling (1986); Sholley (1991); [f]McNeilage et al. (2001; 2006), Jose Kalpers et al (2003); Guschanski et al. (2009), [i]Martha et al (2011)

3.3.3.1.3 Conservation Status of Birds in Uganda

Uganda has a total record of 1,057 species of birds. Among this country list of species, about 190 are regular migrants mainly from the Palearctic region but also about 54 of these are intra-African migrants. The majority of the bird species in Uganda are residents and breed in the country (Adopted from-NatureUganda 2015: The State of Uganda's Birds 2014).

Table 3.7: Conservation Status of Birds in Uganda*

Total Bird Species	**1,057**
Extinct	0
Extinct in the Wild	0
Globally Threatened	24*
Critically Endangered	0
Endangered	9
Vulnerable	15
Near Threatened	29
Least Concern	1,004
Land birds	847
Migratory Birds	236
Breeding Endemic	1
Water birds	140

Source: NEMA (2016)

Uganda has 24 (2%) globally threatened bird species and 29 (3%) near-threatened species1 and the rest of the species are of least concern (BirdLife International, 2014)(Figure 3.23).The globally threatened

1 [1]Endangered refers to species of animal or plant that is seriously at risk of extinction.

species include nine endangered species and 15 vulnerable species. The endangered species include the three vulture species, White-backed Vulture, Rüppell's Vulture and Hooded Vulture and the Grey-crowned Crane species.

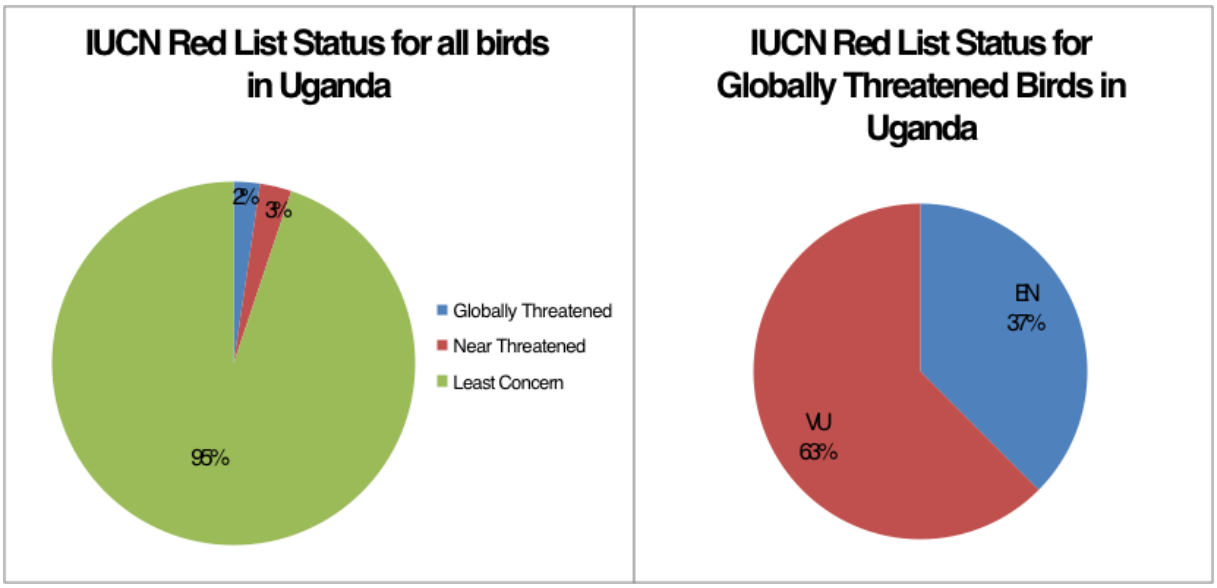


Figure 3.23: Globally Threatened Birds in Uganda and IUCN Red List Status for all birds
Source: Birdlife International (2014) Country Profile for Uganda.

The population of Uganda's national bird, the Grey-crowned Crane *Balearica regulorum*, has plummeted by 80% since the 1970s. Its population has reduced from more than 35,000 birds in the 1990s to less than 13,000 individuals by 2010 (Nature Uganda 2014).

The Grey Crowned Crane is also on the decline globally and is listed as Endangered on the IUCN Red List. In Uganda, its habitat (seasonally flooded wetlands) is seriously degraded and quickly disappearing. However, they are also under threat from illegal trade, use in witchcraft and domestication. Although records since 2000 show signs of recovery due to increased public awareness, a national crane species action plan has been developed and its implementation will help to protect the species. The action plan presents overviews of the species with a particular emphasis on status and threats. The plan identifies priority actions for immediate implementation to address threats of; wetland degradation, Crane capture/hunting/trapping for home use, sale and or traditional use, collision with power lines and communication lines, unnecessary human disturbance and proximity to breeding sites.

The Uganda Bird Atlas (Carswell et al. 2005) categorises 18% of the species as forest interior species (FF), 12% as forest dependent species (F) and 10% as forest edge species (f) based on habitat associations (Pomeroy, D. & Asasira, J. 2011). It further considers 22.5% of the total species as water birds (Table 3.8).

[2]A vulnerable specie is one which has been categorized by the International Union for Conservation of Nature as likely to become endangered unless the circumstances that are threatening its survival and reproduction improve

Table 3.8: Globally threatened Birds of Uganda: EN= Endangered, VU= Vulnerable

Scientific name	Common name	Red List Category
Acrocephalus griseldis	Basra Reed-warbler	EN
Apalis karamojae	Karamoja Apalis	VU
Ardeola idea	Madagascar Pond-heron	EN
Balaeniceps rex	Shoebill	VU
Balearica regulorum	Grey Crowned-crane	EN
Bradypterus graueri	Grauer's Swamp-warbler	EN
Bucorvus leadbeateri	Southern Ground-hornbill	VU
Chloropeta gracilirostris	Papyrus Yellow Warbler	VU
Circaetus beaudouini	Beaudouin's Snake-eagle	VU
Cryptospiza shelleyi	Shelley's Crimson-wing	VU
Eremomela turneri	Turner's Eremomela	EN
Falco fasciinucha	Taita Falcon	VU
Gyps africanus	White-backed Vulture	EN
Gyps rueppelli	Rüppell's Vulture	EN
Hirundo atrocaerulea	Blue Swallow	VU
Muscicapa lendu	Chapin's Flycatcher	VU
Necrosyrtes monachus	Hooded Vulture	EN
Polemaetus bellicosus	Martial Eagle	VU
Pseudocalyptomena graueri	African Green Broadbill	VU
Psittacus erithacus	Grey Parrot	VU
Ptilopachus nahani	Nahan's Partridge	EN
Sagittarius serpentarius	Secretarybird	VU
Torgos tracheliotos	Lappet-faced Vulture	VU
Trigonoceps occipitalis	White-headed Vulture	VU

Source: BirdLife International (2014) Country PROFILE: Uganda. Available from: http://www.birdlife.org/datazone/country/uganda. Checked: 2018-05-23

Amphibians (Amphibia) and reptiles (Reptilia) are two classes of animals that are grouped together because they are considered ectothermic (derive heat from outside sources most commonly the sun). Amphibians include frogs, toads, newts and salamanders and make up over 5,500 different species. In Uganda, 80 species, 20 genera of amphibians and 1 order the Anura have been recorded. There are over 9000 species in Reptilia that include snakes, lizards, crocodiles and alligators, turtles and tortoises. In Uganda 175 species, 77 Genera, 19 families and 4 orders (the Chelonii, Crocodylia, Sauria & Serpentes) have been recorded (Daniel.F, Greenbaum.E, Lukwago.W, and Behangana.M, 2016) The conservation status of these two classes of animals is shown (Table 3.9)

Table 3.9: Conservation status of Amphibians and Reptiles in Uganda

IUCN STATUS	Amphibia	Reptilia
	No of species	No of species
CR = Critically Threatened	01 (Arthroleptides dutoiti)	06 (including Trionyx triunguis)
EN = Endangered	06	04
VU = Vulnerable	06	06
NT = Near Threatened	08	06
LC = Least Concern	48	73
DD = Data Defficient	11	80

Source: Hughes. D.F, Greenbaum.E, Lukwago.W, and Behangana.M, (2016)

Landscape studies conducted in Buffer Zones of National Parks suggest considerable decline of wildlife for the Mt. Elgon National Park (Figure 3.24). The decline was attributed to conversion of habitats to agricultural production due to the high human population aroubd Mt. Elgon National Park and also use of wildlife as a source of food due to the frequent landslides when farmers are unable to grow crops. The result was increased pressure to encroach the national park as the population grows and the impacts of natural disasters, particularly landslides, intensify. There is no wildlife corridor between the park and local communities.

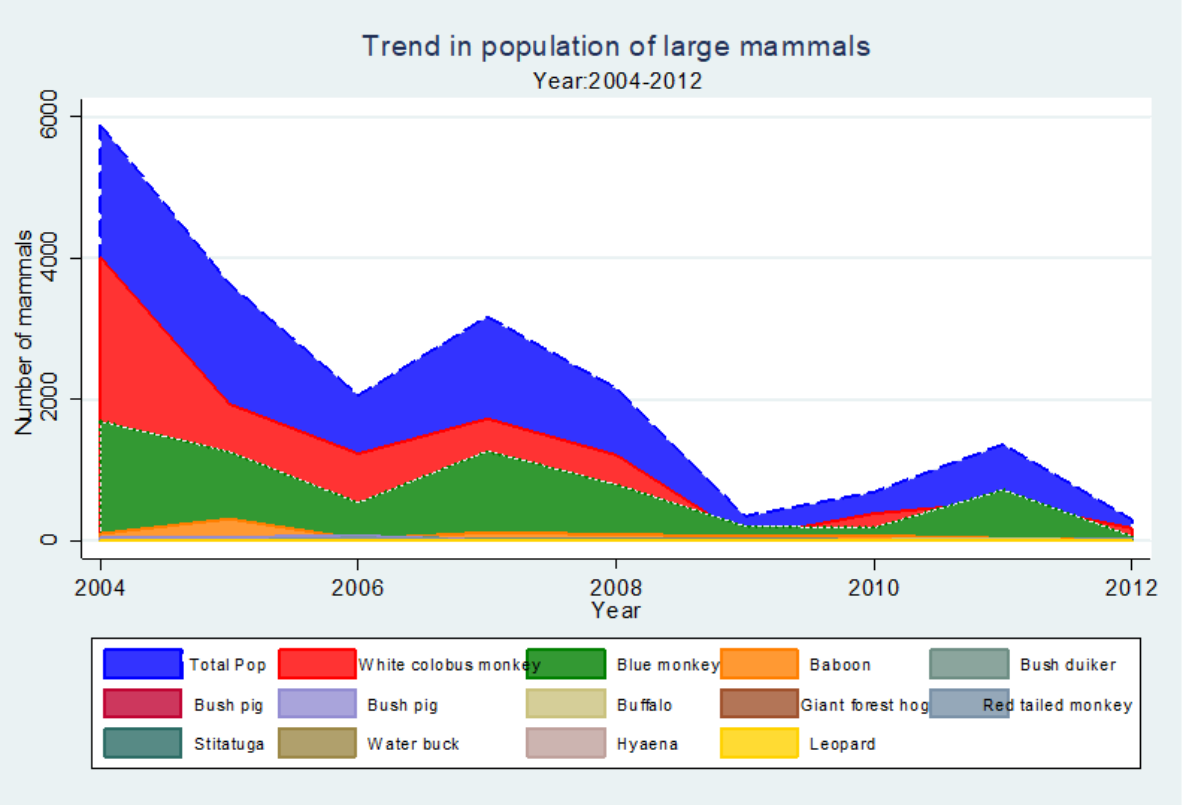


Figure 3.24: Trend in species distribution in Mt. Elgon National Park
Source: NEMA 2018

3.3.4 By 2020, The genetic diversity of cultivated plants and domesticated animals including their wild relatives and other socio-economically valuable species conserved

3.3.4.1 Collection of at least 20% of the genetic diversity of important crops and animals in Uganda together with their wild relatives undertaken and conserved after estimating their baseline

3.3.4.1.1 Plant diversity, plant resources

Uganda offers an exceptionally wide range of habitats available for human exploitation (Schoenburn 1998). The indigenous flora contains about 5,000 species of higher plants. Tree floras report many species as having uses and local inventories of medicinal plants can yield extensive lists (Hamilton et al. 2016). Genetic resources are either conserved as the organisms' genetic material ex situ/in vitro, e.g. plant or animal material such as seeds or semen, or they are actively conserved as living components on farms or in the landscape in situ/in vivo (Last 2013). The main food crops are maize, bananas, finger millet, sweet potatoes, sorghum, cassava, beans, peas, groundnut, Solanum potatoes, rice and sesame. Other crops of relative importance in some regions are pigeon peas, cowpeas among others.

There are many vegetables cultivated, some introduced and others indigenous. Of the indigenous ones some are semi-wild and still collected from the wild. Wild ones of relative importance in north and north-east Uganda include *Cucumis figarei, Corchorus tridens, Crotararia ochroleuca, Hyptis spicigera*, among others. Communities in north and north-eastern Uganda traditionally keep seed of variable crops in granaries but production constraints and population increase resulting in food shortage eventually led to rampant thefts from granaries. This situation eventually led to a level of food insecurity and subsequent loss of some diversity within individual crops. Granaries are run by individual households and seed exchange amongst the community has been common. Most of the fruits grown are introduced species (e.g. citrus species, pineapples, pawpaws among others) though some few indigenous ones such as *Garcinia buchananii*, *Carissa edulis and Saba comorensis*. have been introduced in local markets. Though germplasm collections of these have been undertaken, their promotion to cultivation still requires extensive study. These, being wild plants, are not differentiated into varieties by the rural communities and have not been subjected to selection. The banana still serves as a major staple food, a major cash crop on the local market and a fruit. Appraisal of the diversity in this crop revealed 84 distinct banana cultivars.

Many underutilized crops (e.g. yams (*Colocasia* spp, *Xanthosoma* spp, *Dioscorea* spp), are maintained by farmers to ensure food security. The majority of such species that are utilized at local level lack documentation that depict their variation, but the process of retrieving this information from farmers for documentation is under way. However, in these crops distinct cultivars are often not formally recognized but their diversity is based mainly on morphological factors. Therefore, in home gardens extensive amounts of genetic diversity are maintained even though the numbers of morphotypes and population sizes in any individual garden are often small. However, despite neglect by agricultural research and development, poor communities continue to grow minor crops such as bambara nut (*Vondzeia subterranean*), *Crotararia ochroleuca*, *Solanum nigrum*, etc. and market them at low scale. Many of the plant species harvested from the wild or protected in backyard gardens in homesteads are multi-purpose plants, with those of medicinal value contributing a significant proportion. Once all these are characterized it will be possible to select or eventually improve on them thus enhancing the process of their domestication and contribute to agricultural diversification. The rarer edible plants harvested in the wild or semi-protected by people in drier cattle corridor areas in north-east region (Karamoja and

Katakwi) are of relatively low importance to areas with adequate rainfall. So there is little known about the wild fruits from such areas, though some information was captured on them by Katende et al in the two publications on indigenous trees and shrubs in Uganda and that on edible plants from the wild. These species include non-food *Acacia spp.* and shear butter tree (*Vitellaria paradoxa* subsp *nilotica*) that could give a significant boost to the income of the people if exploited for gum Arabic and oil respectively. Researchers carrying out a survey on *Acacia senegal*. The diversity represented by such crops is still less studied and hardly collected for conservation. Ethno-botanic surveys so far undertaken reveal utilisation of plant diversity both wild and cultivated which has led to capturing different nutritional components in the people's diet at low cost. Unfortunately, the rich diversity found in plants harvested from the wild in most areas of the country has not been exploited through selective breeding (especially in indigenous fruits and vegetables to get more uniform varieties, which are a pre-requisite for consistent higher yields. The diversity of wild plants harvested for food production has been subjected to control under the Uganda National Forest Authority. However, there is no policy/legislation in place to support Collaborative Forest Management processes especially where wild species are harvested for food purposes e.g. bamboo shoots (*Arundinaria alpine*) and several species of mushrooms in the Elgon highlands in the Eastern region of the country. It is envisaged that potential livelihood benefits to local communities from Collaborative Forest Management are likely to be very low mainly because benefits/values of Collaborative Forest Management are not understood by the stakeholders. Problems associated with sourcing food plants from the wild include supply dependence on seasons, which at times fluctuate depending on rains received and duration thus affecting marketable biomass. The popularity of wild sourced diversity in PGRFA is reflected in their demand at the markets. Market prices received for the supplies often double or triple in the dry season.

3.3.4.1.2 In-situ Conservation of Wild Crop Relatives and Wild Plants for Food Production

By maintaining viable populations of threatened species like Shear butter trees (*Vitellaria paradoxa* subsp *nilotica*) rural communities have been sensitized by emphasizing the income generation aspects (NARO 2008). In communities where land ownership is communal, participatory planning of the in-situ conservation is crucial since decisions taken incorporate cultural values as well as people's livelihood. In areas designated as national parks or reserves, the communities' involvement in collaborative management of such areas enhances a sense of joint ownership thereby instilling a responsibility of sustainable harvesting. Such measures can only be achieved when the stakeholders are sensitized and act as members of a cohesive team. The wild crop relative and edible wild plants are components of the country's natural resources and policies related to their management such as the National Envionment Act (2017) and the Uganda Wildlife Act cap 200 (the Uganda Wildlife Bill).

3.3.4.1.3 Sustaining existing ex-situ collections

Under Sida contribution, and the commencement of East African Plant Genetic Resources Network (EAPGREN), activities in Uganda boosted ex-situ conservation efforts. Consequently, Long term and Short term seed storage facilities have been established at National PGR Centre (NARO 2008). Prior to that, ex-situ samples and crop related diversity was being maintained by individual plant breeders at research institutes under ambient condition with consistent loss of some of the samples annually. Presently the collection of genetic resources for some of species has covered most of the agro-ecological zones, districts, major farming systems and major ethnic groups. However, the coverage of the different zones is not uniform. Workshops have been held for participatory planning with stakeholders on PGR conservation strategies, with aim of having germplasm sample duplicates in-country in addition to those

at the central gene bank. Attempts are under way to initiate community based gene banks in different ecological zones, which hopefully will play a big role in sustaining local landraces and minor crops collections. The germplasm conserved ex-situ includes those of most traditional crops including sorghum, maize, finger millet, pearl millet, cowpea, beans, groundnuts, sweet potato and cassava. Farmers generally use several seed storage methods. These methods, however, only meet short-term requirements of preserving seed from harvest to the next planting season. Studies aimed at adjusting the indigenous seed storage techniques are being done by the post-harvest programme of NARO. Some herb collections are held by private organizations such as the Homeopathy and Herbal Centre, Muddu Awulira African Medicine, Uganda Commercial Aloe Vera Farmers Association, Tropical Aloe-Lands Foundation and Uganda traditional herbal medicine practitioners. Though these organizations set their priorities and activities independently, the Natural Chemotherapeutic Research Laboratories collaborates with these institutions and is in the process of collecting characterisation data on the chemical composition of individual herbs and indirectly establish a data base that could serve as an inventory of the herbal collections held. However, there is still need for training the curators of these herbal collections in germplasm maintenance techniques ex-situ.

At the National Genebank, over 5000 accessions are being conserved in both the active (short term storage 5°C) and base (long term storage -20°C) collections. The Genebank ensures that seed placed in storage are of the highest quality and achieve maximum longevity. The seed are occasionally regenerated to ensure their genetic integrity is maintained. Species whose seed cannot survive desiccation and very low temperature levels (referred to as recalcitrant) and are conserved in the Botanic gardens as live collections. The germplasm held is available for different users on request. The genebank includes a database on all stored collections in the Uganda National Genebank under priority activity of ex situ conservation.

Table 3.10: Crop groups documented

Cereals	**Vegetables**	**Fruits**	**Legumes**	**Gum**	**Pastures**
Peal millet	Okra	*Garcinia buchananii*	Bambara nut	Gum Arabic	*Panicum maximum*
Sorghum	Pigeon pea	*Carissa edulis*	Groundnuts		*Brachiaria ruziziensis*
Sesame	Chick pea	*Eriosema shirense*	Cotton		*Chloris gayana*
Rice	Spider plant	*Parinari curatellifolia*	Peas		*Hyparrhenia rufa*
Quinoa	Amaranthus	*Landolphia dawei*	Pigeon peas		*Pennisetum species*
Finger millet	Eggplant	*Rhus vulgaris*	Cow pea.		*Setaria anceps.*
			Chickpeas		
			Beans		
			Soya beans		

Source: PGRC (2018)

3.3.4.1.4 In situ conservation on farms and home gardens

In situ/in vivo conservation of genetic resources refers to the protection of farmers' varieties, landraces (crops and animals), local varieties or breeds as well as valuable wild relatives directly in the natural and agricultural ecosystem (Maxted et al 1997). In Uganda, the use of farmers' varieties played a dominant role and was of great economic and social importance.

Last 2013 assessed on crop and livestock genetic diversity using survey-based participative approach based on four indicators of crop-species richness, crop cultivar diversity, type of crop accessions and breed diversity. Data required for the calculation of these indicators, e.g. precise names of crop accessions and livestock breeds or their type, were easily accessible. Crop-species richness (CSR) was calculated based on the total numbers of arable, vegetable, tree and forage crops and was expressed as crop species richness, i.e. the total number of natural or cultivated populations of plant species for agricultural purpose per farm. Crop-cultivar diversity (CCD) was calculated as the total number of accessions (cultivars, landraces and 'unknown') divided by CSR per farm.

Table 3.11: The number of crop species, crop accessions, and livestock breeds (cattle and sheep) utilized per case study region.

Indicators	n	a	Median	Min	Max
Crop species richness	16	16	5.5	2.0	9.0
Crop cultivar Diversity	16	16	1.7	1.4	2.2

*the number of farms (n), the number of farms where crops (a) and/or livestock (b) was present, the median (med), and the minimum (min) and maximum (max) values are presented.
Source: (Last 2013).

The indicator Type of Crop Accessions (TCA) relates to landraces, which are mostly heterogeneous populations of crop species locally adapted and valuable as genetic resources. Landraces are of considerable importance in Uganda. On the 16 farms of the Ugandan case study, 15 crop species were cultivated in total. Thirty-one percent of the corresponding accessions were classified as landraces and 21% were of unknown type. Most landraces were recorded for banana (Table 3.12), which is the most abundant crop species in this case study region, mainly indigenous and an important food source in Uganda. In countries such as Uganda, where subsistence farming prevails, the indicator TCA gives a hint of the genetic diversity of individual crop species and indirectly, on farmers' dependence on commercial accessions. Likewise, the indicator provides a point of departure for monitoring trends in landrace cultivation and the status of genetic resources maintained on-farm.

Table 3.12: Crop species and corresponding share of cultivars and landraces recorded on 16 selected farms in Central Uganda

Crop Species	Number of Plots within CS	Cultivars (%)	Landraces (%)	Unknown (%)
Banana (*Musa L.*)	42	26.20	66.70	7.10
Potato (*Solanum tuberosume*)	27	7.40	55.60	37.00
Common Bean (*Phaseolus vulgaris*)	26	42.30	57.70	0.00
Pineapple (*Ananas comosus*)	18	50.00	50.00	0.00
Maize (*Zea mays*)	17	76.50	11.80	11.80
Coffee (*Coffea*)	15	33.30	66.70	0.00
Pawpaw (*Asimina triloba*)	14	42.90	50.00	7.10
Cowpea (*Vigna unguiculata*)	1	0.00	100.00	0.00
Cabbage (*Brassica oleracea*)	2	50.00	50.00	0.00
Peanut (*Arachis hypogaea*)	2	100.00	0.00	0.00
Cassava (*Manihot esculenta*)	2 0.00	100.00	0.00	
African Eggplant (*Solanum aethiopicum*)	1 0.00	100.00	0.00	
Tomato (*Solanum lycopersicum*)	1	100.00	0.00	0.00
Sugarcane (*Saccharum officinarum*)	1	100.00	0.00	0.00
Soybean (*Glycine max*)	1	100.00	0.00	0.00

Source: (Last 2013).

Seed-multiplication is an important farming practice to multiply own seed material for further seasons and to keep or sell their landraces. The extensive use of landraces is an important part of subsistence providing natural insurance, e.g. against pests and diseases, vagaries of the market or weather, without spending high prices for improved cultivars (Zhu et al 2000). Furthermore, landraces or indigenous accessions are cultivated to meet needs and diverse purposes within the socio-economic context, e.g. banana accessions for cooking, animal feed, mulch production and brewing of beer (Last 2013).

3.3.4.1.5 Livestock diversity

Livestock plays an important role in the country's food security and it is the main source of proteins. There was a 2.4% increase in the cattle population from 14,031,000 in 2015 to 14,368,000 in 2016. In addition, sheep and goat numbers increased from 4,198,000 to 4,307,000 and from 15,312,000 to 15,312,000 respectively in the year 2015 and 2016. This was a 2.6 and 2.7% increase respectively for the small ruminants. The pig population also increased from 3,916,000 in 2015 to 4,037,000 in 2016 while poultry numbers increased from 45,145,000 in 2015 to 46,291,000 in 2016. Fig 3.1.4 shows changes in livestock numbers for all livestock types (Figure 3.25).

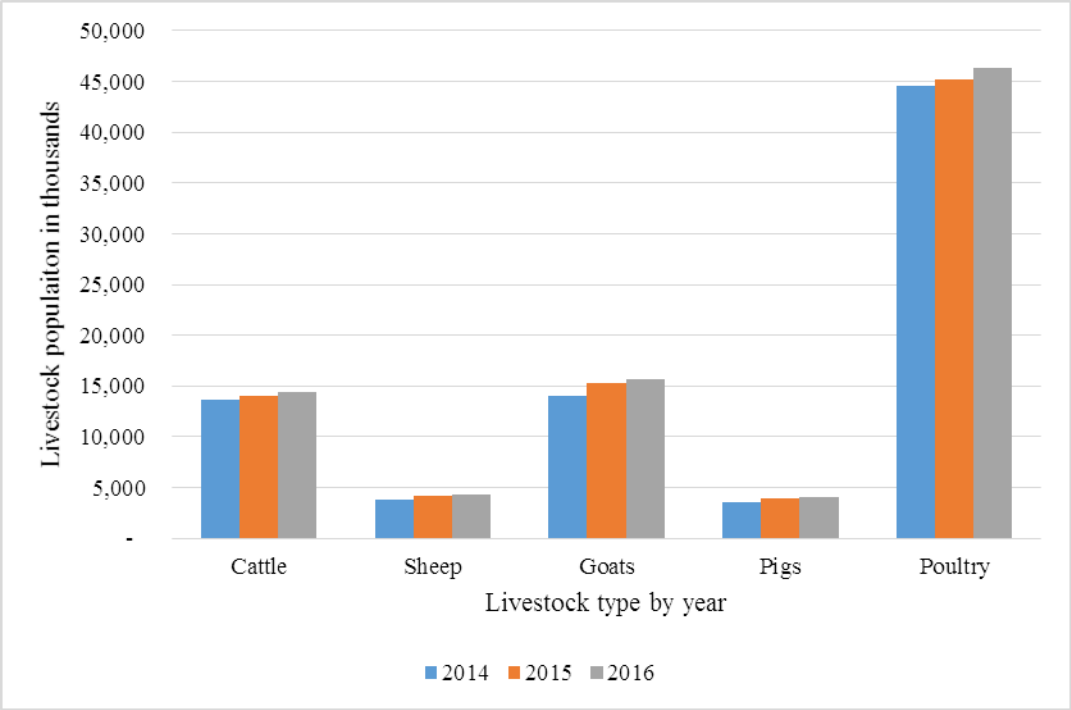


Figure 3.25: Changes in Livestock numbers ('000s) for 2014-2016
Source: UBOS 2018

Cattle, Goats and Poultry indigenous breeds continue to be dominant over the exotic ones as shown in Table 3.1.3. For 2016, there were 13,377,000, 15,521,000 and 40,597,000 indigenous cattle (93.3 %), goats (98.7 %) and poultry (87.7 %) respectively. On the other hand, the exotic breed contributed 991,000, 5,694,000 and 204,000 for cattle (6.7 %), goats (1.3 %) and poultry (12.3 %) respectively in 2016 as shown in Table 3.13.

Table 3.13: Population Estimates Livestock ('000s) by breed 2012-2016

Year	Cattle		Poultry		Goats	
	Indigenous	**Exotic**	**Indigenous**	**Exotic**	**Indigenous**	**Exotic**
2008	10,679	730	32,835	1,536	12,288	162
2012	11,979	861	36,955	5,176	13,830	182
2013	12,339	887	38,064	5,332	14,245	188
2014	12,709	914	39,206	5,492	13,829	182
2015	13,090	941	40,382	5,657	15,113	199
2016	13,377	991	40,597	5,694	15,521	204

'2008- are figures from Livestock census

Source: UBOS 2018

Using the analogy of livestock, Kabi et al. (2016) showed that in situ/in vivo conservation of genetic resources of livestock has generally been effective in Uganda. Indigenous cattle support approximately 26.1% of Ugandan families through provision of food and income in addition to the supply of socio-cultural wealth and security. Cattle keepers have developed and maintained variations of indigenous cattle phenotypes and genotypes suited to their agro-ecological zones through traditional management practices and socio-cultural aspects. The Ankole (*Bos taurus indicus*), East African short-horn Zebu (*Bos indicus*) and their crossbred cattle constitute the main indigenous breeds, adding up to 93.3% of the Ugandan herd. With intensions to increase productivity, state policies encourage livestock farmers to upgrade local genotypes towards high yielding exotic dairy cattle. This if not appropriately planned is likely to result into loss of local genetic diversity, well endowed with resilience to local climatic conditions, endemic diseases and feed resource constraints. Since indigenous cattle vary with landscapes and socio-cultural values, have taken decades to establish, efforts to save them through genetic diversity studies, conservation and farmers sensitization is of paramount importance.

3.3.5. By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero to reduce degradation

3.3.5.1 Restoration programmes for critical fragile and degraded/threatened ecosystems in place and implemented.

Uganda's critically fragile and degraded ecosystems comprise wetlands, forest reserves, hilly and mountainous areas and lake shores and riverbanks. With regard to wetlands, the Ministry of Water and Environment (MWE) and NEMA have been implementing wetland restoration activities as part of the public fiscal undertaking since 2011/12.

3.3.5.1.1 Wetland and forest restoration

Between 2011/12 and 2017/18, MWE and NEMA restored 4,487.9 ha of wetland cover across the country, an average restoration rate of 641.13 ha/year (Figure 3.26). Generally, the restoration effort has been declining at a rate of 62 ha/year from the peak annual restoration of over 1,600 hectares in 2012/13.

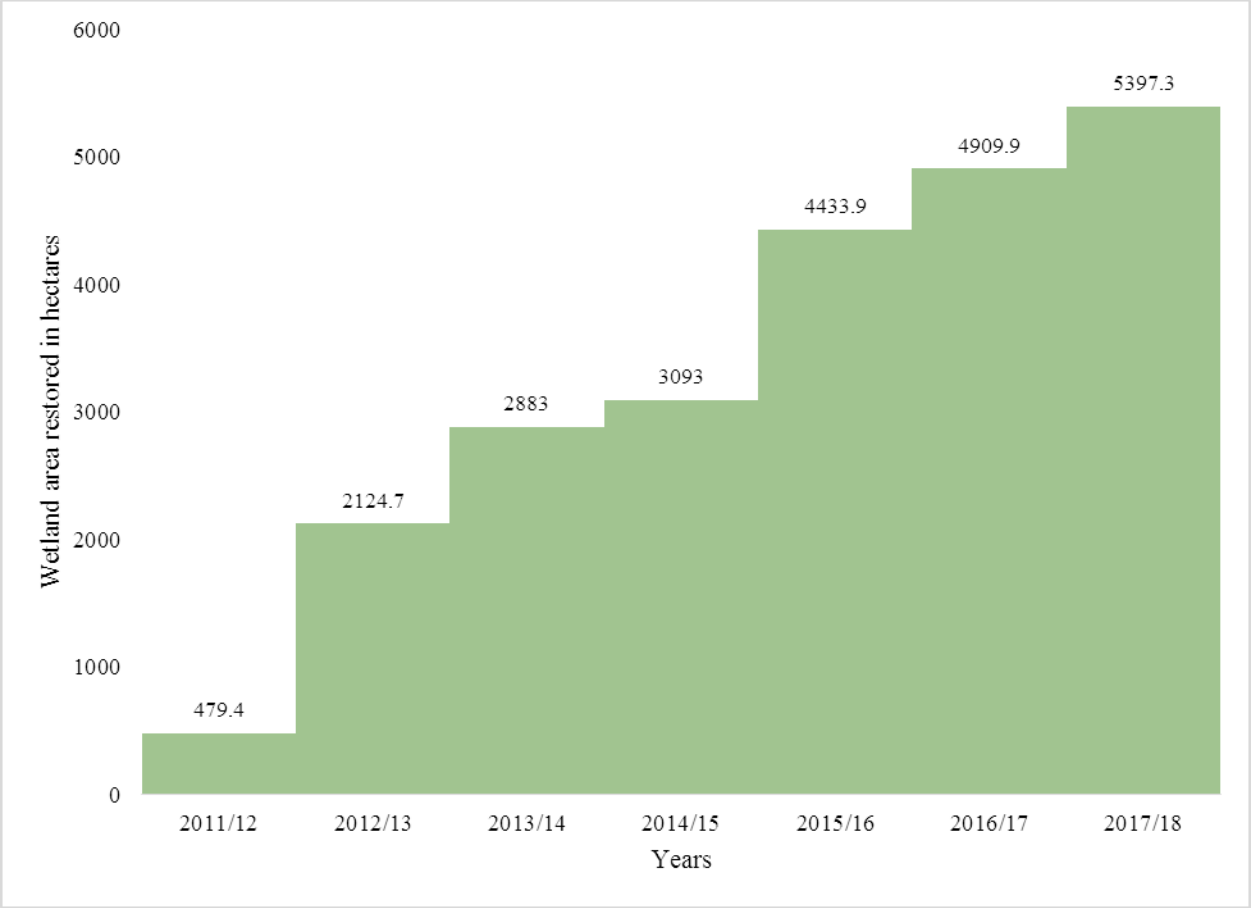


Figure 3.26: Wetlands restored in hectares 2011/12 to 2017/18
Source: MWE SPR (2015, 2016, 2017, 2018)

Whereas there has been a considerable depletion of forest resources in the country. The restoration efforts have also increased. The interventions include the Sawlog Production Grant Scheme (SPGS), which has largely focused on forest plantations as a means of reducing pressure on the natural forest estate. Other interventions include actions through the tree fund where District Local Governments receive tree seedlings from the National Forestry Authority (NFA) for planting annually, interventions by civil society organisations such as the Environment Conservation Trust of Uganda (ECOTRUST), Little hands Go Green, Tree Talk, and the World Wide Fund for Nature (WWF), among others (MWE 2018). The three main interventions for forests are enrichment planting, encroachment planting and forest plantations (MWE/SPR 2018) (Figure 3.27).

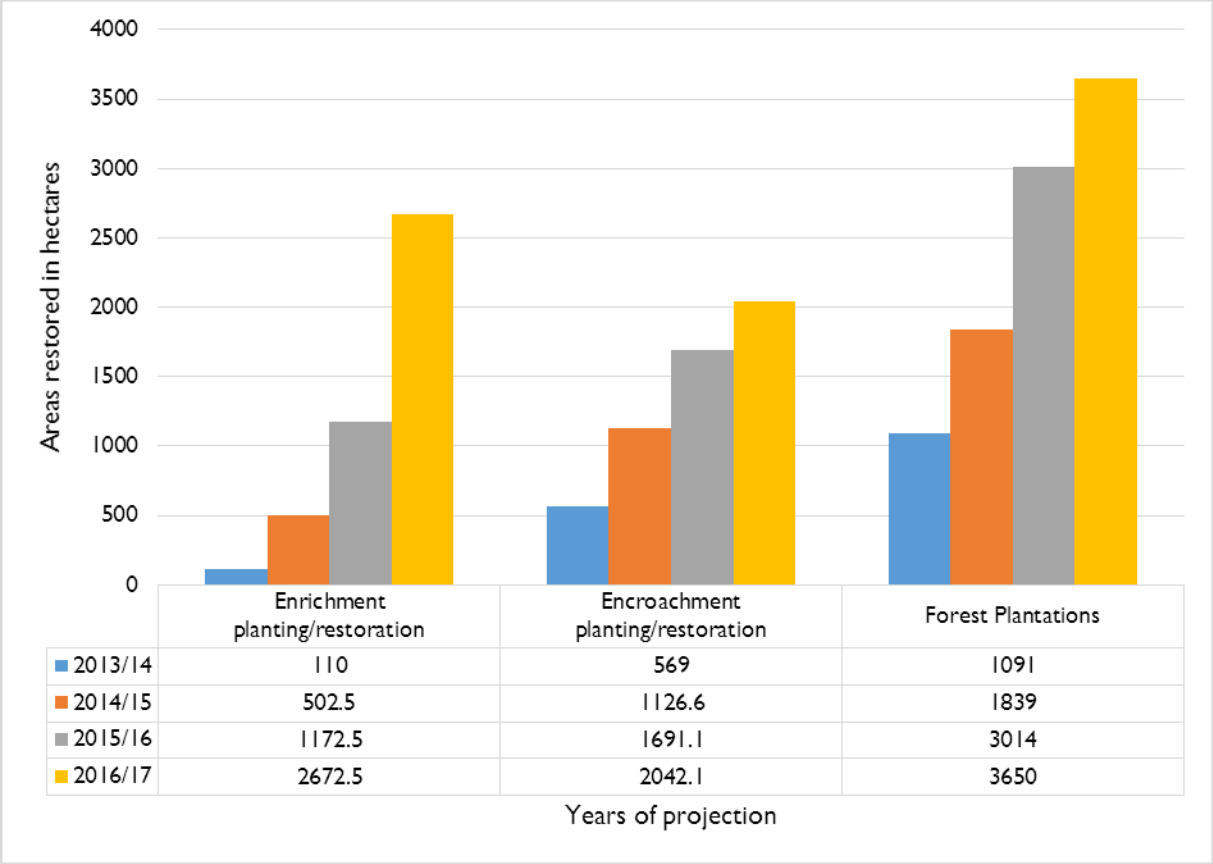


Figure 3.27: Forest restored in hectares 2011/12 to 2017/18
Source: MWE SPR (2015, 2016, 2017, 2018)

3.3.5.2 Trends in proportion of degraded/threatened habitats

The trends and proportion of degraded and threatened habitats was based on work assessing the future trends of land cover and land use in Uganda (Majaliwa et al. 2018). The land use systems were defined and classified using spatially explicit land use/cover layers for the years 1990 and 2015. Twenty-nine (29) classes of land use systems were broadly categorized as follows: three of the land use systems are agricultural, five are under bushland, four under forest, five under grasslands, two under impediments, three under wetlands, five under woodland, one under open water and urban settlement respectively. The highest gains in the land amongst the land use systems were experienced in subsistence agricultural land and grasslands protected, while the highest losses were seen in grasslands unprotected and woodland/forest with low livestock densities (Figure 3.28).

By 2040, subsistence agricultural land is likely to increase by about 1% while tropical high forest with livestock activities is expected to decrease by 0.2%, and woodland/forest unprotected by 0.07%. High demand for agricultural and settlement land are mainly responsible for land use systems patchiness. More land degradation is predicted will be linked to disasters such as landslides, floods, droughts, among others if the rate at which land use systems are expanding is not closely monitored and regulated in the near future (Figure 3.29).

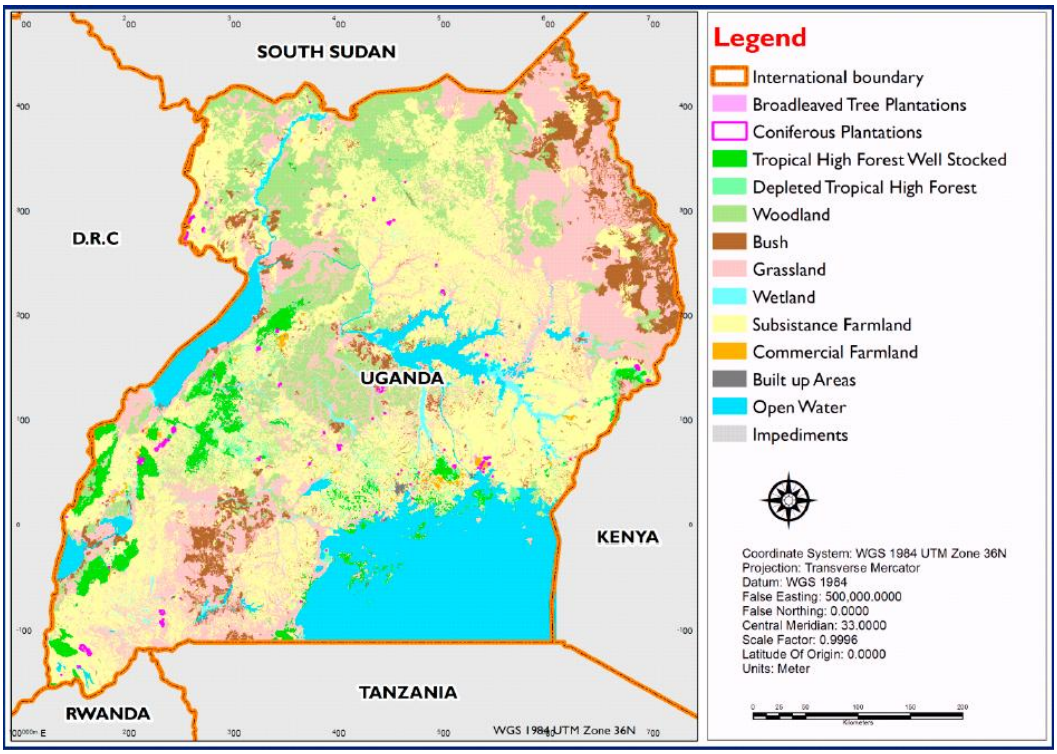


Figure 3.28: Uganda land use/land cover 1990
Source: Forest Department/MWLE (1995)

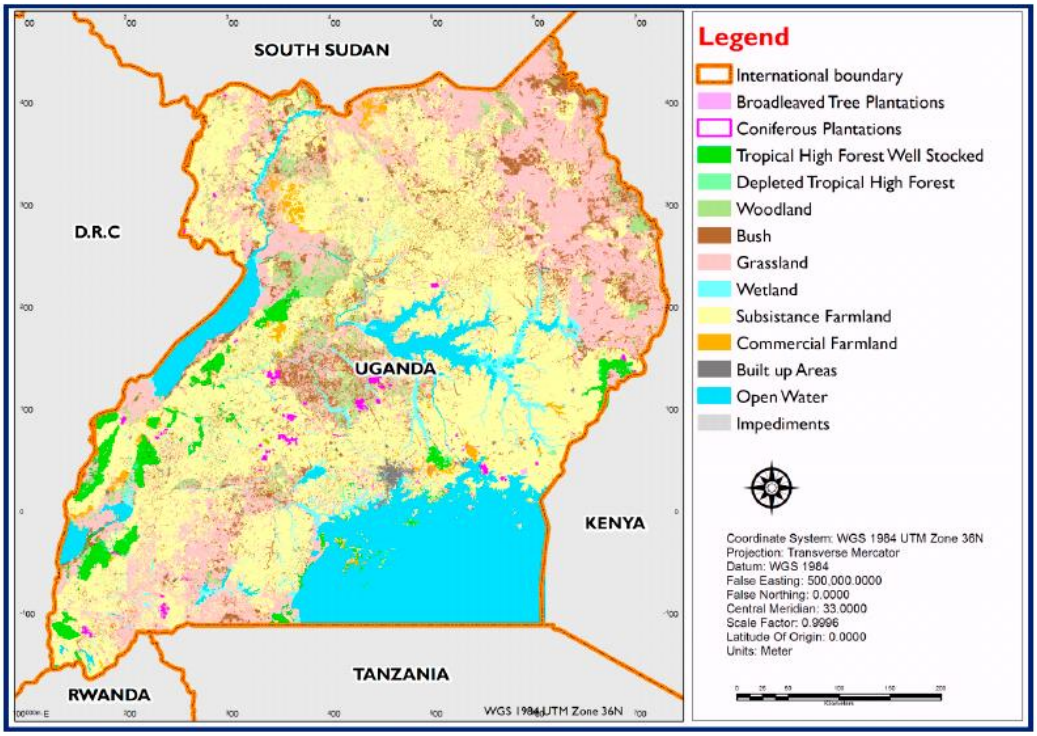


Figure 3.29: Uganda land use/land cover 2015
Source: MWE (2016)

The extent of historical and present land use systems is presented in Table 3.14. The 29 classes of land use were clustered into three land use systems of agricultural, five under bushland, four under forest, five under grasslands, two under impediments, three under wetlands, five under woodland, and one under open water and urban settlement respectively. In 1990, the agricultural land use system was the most dominant (35.06%), followed by grassland (21.17%), woodland (16.45%), and open water (15.28%). The other land use systems include open water—protected, urban—settlement, impediments, and forest- and bushland-related land use systems.

In 2015, agricultural, grassland, and wetland-related land use systems remained the most dominant. Between the two periods, agricultural and woodland-related land use systems experienced the most significant changes in terms of gains or losses. Agriculture-related land use systems increased by 8.56%, while those related to woodland reduced by 11.86% compared to their original values.

Table 3.14: Changes in the extent of land use systems coverage between 1990 and 2015

Land use system	**1990**		**2015**	
	Area (km^2)	**% areas (km^2)**	**Area (km^2)**	**% areas (km^2)**
Agricultural land – commercial	517.32	0.209	2587.71	1.06
Agricultural land – irrigated	28.8	0.012	46.08	0.02
Agricultural land subsistence	98,073.36	39.683	107,426.6	44.16
Bushlands – high livestock density	1,389.29	0.562	1,360.66	0.56
Bushlands – low livestock density	111.07	0.045	452.54	0.19
Bushlands – moderate livestock density	2,111.071	0.854	2,642.54	1.09
Bushlands – protected	5,206.78	2.107	7,410.41	3.05
Bushlands – unprotected	5,459.02	2.209	4,236.81	1.74
Grasslands – high livestock density	3,240.07	1.311	6,588.38	2.71
Grasslands - low livestock density	7,398.23	2.993	5,350.85	2.20
Grasslands – moderate livestock density	6,131.7	2.481	6,534.76	2.69
Grasslands - protected	6,648.12	2.690	27,146.2	11.16
Grasslands – unprotected	26,402.33	10.683	6,118.32	2.52
Impediments - protected	9.7	0.004	34.56	0.01
Impediments – unprotected	11.52	0.005	51.9	0.02
Open water	37,130.69	15.024	36,980.77	15.20
Tropical high forest (encroachment) –subsistence	2,186.91	0.885	872.06	0.36
Tropical high forest (encroachment) –subsistence	218,1	0.088	2,420.6	1.00
Tropical high forest (encroachment) –subsistence	6,765.05	2737	942.69	0.39
Tropical high forest (encroachment) –subsistence	2,715.46	1.099	3,199.14	1.32
Urban – settlement	362.1	0.147	1,340.09	0.55
Wetlands – protected	1,963.58	0.795	6,028.29	2.48
Wetlands – with crop farmland activities	217.43	0.088	347.64	0.14
Wetlands – with livestock activities	528.3	0.214	487.72	0.20
Woodland/forest – high livestock density	1,851.1	0.749	685.19	0.28
Woodland/forest – low livestock density	5,481.56	2.218	1,246.91	0.51
Woodland/forest – protected	4,092.06	1.656	6,822.21	2.80
Woodland/forest – unprotected	9,612.57	3.889	867.25	0.36
Woodland/forest – moderate livestock density	11,281.56	4.565	3,024.91	1.24

Source: Majaliwa et al. 2018

3.3.6. By 2020, management plans are in place and implemented for areas under agriculture, aquaculture and forestry

3.3.6.1 Trends in area and productivity of agricultural land, forests under sustainable management

3.3.6.1.1 Agricultural production

Uganda's farmlands are dominated by subsistence farms. Whereas the land under commercial agriculture has increased four-fold from 68,580 to 256,746 hectares, the increase is modest in magnitude when compared to the 2.1 million hectare increased in farmlands between 1990 to 2015 (NFA 2017). Farmlands increased, from 8.5 to 10.6 million hectares by nearly 25%, and the land under subsistence agriculture also increased by 1.8 million hectares over the same time (Table 3.15).

Table 3.15: Distribution of farming system

Type of farm system	1990	2000	2005	2010	2015
	Hectares				
Subsistence farms	8,405,204	8,913,924	8,936,378	9,787,587	10,274,975
Largescale farms	68,580	103,370	107,004	134,301	256,746

Figure 3.30 shows the importance of subsistence farming as the main source of earning by regions across the country. Indeed, between 2013/14 and 2016/17, the importance of subsistence farming increased in the Acholi sub-region of northern Uganda, in Karamoja, the West Nile sub-region, and Teso, Bukedi and Busoga sub-regions of Eastern Uganda (UBOS 2018).

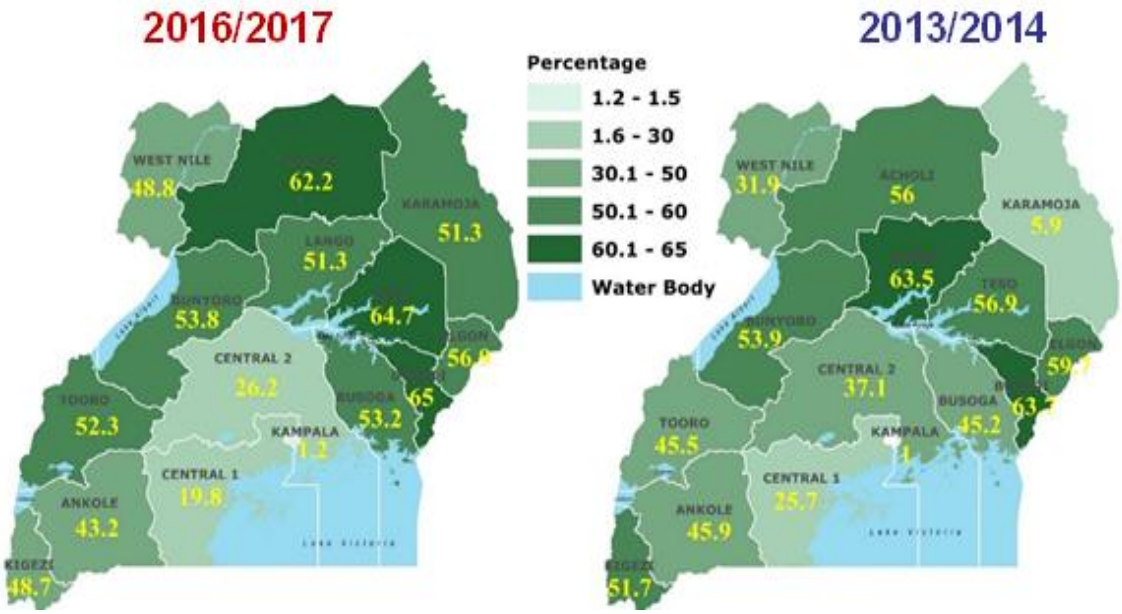


Figure 3.30: Subsistence farming: main source of earnings
Source: UBOS 2018

A World Bank assessment on agriculture in Uganda established that communities with increasing subsistence agriculture also registered the highest poverty, particularly income poverty scores in the country (World Bank 2015). Subsistence agriculture is often associated with low use of external input agriculture, but it is the lack of soil fertility improvement and nutrient mining that leads to most of the low agricultural performance observed (World Bank 2015; UNDP/SLM 2013; MAAIF 2016).

The trends of agricultural productivity reported in the national statistical abstract (UBOS 2018) also show that whereas the area under agricultural production has generally increased the agricultural productivity has not increased (Figure 3.31). Therefore, more land is being put under agriculture to increase output but since the population is also growing at a rate of 3.2% per year (UBOS 2016), this means that increased area under agricultural production is likely to be outweighed by the increased population engaged in agricultural production, and a reduction in agricultural productivity.

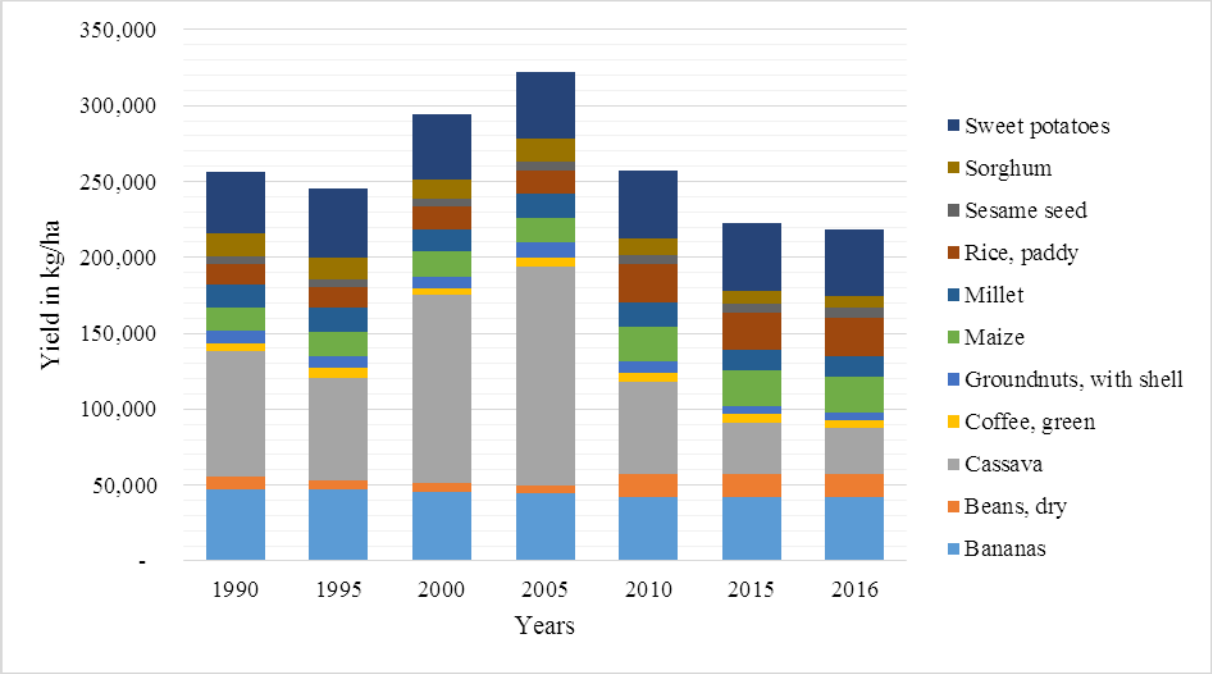


Figure 3.31: Trends in crop productivity between 1990 and 2016
Source: UBOS 2018

Uganda's outstanding form of sustainable agriculture practice is organic agriculture. However, organic agriculture represents only 2.6% of the land under agricultural production. Nonetheless, organic agriculture production has been increasing in the country (Table 3.16). The leading organic crops are coffee, cocoa, fruits and vegetables and oil seeds. Wild plants and natural ingredients such as Shea are usually recorded as organic agriculture in Uganda. For the most part organic agriculture is practiced on smallholder farms (Willer and Lernoud eds 2016; 2017; 2018; 2019).

Table 3.16 Organic agriculture production

Characteristics	**2014**	**2015**	**2016**	**2017**
Area under organic agriculture (hectares)	240,197	241,150	262,282	262,282
Main commodities	*Area under organic agriculture in hectares*			
Coffee	17,721	17,721	65,570	65,570
Cotton	7,575	6,187	2,428	12,600
Cocoa	3,750	3,750	7,872	19,092
Fruits				2,072
Vegetables			5,245	5,245
Oil seeds		14,633	44,587	44,587

Source: Willer and Lernoud eds (2016; 2017; 2018; 2019)

The trends of agricultural productivity reported in the national statistical abstract (UBOS 2018) also show that whereas the area under agricultural production has generally increased the agricultural productivity has not increased (Figure 3.32). Therefore, more land is being put under agriculture to increase output but since the population is also growing at a rate of 3.2% per year (UBOS 2016), this means that increased area under agricultural production is likely outweighed by the increased population engaged in agricultural production, and a reduction in agricultural productivity.

One way of increasing agricultural productivity is through integration of trees on farms amongst farming communities, since they fix nitrogen, control erosion and broadly contribute to watershed management (Place and Garrity 2015).

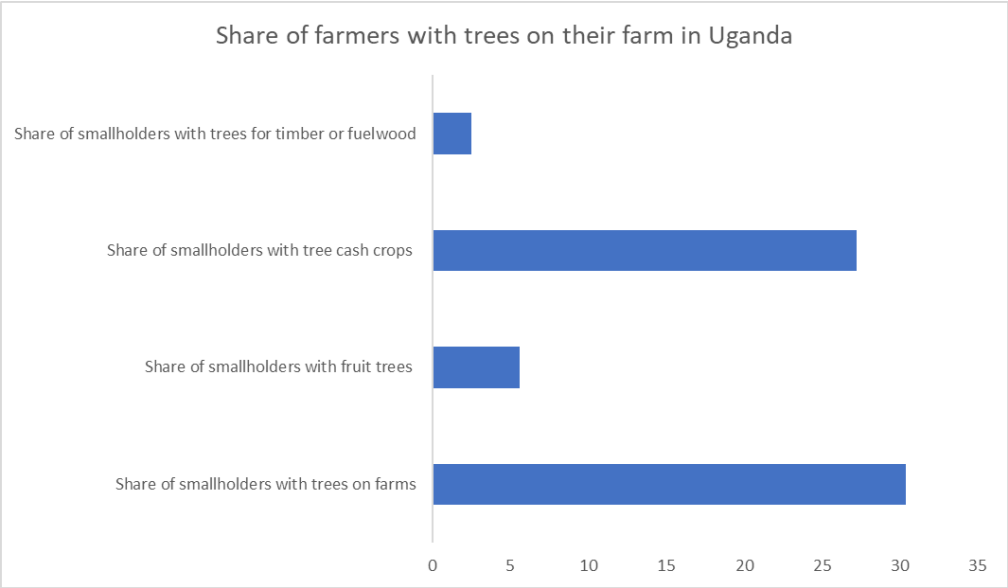


Figure 3.32: Share of farmers with different trees on their farms in Uganda.
Adopted from *Christiaensen &Demery 2018.*

In recent years, tree cover in protected areas in Uganda has declined, but not nearly to the extent of the decline on private land. If Uganda is to achieve its targets of land restoration under the Bonn Challenge, and its climate targets under the Paris Agreement, trees on farms should be an integral part of landscape planning (Place and Garrity 2015). Trees on farms not only provide farmers with important sources of income through timber, fruit and fodder production, they also contribute to local and global ecosystem services, including controlling water flow, making soils more fertile and sequestering carbon. Trees on farms have an important role in conserving biodiversity, especially soil biota and vitally important pollinators. They can provide important corridors connecting areas of high biodiversity. They are relatively resilient in the face of more intense and frequent climate stressors. This will be helpful especially as we work towards attaining and ensuring restored landscapes.

3.3.6.1.2 Forestry

The forest management system in Uganda is guided by the Forestry Sector Review (FSR) that took place between 1998 and 2001. The FSR also led to the formulation of a new Uganda Forestry Policy 2001, the development of a National Forest Plan 2002 and the enactment of the National Forestry and Tree Planting Act 2003. Following the decentralization policy that came into force around the same period, government

restructured a number of its ministries among which was the Ministry of Water, Lands and Environment (MWLE) under which the Forestry Department fell. New institutions were established to replace the Forestry Department. These included the National Forestry Authority (NFA), a semi-autonomous agency mandated to manage Central Forest Reserves (CFR), District Forest Services under local government to manage Local Forest Reserves (LFR) and provide forest extension services to local communities and private forest owners, and the Forest Inspection Division which has since been transformed into the Forestry Sector Support Department (FSSD) under the Ministry of Water and Environment (MWE) to coordinate all activities in the forestry sector. The forestry sector reforms recognized other players in the forestry sector including UWA which manages five former CFRs which are now managed as national parks which were transferred in the mid-1990s, private forest owners (PFOs), and community forest owners.

About 35% of the Central Forest Reserves (CFRs) have management plans, and a total of 1,180ha was reforested in central forest reserves; 280 km of central forest reserve boundaries were surveyed and demarcated, and 670 ha of encroached central forest reserves were restored. According to the MWE SPR (2017), Forest reserves with management plans are now 36% of the total number of reserves. During FY 2015/16, NFA finalized 27 Forest Management Plans (FMPs), 16 ready for printing and 11 waiting for Ministers signature. In 2014/15, NFA finalized Forest Management Plans (FMP) for Massege and Pakwach CFRs, awaiting management consideration and approval. In 2013/14, The Forest Management Plans (FMP) for Kasyoha – Kitomi, Kalinzu, Echuya, Mt Kei, Budongo, Bugoma, Otze-Zoka and Itwara, were finalized and awaiting consideration and approval. Notably the FPM for Kalinzu was prepared based on FSC Standard for Responsible Forest Management which is expected to lead to the first case of forest certification in natural forests in the country.

Area of forest cover in plantations increased from 36,464 ha in 2009 to 73,000 ha (plantations established by NFA from 1,370 ha to 13,000 ha), area of CFRs licensed for the establishment of private forest plantations increased from 25,400 to 60,000 ha, length of forest boundaries re-opened and marked with pillars increased from 6 km to 968 km, and amount of seedlings sold to private tree planters and Government increased from 2.8m to 16m. NFA community forest management (CFM) initiatives increased participation of forest edge communities in tree planting in and outside the forest reserves, beekeeping, ecotourism and employment in the plantations and natural forests. These incentives however are still largely inadequate to ensure full participation in forestry management and conservation. Biomass studies (NFA, 2015) show that almost all the natural forests outside protected areas had been cleared and most of the remaining forests were in protected areas; forest reserves or national parks (MWE 2016).

CFR in Uganda fall in two main categories namely those for production and those for protection. *Production* forests which include savannah bushland and grassland areas were gazetted for supply of forest products and future development of industrial plantations (Table 3.17). The protection forests include all the THFs, savannah woodlands and/or grasslands that protect watersheds and water catchments, biodiversity, ecosystems and landscapes that are prone to degradation under uncontrolled human use (MWLE 2005; NFA 2015).

Table 3.17: CFR number and areas 2005 and 2015

Description of CFRs	Number of forests	Area of forest in 2005	Area of forest in 2005
CFRs for ecological and biodiversity importance	353	1,073,983	504,391
Other CFRs not specifically designated	45	40,566	
CFRs for industrial plantations	108	151,193	73,000
Total	**506**	**1,195,742**	**577,391**

Source: MWE 2016

3.3.7 By 2020, pollution levels in critical urban ecosystems has been brought to levels that are not detrimental to ecosystem function and biodiversity

3.3.7.1 Pollution standards in place and enforced

The pollution standards for Uganda are based on the National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, S.I. No 5/1999 (Table 3.18). There are 53 contents of effluent that were considered under the National Environment Act cap 153 and were maintained under the National Environment Act (2018).

Table 3.18: Standards for pollution management in Uganda

Standards for Discharge of Effluent into Water or on Land					
Contents of Effluent	**MPL**	**Contents of Effluent**	**MPL**	**Contents of Effluent**	**MPL**
1,1,1, -trichloroethane	3.0 mg/1	Cirrus- 1,2 - dichloroethylene	0 mg/1	pH	6.0-8.0
1,1,2.- dichloroethyelene	0.2 mg/1	Cobalt	mg/1	Phenols	0.2 mg/1
1,1, 2,- Trichloroethne	1.06 mg/1	COD	100	Phosphate (total)	10 mg/1
1,2- Dichloroethane	0.04 mg/1	Clifford Organisms	10,000 counts/100 ml	Phosphate (soluble)	5.0 mg/1
1,3- dichloropropene	0.2 mg/1	Color	300 TCU	Selenium	1.0 mg/1
Aluminum	0.5 mg/1	Copper	1.0 mg/1	Silver	0.5 mg/1
Ammonia Nitrogen	10 mg/1	Cyanide	0.1 mg/1	Sulfate	500 mg/1
Arsenic	0.2 mg/1	Detergents	10 mg/1	Sulfide	1.0 mg/1
Barium	10 mg/1	Dichloromethane	0.2 mg/	TDS	1200 mg/1
Benzene	0.2 mg/1	Iron	10 mg/1	Temperature	20-350C
BOD5	50 mg/l	Lead	0.1 mg/1	Tetra Cholera ethylene	0.1 mg/1
Boron	5 mg/1	Magnesium	100mg/1	Tetrachloromethananc	0.02 mg/1
Cadmium	0.1 mg/1	Manganese	1.0 mg/l	Tin	5 mg/1
Calcium	100 mg/1	Mercury	0.01 mg/1	Total Suspended Solids	100 mg/1
Chloride	500 mg/1	Nickel	1.0 mg/1	Tricholoroethylene	0.3 mg/1
Chlorine	1 mg/1	Nitrite - N	2.0 mg/1	Turbidity	300 NTU
Chromium (total)	1.0 mg/1	Nitrogen total	10 mg/1	Zinc	5 mg/
Chromium (VI)	0.05 mg/1	Oil and Grease	10 mg/1		

* Maximum Permissible levels (MPL)

Source: NEMA (2017)

The National Enviroment Act (2018) also mentions 37 chemicals in its schedule 6 as chemicals prohibited or restricted under the Montreal Protocol on substances that deplete the ozone layer and the aw also mentions 19 chemicals that are either banned or under restricted use or production under the Stockholm

Convention on Persistent Organic Pollutants (POPs). The POPs are included in schedule 5. The standards adopted are those under the conventions to which Uganda is party and as prescribed under the National Implementation Plans for the two conventions.

3.3.7.1.1 Compliance to Water Abstraction Permits

With respect to water abstraction permits, 134 of the surface water permit holders complied with the condition to abstract within the maximum permitted limits, improving from last year's 68%, to 71% compliance. For groundwater, 263 permit holders abstracted within the permitted amount, representing **71%** compliance. The main challenge faced by permit holders to comply with groundwater permit conditions is accessing water level and discharge meters, which are not readily available in the country. Many groundwater developments have faced the challenge that some drillers do not furnish them with borehole completion reports. As a result, permit issuance is a challenge as they have to redo test pumping to determine the borehole yield. DWRM is therefore providing assistance to the permit holders by giving them information on where to procure meters and providing the necessary technical assistance during their installation.

3.3.7.1.2 Compliance to Waste Water Discharge Permit Conditions

Compliance to waste water discharge permit conditions improved from 50% (end June 2014) to **52%** (end June 2015). The biggest waste water dischargers such as NWSC facilities, sugar manufacturing companies, leather tanning industries improved their compliance, though they still do not meet the National Standards for waste water discharge onto/into land for some parameters. Efforts continue to ensure that measures are taken to comply with these conditions. The challenges faced by these companies relate to inadequate waste water treatment plants in terms of capacity and efficiency. A number of measures have been taken this year to address challenges of wastewater management. These measures include (i) provision of compliance assistance to permit holders in setting up and operating waste water treatment facilities including monitoring effluent quality, (ii) strengthening enforcement by taking stringent actions on non-complaint permit holders such as heavy penalties and legal action, (iii) training staff of DWRM, permit holders and other stakeholders in waste water management, (iv) reviewing the charging system for pollution to ensure that the funds are high enough to deter permit holders from discharging as well as being able to be used to restore the polluted water bodies.

Working together with the multi-sectoral monitoring technical committee on oil and gas activities, a number of environmental issues in the Albertine Graben are being followed up in the bid to control pollution, ensure sustainable use of the water resources and increase the coordination amongst government agencies that have a stake in the Albertine Graben. To that effect, the ministry participates in the technical committee through joint inspections, sensitisation and awareness campaigns, enforcement and conflict resolution. While efforts have been put in place to treat and dispose of the waste, there is still a challenge of determining the efficiency of the waste treatment facilities due to inability to analyse and assess all effluent parameters associated with oil and gas industry within the country. In addition, efforts are being put in place to assess the effluent being transported from the consolidation area to the treatment facilities to ensure that there are no spills during transportation.

3.3.7.1.3 Kampala Pollution Task Force

The Kampala Pollution Task Force (KPTF) was established in 2015 and it is composed of members from Kampala Capital City Authority (KCCA), Directorate of Water Resources Management (DWRM), National Environmental Management Authority (NEMA), National Water & Sewerage Corporation (NWSC), Uganda Manufacturers Association (UMA) and Uganda Cleaner Production Centre (UCPC). Pollution from Kampala city has resulted in deterioration of water quality in the Inner Murchison Bay, Lake Victoria and has grossly impacted on the water supply service for Kampala City in terms of increased costs for water treatment. In addition, frequent flooding during rainy seasons has resulted in huge damages to businesses, assets and infrastructure, water related diseases outbreak and death.

The KPTF was formed for the following objectives: i. Promote information exchange and collaboration among key government agencies that have the mandate towards a pollution free environment, to jointly engage the public and private sector regarding legal provisions and regulations on, waste management and catchment management. ii. Initiate campaigns to enhance compliance to environmental regulations. iii. Conduct and analyse joint industrial assessments and disseminate pollution monitoring information to the public and private sector. iv. Engage potential priority polluters and the public sector in a Public-Private Dialogue, on air pollution, waste management and catchment management to increase awareness and trust. v. Promote transparency of policy making, regulation, and enforcement in order to empower stakeholders to act as partners of government authorities/agencies. vi. Develop the capacity of especially private industrial enterprises for pollution free measures and technologies vii. Carry out research and studies that inform better and innovative practices for managing waste (solid, wastewater, faecal sludge) in the Greater Kampala.

Of the trends of water quality changes along the streams. The KPTF is currently implementing the monitoring framework proposed by the Kinawataka study report, by taking water samples for laboratory analysis from the designated sampling points along the sub-watershed. Laboratory analysis of samples is carried out in the NWSC central laboratory and at National Water Quality Reference Laboratory of DWRM. KPTF monitoring identified 36 likely sources of pollution to the channel which include mainly manufacturing industries and some other diffuse sources. These sources include KNO_1-Main Ntinda stream before any industry, KNO_2-From Crest foam through a wetland, KNO4-Discharge from KPI into Ntinda stream, KNO_5 discharge from Gentex into the stream, KNO7-Hotspot on main into Ntinda stream, $KN0_8$-Hotspot before joining main Ntinda stream, KNO9-Hotspot on main Ntinda stream, KYO1-From wetland into Kyambogo stream, KYO2-Hotspot on Kyambogo stream. Quarterly monitoring for some of these sources is recommended.

The results of the task force show that some industries had high concentrations Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD) which is a measure of organic matter in the wastewater as showed in Figure 35 Below. ii. Nutrient concentration with respect to Total Phosphorus (TP) and Total Nitrogen (TN) was observed to fluctuate along the channel as showed in Figure 35 though all were below the National Discharge Standard. The concentrations of BOD and COD were above the standards for wastewater effluents in many sampling points despite this being a surface water site not a wastewater channel.

3.3.7.3 Trends in water quality in aquatic ecosystems

This golden indicator is for monitoring water quality is defined as "the percentage of water samples taken at the point of water collection, or waste discharge point that comply with National Standards for

Drinking (Potable) Water (2008) and Water (Waste) Effluent Discharge Standards (1999)". The parameters considered for measuring the performance of this indicator are: (i) presence of Escherichia coli (E. coli) in water from protected/improved sources in rural areas; (ii) E. coli presence in water from treated drinking water supplies in urban towns; and (iii) Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) in both municipal and industrial wastewaters.

There was a decline in the quality of rural water supplies between 2008/9 and 2011/12. An improvement in quality was observed between 2012/13 and 2014/15 (Figure 3.33). However, the improvement seems to have been reversed since 2015/16 and a further decline was observed. The water quality assessment was based on a total of 596 samples were collected from improved water sources in the rural areas out of which 353 (59%) complied with the national standards for drinking water with respect to E. coli. The water samples were collected from 303 boreholes (BHs), 8 gravity flow schemes (GFS), 125 protected springs (PS) and 160 swallow wells (SWs). Compliance by technology type was 64% for boreholes, 0% for GFS, 29% for protected springs and 56% for swallow wells. Trends from 2014 – 2017 show that safe water in the rural areas has a compliance of less than 60%. The fluctuations in figures are attributed to differences in sample size (MWE 2018).

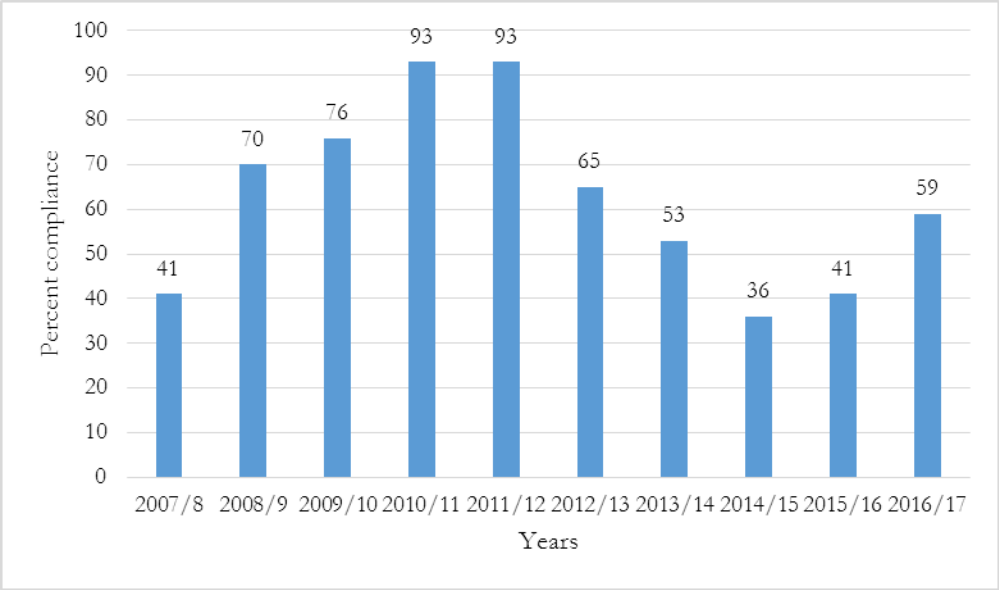


Figure 3.33: Trends of compliance to E. coli in rural drinking water supplies
Source: MWE (2018)

For urban water supplies there was a general improvement in water quality starting in 2007/08. Since 2014/15, the water quality improvement has generally stagnated, although a small improvement was observed for the water supply to large towns (Figure 3.34). It ought to be noted that the water quality testing showed that the water quality in small urban towns was better than that for the larger urban towns (MWE 2017; 2018).

Urban was quality was determined based on a total of 31 water samples were collected from 9 towns managed by National Water and Sewerage Corporation (NWSC). Seventy-four percent of samples complied with the standard for drinking water for E. coli. In the small towns sampled over the years, water quality has not reached the desired target of 100% compliance level. This is attributed to various

factors, including the supply pf water without any treatment from production wells, poor operation and maintenance, lack of skilled manpower for water treatment, seasonal variations in water quality, abstraction of swamp water which is problematic to treat, lack of basic laboratory facilities to guide operations of the water works, lack of risk management and inadequate monitoring and supervision by regulators (MWE 2018).

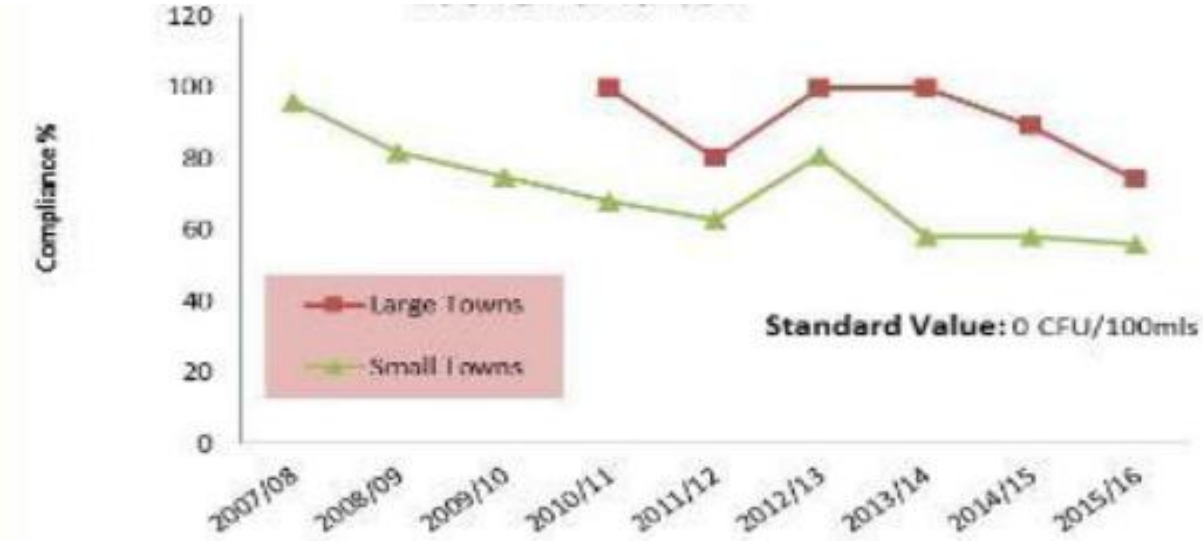


Figure 3.34: Trends of compliance to E. coli in urban drinking water supplies
Source: MWE (2017)

With regard to the quality of waste water discharges, overall compliance to effluent standard over the years is very low and is attributable to lack of wastewater treatment by industries and poorly designed wastewater treatment facilities. A total of 76 wastewater discharge samples were collected from 51 industrial and 25 municipal effluents and assessed for compliance to waste (water) effluent discharge standards (1999). With respect to BOD, overall compliance level was 44%, which was below the target of 65%. With respect to TSS, the performance was at 40% (Figure 3.35). The compliance levels show that most industries and municipal treatment plants are still inefficient in treating wastewater to the required levels. The receiving environments of these wastes including water bodies, land and wetlands get polluted by the waste. High organic matter as indicated by high BOD values leads to nutrient enrichment of the receiving water bodies causing eutrophication. This enrichment/eutrophication manifests in form of algal blooms and proliferation of water weeds such as water hyacinth and *Salvinia molesta.* Wastewater with a high TSS value causes siltation of water bodies affecting fish breeding grounds, navigation and docking of ships as has been experienced at Port Bell in the Inner Murchison bay. Overall, pollution leads to increased costs of water treatment which translates into high tariffs for consumers (MWE 2017; 2018).

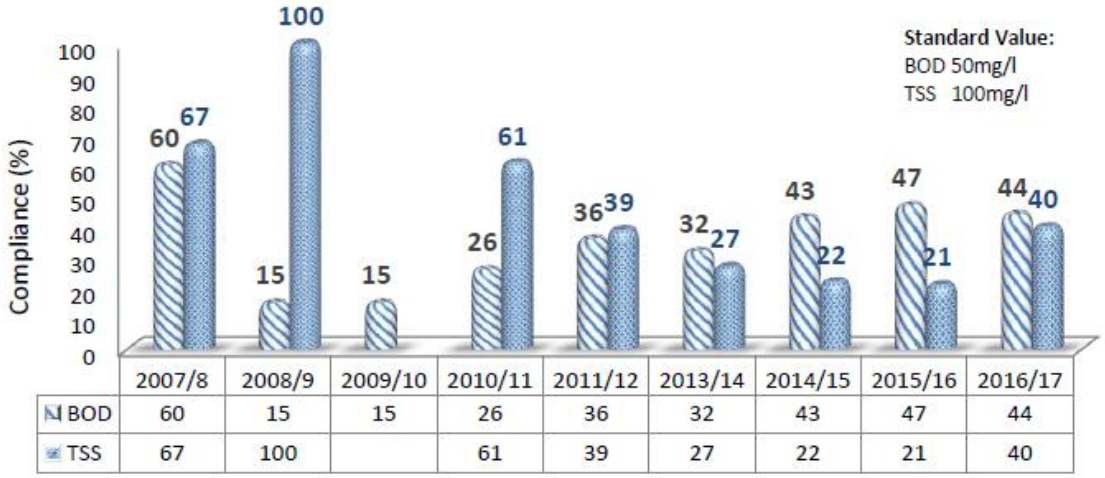


Figure 3.30: Compliance of Biological Oxgyen Demand and Total Suspended Solids to standards
Source: MWE (2018)

3.3.7.4 Trends in sediment transfer rates, case study of Lake Victoria

Sedimentation rates were determined from successive sediment trap retrievals that generated 346 samples. The samples were analysed for particulate nutrients, nitrogen (N), phosphorus (P), carbon (C) and silicon (Si). Sedimentation rates into traps were highest at littoral stations compared to pelagic stations. In littoral areas, the settling velocities of P, N and BSi are higher ranging from 0.25 – 0.30 m/d. The composition of the settling material is highly organic and of algal origin (MWE 2018). Both inshore and offshore settling velocities are relatively low than those for sedimentation in large lakes. This is probably a result of the dominance of slow sinking cyanobacteria in Lake Victoria. There is high nutrient regeneration and resuspension in the lake.

There is yet no evidence that the rate of accumulation of sediments in Lake Victoria have changed over the last few decades in response to eutrophication. However, the nutrient content of Lake Victoria sediments has changed over time with very significant changes over the last 50 years. Hecky (1993) first reported on these changes from core 103 from Kenya waters. The rise in biogenic Si in this core was consistent with the decline in dissolved Si compared to 1960's and the rise in the P content of the core also was of the same magnitude as for total phosphorus concentrations in the lake. These changes were consistent with classical changes reported in other large lakes in response to nutrient enrichment (Hecky 1993).

All studies indicate that sedimentation of P and Si have increased over the last half of the past century and continue at historically maximally high rates. Although soluble Si concentrations have decreased since 1960 as sedimentation exceeded supply, the total phosphorus concentrations in Lake Victoria waters have actually risen, approximately doubling in that period. These changes in nutrient availability have caused changes in the algal communities, as large rapidly sinking diatoms of the genus *Aulacoseira* (formerly *Melosira*) have been replaced by the thinly silicified forms of slow sinking *Nitzschia* in Lake Victoria's accumulating sediments. This change in diatom community has been accompanied by the increase in

cyanobactera taxa (*Anabaena, Cylindrospermopsis, Microcystis and Planktolyngbya*) that now dominate the algal biomass.

3.3.8 By 2020, invasive alien species harmful to biodiversity, socio-economic development and human health are managed to prevent their introduction and establishment

3.3.8.1 Management Plans in place to control most threatening invasive alien species

Between 2008 and 2012, Uganda developed the National Invasive Species Strategy, Action Plan (NISSAP). The strategy was developed from lessons learned during the GEF-funded project, "Removing Barriers to Invasive Plant Management in Africa (RBIPMA)". The goal of the NISSAP is to guide decision making during national and sectoral planning and gives effect to Article 8 (h) of the CBD, which obliges each contracting party to, as far as possible and appropriate, prevent the introduction, control, or eradication of those invasive species that threaten ecosystems, habitats, or species. Amendments addressing the invasive species' threat were approved for incorporation into the second National Biodiversity Strategy and Action Plan (NBSAP II). (USAID 2015).

The goal of the NISSAP is to minimise the impact of invasive species on aquatic and terrestrial ecosystems, and for improved livelihoods, poverty reduction and sustainable economic development. The objectives of the NISSAP are: (i) to increase awareness about IAS as a major issue affecting Uganda's socioeconomic development; (ii) introduce strategies to prevent the introduction of IAS a priority issue requiring national action; (iii) ensure that intentional introductions, including those for biological control purposes, are properly evaluated in advance with full regard to their potential impacts on the environment and economic development; (iv) develop and implement eradication and control programmes for invasive species; (v) facilitate necessary research and introduce communication strategies to enhance Uganda's knowledge base in order to address the problem of invasive species; and (vi) development of a comprehensive framework for national legislation and international cooperation for IAS management (NEMA 2014).

The apex body responsible for coordinating national IAS policy the National Agricultural Research Organisation (NARO), under the National Invasive Species Coordination Unit (NISCU). The Government of Uganda committed itself to underwriting IAS management programmes in the country for another five years (UNEP-GEF 2008; USAID 2015).

Invasive species as a priority concern for PA management. Invasives are affecting habitats in Queen Elizabeth Conservation Area (QECA), Lake Mburo National Park (LMNP), Kidepo Valley Conservation Area (KVCA), Murchison Falls Conservation Area (MFCA), and nearly half of all National Parks (USAID ETOA 2015). National Agricultural Research Organization (NARO), in a study about removing barriers to effective invasive plant management under Aichi Target 9, identified invasive species of concern that need urgent control (Table 3.19). Beyond, the NARO Study, species of concern in PAs include congress weed, a significant problem in Queen Eliabeth National Park (QENP), and various cactus species. Spread of invasive species is forcing wildlife to roam beyond park boundaries.

Table 3.19: List of invasive species of national concern for urgent control

Species/Name	Remarks

Plants	
Black wattle	Source of timber woodchips, firewood and its tan is used in leather industry as well as building materials
Paper mulberry	Concern in Budongo and Mabira CFRs
Calliandra	Used in agroforestry for fodder and firewood, possible to contain
Cacia	Concern in Bwindi Impenetrable National Park and Budongo CFR, good for fuel wood and building materials
Kariba weed; giant Salvinia (*Salvinia Molesta)*	Flooring on lakes, fern used as an ornamental, spread quickly and chokes fisheries resources
Water lettuce; Nile Cabbage	Biological control needed
Water hyacinth	Water weed affecting fisheries and other organisms, eradication, not feasible
Lantana camara	Common in fallow land and thickets and PAs (QENP and LMNP) reduces biodiversity and eradication impossible
Acacia hockii	Common in south-western Uganda, in rangelands and PAs- LMNP, MFNP and QENP. Displaces native species that are palatable to wildlife and livestock, difficult to eradicate
Stiga	Weed on agricultural land-lowers crop yields, poisonous and unpalatable to wildlife, present in QENP
Sensitive plant	Common along riverbanks and lake shores, it covers other vegetation and hampers movement
Lemon grass (*cympogon nardus*)	Common in rangelands-unpalatable to livestock and wildlife, common in Rakai district and Lake Mburo National Park.
Insect species	
• Cypress aphid Cinara cupressi	Pest attacks cypress trees. At the height of attack in 1995 on average 60% of the trees were under damage category 3 (26- 60%). • Following release of P. juniperorum 1995-1996, damage dropped to category 2(11-25%) in 1999 and category 1(0-10%) in release sites in 2006.
Pine woolly aphid	Before release of Tetraphleps raoi most of trees in woolliness category 1 (woolly spots<=10% adjacent spots touching) • After release most trees >95% in woolliness category 0 (no wool spots) in release sites and adjacent • Redistributing in other sites
Blue Gum Chalcid	Currently major problem • Present in all agro ecological zones but absent in Kabale district – Highland and cold. • Hill top areas of Mbale and Sironko districts-mild attacks • Most clones showing resistance. GU clones showing more resistance at seedling level. GC Clones 784, 540, and 514 showing susceptibility in that order at clonal hedge (mother garden).

Source: NEMA 2014

Water hyacinth has been controlled through manual, mechanical and biological control. Like Water hyacinth, the Kariba weed can also be controlled through Manual, mechanical, biological and chemical methods. The manual removal method involves physical removal of the weed using hand tools like rakes and wheel barrows with the help of protective gear. This method is very labour - intensive suitable for clearing small infestations or delimited areas like landing sites. The Mechanical control method is based on harvesting, removing and transporting all types of aquatic weeds using different machines working from banks or floating on water surface. This method is effective but expensive. The Biological Control method involves rearing and release of weevils (insects) that feed on the Kariba weed. It is cheap, slow but effective and sustainable. The Chemical Method of aquatic weed control involves the use of chemical

herbicides for controlling infestations of the Kariba weed. In addition to the above, one of the key long term options for control of aquatic weed is watershed management that aims at reducing the influx of excess nutrients into surface waters.

Uganda Wildlife Authority (UWA) has taken measures to control Invasive Alien Species (IAS) that are threatening to take over two of Uganda's most popular National Parks. The affected parks are Queen Elizabeth and Lake Mburo. "Sixty-five percent of the area in Queen Elizabeth protected area has been colonised by the Invasive Alien Species while about 85 per cent of Lake Mburo National Park is also affected," says Dr Peter Beine, the national project coordinator, National Agricultural Research Organisation (NARO). That means 1,256 square kilometres of Queen Elizabeth National Park is under the Invasive Alien Species leaving only 722 square kilometres of unaffected area for animals. The park measures 1978 square kilometres. Bad as this sounds, Lake Mburo is in a worse situation with only 39 km² out of 260 square kilometres unaffected by the invasive species. The project to get rid of the alien species is implemented by Uganda Wildlife Authority together with the National Invasive Species Coordination Unit (NISCU), a branch of NARO with technical support from the Inter-Ministerial Working Committee (IMWC-IAS) composed of representatives from the various IAS-affected countries, ministries, departments and agencies. The International Union for Conservation of Nature (IUCN) defines Invasive plants as non-indigenous or non-native plants that adversely affect the habitats they invade economically, environmentally or ecologically.

3.3.8.2 Trends in the economic impacts of selected invasive alien species

Salvinia molesta has been recently added onto the list of the world's 100 most invasive species and ranks second to water hyacinth (*Eichhornia crassipes, (Mart.) Solms-Laub*.) as the most invasive aquatic plant in the world due to its environmental, economic and human health impacts (CABI 2017; Madsen and Wersal 2008). S. molesta poses similar problems as those posed by Water Hyacinth and Water Lettuce including clogging canals, rivers and lakes; displacing native plants and animals; and interfering with irrigation, navigation, fishing and electric power generation activities (Labrada and Fornasari 2002).

The Kariba-weed in Uganda was first sighted on Lake Kyoga in 2007. The water weed has since then spread to different water bodies including Albert Nile, Lake Albert and River Nile among others. It has spread to South Sudan through the Nile. The immediate negative impacts of the weed are; many of the communities that live near these water bodies have abandoned fishing because the water weed sweeps away the fishing gear as it moves with the water current, navigation is impeded, difficulty in docking of ferries and boats has been reported at many docking sites in the affected water bodies, fishing communities that used to survive on fishing have had to change their livelihoods to alternative livelihoods which include charcoal burning, and further de-forestation and Environmental degradation as fishing communities resort to charcoal burning.

The Government still lacks the adequate human and machinery capacity to address the challenges posed by the Kariba weed. The affected Local Governments lack adequate logistical capacity to satisfactorily establish adequate sanitary facilities along landing sites to curb nutrient loading. MWE in collaboration with other Ministries such as Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and the Office of the Prime Minister developed a costed action plan in form of immediate, short term and long term strategies to combat the weed. The budgeted action plan did not get funds from the Ministry of

Finance, Planning and Economic Development (MFPED), and Ministries were tasked to work within the budgets they operate to handle the weed. However, the interventions proposed in the inter-ministerial control strategy sought a financial allocation of UGX 16.354 billion. The immediate actions required was UGX 7,554 billion. The medium term interventions require UGX4.96 billion while the long term interventions require 3.840 billion. MAAIF requested an emergency fund of UX 4.o billion to maintain and operate the existing equipment so as to respond to abrupt resurgences (MAAIF 2017).

3.3.8.3 Trends in area covered invasive alien species

Compared to other Eastern African countries (Table 3.20), Uganda has a relatively high invasive species coverage. Only Rwanda was considered to have a higher coverage of invasive species based on the sampling conducted (Witt et al. 2018).

Table 3.20: Surveys of invasive alien plant species using GIS grids

Country	Total number of grid cells	Number of grid cells surveyed	% of country surveyed
Kenya	201	129	64.0
Rwanda	13	12	93.3
Tanzania	344	169	49.1
Uganda	90	67	74.4
Total	**1063**	**522**	**49.1**

Source: Witt et al. 2018

Table 3.21 shows the distribution of what is considered the 30 species with the greatest impact in terms of transforming natural vegetation within Uganda (Witt et al. 2018). The habitats commonly impacted by invasive species include forests, savannahs, grasslands, forest plantation, farm lands or arable lands, wetlands and drylands, among others.

Table 3.21: Distribution of what is considered the 30 species with the greatest impact in terms of transforming natural vegetation

Species and family	Growth form & invasive type	Distribution		Habitat types invaded	Negative impacts
		% of surveyed grid cells present	% of surveyed grid cells present		
Cascabela thevelia (L.) Lippold (Syn: Thevelia peruviana (pers.) k. Schum (Apocynaceae)	Tree or shrub	48.6	6.0	Sa, Tr, Rr, Ha, PA, Ws, Gr	Form dense thickets, especially in low-lying areas and along water courses, displacing native plants and animal species.
Chomolaena odorota (L.) R.M. King and H. Rob. (Asteraceae)	Shrub	1.9	1.5	Sa, Tr, Rr, Ha, PA, Ws, Wc	Displaces native plant species and alters fuel properties of vegetation, increasing fire intensities. Reduces the productivity of the rangelands and causes serious health problems in livestock and people
Parthenium hysterophorus (Asteraceae)	Herb	31.6	25,4	Sa, Tr, Rr, Ha, PA, Ws, Wc	Allelopathic and able to suppress natural vegetation. Severely reduces the productivity of rangelands, and causes allergenic reactions (dermatitis, hay fever and asthma) in a large proportion of people who come into contact with it, as well as in livestock and wildlife.
Tithonia diversifolia (Hemsl.) A Gray (Asteraceae)	Shrub	29.4	23.5	Sa, Tr, Rr, Ha, Pl, Ar, PA, Ws, Wc	Displaces native vegetation and reduces species diversity and the productivity of rangelands. Contributes to the local

Species and family	Growth form & invasive type	Distribution		Habitat types invaded	Negative impacts
		% of surveyed grid cells present	% of surveyed grid cells present		
					extinction of valued native species.
Xanthium strumarium L. (Asteraceae)	Herb	34.1	28.4	Sa, Tr, Rr, Ar, Ws, Wc	Rapidly forms large stands, displacing other plant species. Toxic to livestock and can lead to death if eaten.
Austrocylindropuntia subulata (Muelenpf.) Backeb. (Cactaceae)	Succulent tree or shrub	12.1	4.0	Sa, Rr, Ha, Pa, Wc, Dr	Forms impenetrable thickets that prevent access to grazing pastures and water resources. Infestations reduce the livestock-carrying capacities of pastures. Spines cause injuries to livestock, wildlife and people.
Bryophyllum delagoense (Eckl. & Zeyh.) Druce (Crassulaceae)	Succulent herb	5.2	2.5	Sa, Tr, Rr, Ha, Pa, Ws, Wc	Forms dense monotypic stands, which displace native plant species. Toxic to livestock and humans and probably also to wildlife.
Acacia mearnsii De Wild (Fabaceae)?	Tree or shrub	15.4	6.4	Fo, Gr, Tr, Rr, Ha, Pl, Ws, Wc	Displaces natural vegetation, reducing native biodiversity and rangeland productivity. Reduces surface water runoff. Increases soil nitrogen levels, altering soil nutrient cycling.
Caesalpinia decapetala (Roth) Alston (Fabaceae)	Climber	35.6	12.6	Fo, Sa, TR, Rr, Ha, Pl, Pa, Ws, Wc	Climbs over vegetation, forming tangled, impenetrable thickets, detrimental to fauna and flora. Grows into forest and woodland canopies, causing canopy collapse. Impedes forest management operations and is a fire hazard. Reduces livestock-carrying capacities and inhibits the movement of livestock and people. The large spines on the stems can cause injuries to wildlife, livestock and people.
Leucaena leucocephala (Lam.) de Wit (Fabaceae)	Tree or shrub	53.9	15.4	Sa, Tr, Rr, Ha, Pa, Ws, Wc	Forms large monocultures, displacing native plant and animal species. Invasions alter secondary succession processes and render areas unusable and inaccessible.
Mimosa diplotricha Sauvalle (Fabaceae)	Tree or shrub	3.2	3.0	Fo, Sa, Gr, Tr, Rr, Ha, Pl, Ar, Pa, Ws, Wc	Smothers other plants, shading out light-demanding species and preventing their natural regeneration. Dense stands may prevent or inhibit the movement of livestock and wildlife. Toxic to both sheep and pigs.
Mimosa pigra L. (Fabaceae)	Tree or shrub	15.1	11.7	Sa, Tr, Rr, Ha, Ar, Pa, Ws, Wc, Wt	Dense infestations can eliminate native plant and animal species, and lead to steep declines in the abundance of others. Hampers fishing activities, and blocks access to waterbodies.
Senna spectabilis (DC.) H.S. Irwin & Barneby (Fabaceae)	Tree or shrub	36.0	4.5	Fo, Tr, Rr, Ha, Ws, Wc	Grows rapidly, dominating other species and displacing native flora and fauna. Inhibits regeneration of native plant species.
Psidium guajava L. (Myrtaceae)	Tree or shrub	42.0	9.8	Fo, Sa, Tr, Rr, Ha, Pl, Pa, Ws, Wc	Establishes dense stands, displacing native plant and animal species. Allelopathic, impacting negatively on some crop species. Invasive in secondary forests.

Species and family	Growth form & invasive type	Distribution		Habitat types invaded	Negative impacts
		% of surveyed grid cells present	% of surveyed grid cells present		
Eichhornia crassipes (Mart.) Solms (Pontederiaceae)	Aquatic	5.6	4.3	Wc, Wt	Forms thick mats which hamper water transport; inhibit or prevent fishing-related activities; blocks waterways; hampers hydroelectricity generation; and provides habitats for vectors of human and animal diseases.
Datura stramonium L. (Solanaceae)	Herb	45.2	34.1	Sa, Gr, Tr, Rr, Ha, Ar, Pa, Ws	Competes aggressively with native plants and crops, forming dense monospecific stands. Toxic to people and animals.
Solanum mauritianum Scop. (Solanaceae)	Tree or shrub	10.4	5.5	Fo, Tr, Rr, Ha, Pl, Ws, Wc	Displaces native plant and animal species. By producing copious amounts of edible seeds, it disrupts natural seed dispersal mechanisms, leading to declines in affected native plant species. The plant, if consumed, is toxic to livestock.
Lantana camara L. (Verbenaceae)	Tree or shrub	54.4	38	Fo, Sa, Gr, Tr, Rr, Ha, Pl, Ar, Pa, Ws, Wc	Displaces natural vegetation, impacting negatively on biodiversity. Toxic to livestock, causing animal deaths, reduced productivity, and loss of pasture.

Habitat types invaded (Fo, forest; Sa, savannah; Gr, grassland; Tr, transformed; Rr, road/rail side; Ha, around habitation; Pl, plantation; Ar, arable/ploughed land; Pa, pastoral; Ws, wasteland; Wc, watercourse; Wt, wetland; Dr, dryland/well drained; Kl, kloof/ravine; Ro, rocky site), and impacts. A full set of references to accounts of impact are contained in Witt and Luke (2017).

Source: Witt et al. 2018

3.3.9 By 2020, the impacts of fisheries activities on fish stocks, species and ecosystems are within safe ecological limits

3.3.9.1 Trends in catch per unit effort

The ecological resilience of Lake Victoria is threatened by high human population, unsustainable fishing practices, increased watershed degradation, pollution, conversion of sensitive shoreline wetlands to agricultural lands, reduced water inflows and the effects of climate change (LVFO Secretariat, 2015: Cooper 2018).

The fishing effort on Lake Victoria was assessed based on the number of fishers, number of boats, number of motorised boats and number of owners of fishing crafts (or boats). Between 2014 and 2016, there was an increase in the fishing effort (MAAIF/DiFR 2017). Between 2000 and 2014, the number of fishers increased by 85% (Nakiyende et al., 2016) but between 2014 and 2016, the increase in number of fishers was marginal at 3.5%. The number of fishing boars increased by 4.1% from 28,239 fishing crafts in 2014 to 29,398 in 2016. The higher increases in number of fishers by 85% while the number of fishing boats increased by approximately 82% between 2000 and 2014 may have levelled off between 2014 and 2016. However, the fishing effort is still reasonably high and this undermines sustainable management as it is a sign of increasing fishing pressure.

Table 3.22: Fishing effort on Lake Victoria 2000-2016

Fishing effort	2000	2014	2016

Number of fishers	34,889	64,617	66,869
Number of boats	15,544	28,239	29,398
Number of motorised boats	2,031	9,995	11,090
Number of owners	-	16,790	16231
% of owners who are women	-	11.5	14.9

Source: MAAIF/DiFR (2017)

The majority of boats are paddle operated (61.1%), implying that fishing effort is concentrated close to shore; this contributes to localised over-fishing (Ikwaput, 2015). Motorised boats almost exclusively target Nile Perch in deeper waters (Ikwaput, 2015). Illegal fishing nets, which target smaller size of Nile Perch increased dramatically between 2012 and 2014: beach and boat seines increased by 47.3% and monofilament gillnets by 43.9% (Ikwaput, 2015).

Declining fish catch: There has been an overall decline in the annual catch of the 3 commercially important species from 239,000 tonnes in 2005 to 149,000 tonnes in 2015 (Nakiyende et al., 2016). However, across the same period the beach value of the catch increased from 240billion Ugandan shillings (UGX) to 416 billion UGX (Nakiyende at al., 2016). The selling price of fish often increases as a result of scarcity and increased demand from domestic, regional and international market.

Based on the information of catch and fishing effort, Maximum Sustianable Yield (MSY) was determined for each of the three major commercial fish species exploited on Lake Victoria (Natugonza et al 2018). Using the MSY, appropriate fishing effort (number of boats) was determined for each of the species and distributed to riparian districts (Table 3.23). Basing on this, licensing of the boats is underway as a measure to reduce fishing effort and exploit the fisheries resources of Lake Victoria under safe ecological limits.

Table 3.23 The recommended number of boats for licensing allocated to each of the districts to exploit each of the commercial fish species

Districts	Nile perch	Districts	Nile tilapia	Districts	Mukene
Kalungu	25	Rakai	58	Kalungu	0
Jinja	39	Kalungu	59	Kampala	0
Kampala	40	Busia	65	Busia	1
Busia	50	Kampala	66	Jinja	12
Bugiri	87	Bugiri	88	Rakai	57
Mpigi	147	Jinja	167	Bugiri	66
Rakai	297	Masaka	188	Masaka	141
Masaka	318	Mpigi	324	Mpigi	311
Buikwe	381	Kalangala	387	Wakiso	398
Wakiso	714	Buikwe	428	Namayingo	659
Mayuge	1,100	Namayingo	711	Buikwe	724
Namayingo	1,217	Buvuma	744	Mayuge	758
Mukono	1,541	Wakiso	847	Mukono	773
Kalangala	1,637	Mukono	1,029	Kalangala	946
Buvuma	3,291	Mayuge	1,045	Buvuma	1,158
Total	10,882	Total	6,204	Total	6004

Source: Natugonza et al. (2018)

Table 3.24: Tends in annual fish yield ("000" t) and beach value (Billion UGX) of catch of the major commercial species on Lake Victoria Uganda 2005-2015

Year	Nile perch		Tilapia		Daaga/Mukene		Other species		Overall	
	Catch	Value	Catch	Value	Catch	Value	Catch	Value	Catch	Value
2005	95	183	29	28	106	21	8	8	239	240
2006	91	175	27	26	96	19	2	2	216	222
2007	87	147	24	26	114	19	3	2	227	194
2008	81	181	20	28	70	19	2	3	173	231
2010	85	297	17	37	59	16	2	4	163	355
2011	70	326	19	54	89	46	4	8	182	435
2014	67	362	21	90	166	93	15	39	270	584
2015	37	220	13	69	65	49	34	78	149	416

Exchange rate (UGX 1756.30 =**$1 in 2005; UGX** 1823.41 = $1 in 2006: UGX 1728.58 to $1 in 2007; UGX 1667.64 to $1 in 2008; UGX 2233.62 to $1 in 2009; UGX 2282.81 to $1 in 2010; UGX 2809.20 to $1 in 2011; UGX 2690.91 to $1 in 2012; UGX 2532.93 to $1 in 2013; UGX 2778.07 to $1 in 2014; UGX 3382.0 to $1 in 2015

Source: Nakiyende et al. 2016

Nile perch dominated the catch between 1980 and the late 1990s (Nakiyende et al., 2016). Catches of Nile Perch have declined since then due to fishing pressures and changes in fishing practice (Indian Ocean Commission, 2015). Mukene/Dagaa fishing is mainly conducted in shallow waters and as such also results in the cropping of juveniles of other species (Nakiyende et al., 2016).

Nile Perch: The Nile Perch fishery, across the whole of Lake Victoria, is currently vulnerable to overfished at a level approaching its biological safe limit (Indian Ocean Commission, 2015). Signs of vulnerability include: decline in stock abundance; dominance of juvenile fish; and decrease in length at first maturity. This could lead to stock collapse and a suboptimal economic contribution. The Lake Victoria Fisheries Organisation, a transboundary governance body, developed a Nile Perch Management Plan for 2009-2014, but failed to reverse over-fishing; a second plan has now been developed. The Nile Perch fishery is predominately a small-scale commercial fishery, employing approximately 166,000 people in Uganda (Indian Ocean Commission, 2015). Women play a significant role in the fish trade as they comprise 36% to 80% of the labour force in different stages of the processing chain (Indian Ocean Commission, 2015).

3.3.9.2 Trends in area, frequency, or intensity of destructive fishing practices

1. The high value large fish species have substantially declined on all the major lakes, replaced by the low value small fishes
2. Fishing effort on major water bodies has more than doubled over a two-decade period, dominated by illegal gears
3. Catch landings of the large sized fishes is dominated by Juveniles.

- Fisheries production in Uganda is majorly based on the wild stocks (capture fisheries).
- These contribute about 90% of the total annual fish supply (estimated at 550,000 tons).
- Capture fisheries production is mainly from the large lakes (~95%)
- The exploited fish species range from the small (e.g. silver fish, Ragoogi, Nkejje) to the large ones (e.g. Nile perch, Nile tilapias,) (Nakiyende et al. 2016).

Table 3.25: Dominant fish species and percentage composition by water body

Water body	Dominant species	% composition of dominant species
Victoria	*Rastrineobola. argentea* (Silver cyprinid)	60
Kyoga	*Rastrineobola. argentea* (Silver cyprinid)	43
Albert	*B. nurse & N. bredoi*	83
George	*Haplochromine cichlids*	>90
Edward	*Haplochromine cichlids*	>90

Source: Nakiyende et al. 2016

Table 3.25: fishing effort on the five lakes (2000 – 2014)

Variable	Victoria	Albert	Kyoga	George	Edward
Number of boats	15,500	5,770	6,630	290	210
Number of fishers	34,890	15,360	12,632	520	450
Number of undersize gillnets	54,450	54,350	67,765	26,940	920
Number of hooks	259,120	1,978,470	120,370	87,600	38,400
Other illegal gears	2,080	2,080	2,050	10	20

Source: Nakiyende et al. 2016

3.3.10 By 2020, fish is managed and harvested sustainably, legally, overfishing is avoided and recovery plans and measures are in place for all depleted species

3.3.10.1 Trends in fish stocks

There was a 31.6% increase in Nile perch biomass from 0.851 million tonnes in 2016 to 1.12 million tonnes in 2017. The largest increase (relative to previous biomass for each country) was recorded in the Kenyan portion of the lake (75.9%) followed by Tanzania (41.8%) and least in Uganda (16.2%). The increase was recorded in most of the strata with exception of SE deep stratum and Emin pasha (Tanzania), NW deep and NE coastal strata (Uganda), and Nyanza Gulf (Kenya).

In the current survey Nile perch densities were highest (>20 tonnes/km2) in SE inshore and coastal strata and SW coastal stratum (Tanzania), NE inshore and Ssesse Islands (Uganda), and NE inshore and coastal strata (Kenya), and lowest (<5 tonnes/km^2) in Nyanza Gulf (Kenya), NW deep stratum (Uganda) and Emin pasha (Tanzania). Generally, there has been a recovery in the southeast and northwest strata. Despite the increase in overall biomass, the size structure has not changes and most of the Nile perch have remained small, where most of the targets. Most of the Nile perch targets (96.3%) were estimated to be less than 50 cm TL.

Table 3.26: Standing stock and biomass estimates of Nile Perch greater than 10cm TL, from the last three acoustic surveys

Region parameters			Nov-15		Aug-16		Sep-17	
Quadrant	Stratum	Areas (km^2)	Densities (t/km2)	Biomass (t)	Densities (t/km2)	Biomass (t)	Densities (t/km2)	Biomass (t)
NW	Deep	6,226	8.18	50,903	10.65	66,289	1.87	11,640
NW	Coastal	4,865	19.08	92,826	11.45	55.717	19.79	96,256
NW	Inshore	3,115	19.81	61,705	15.58	48,527	21.21	66,084
NW	SI	2,494	13.92	34,712	15.31	38,181	23.72	59,164

NE	Deep	4,724	18.47	87,272	11.64	54,994	19.30	91,175
NE	Coastal	2,704	23.61	63,842	19.95	53,932	19.72	53,335
NE	Inshore	3,966	14.34	56,887	19.09	75,712	20.07	79,593
Sub-total				448,146		393,353		457,248

Source: Nyamweya et al. (2017)

Standing stock of dagaa

Table 3.31 shows the standing stock and biomass of dagaa in Lake Victoria estimated during September 2017 acoustic survey, and compared with the biomass of the two previous (November 2015 and August 2016) acoustic surveys. Generally, there was a further reduction (11%) in dagaa biomass between August 2016 and September 2017, adding to the 49% decline in the precedent year. However, unlike the previous survey, where the decline in all other strata with exception of Emin Pasha, NW deep, NW coastal, and Nyanza Gulf, the decrease during 2017 survey was recorded only in SE deep and Emin Pasha strata (Tanzania) and NW and NE deep and coastal strata (Uganda). In fact, in terms of total biomass per country, the only decrease in biomass was recorded in the Ugandan portion of the lake. Tanzania posted a slight increase (3%), although still substantially lower than 2015 biomass, while Kenya recorded a significant increase (with 2017 biomass almost equalling 2015 biomass).

Table 3.27: Density and Biomass estimates of dagaa from the last three acoustic surveys conducted in Lake Victoria by country and stratum

Region parameters			**Nov-15**		**Aug-16**		**Sep-17**	
Quadrant	**Stratum**	**Areas (km^2)**	**Densities (t/km2)**	**Biomass (t)**	**Densities (t/km2)**	**Biomass (t)**	**Densities (t/km2)**	**Biomass (t)**
NW	Deep	6,226	7.6	47,366	10.8	67,108	8.1	50,545
NW	Coastal	4,865	10.8	52,455	18.5	90,110	6.8	32,860
NW	Inshore	3,115	24.2	75,269	10.9	33,939	11.5	35,830
NW	SI	2,494	22.9	57,142	10.4	26,046	21.8	54,488
NE	Deep	4,724	11.2	52,690	8.8	41,493	3.0	14,100
NE	Coastal	2,704	17.5	47,297	15.9	43,020	11.4	30,908
NE	Inshore	3,966	25.1	99,642	10.4	41,204	16.6	65,823
Sub-total				431,861		342,920		284,554

Source: Nyamweya et al. (2017)

Haplochromines and others

Table 3.32 shows the standing stock and biomass of haplochromine cichlids and others in Lake Victoria estimated during September 2017 acoustic survey. These were compared with estimates of the two previous (November 2015 and August 2016) acoustic surveys.

There was an increase (55.4%) in biomass of haplochromine cichlids and other unidentified species relative to the levels recorded in the November 2016 survey, with the total biomass recorded in 2017 survey matching that of the 2015 survey. The largest increase (relative to biomass per country) was recorded in the Tanzanian portion of the lake (67%) followed by Kenya (53%) and least in Uganda (39%). The increase was recorded in all strata with exception of two strata, NW deep and coastal, Uganda.

Table 3.28: Estimated standing stock of Haplochromine cichlids and other unidentified fish species from the last three acoustics by country and by strata

Region parameters			Nov-15		Aug-16		Sep-17	
Quadrant	**Stratum**	**Areas (km^2)**	**Densities (t/km2)**	**Biomass (t)**	**Densities (t/km2)**	**Biomass (t)**	**Densities (t/km2)**	**Biomass (t)**
NW	Deep	6,226	3.39	21,076	3.3	20,423	0.1	765
NW	Coastal	4,865	10.19	49,419	8.1	39,404	7.6	37,168
NW	Inshore	3,115	15.66	48,791	6.8	21,240	10.3	31,929
NW	SI	2,494	10.35	25,802	4.8	11,994	12.7	31,636
NE	Deep	4,724	5.32	25,118	5.6	26,407	14.3	67,546
NE	Coastal	2,704	9.77	26,429	8.1	21,281	9.2	24,968
NE	Inshore	3,966	10.15	40,263	9.3	37,046	13.9	55,273
Sub-total				236,898		178,334		249,285

Source: Nyamweya et al. (2017)

Standing stock of *Caridina nilotica*

A total of 100,723 tonnes of C. nilotica were recorded in the current survey. This was 43% decline from the 176,649 tonnes reported in the 2016 survey. The largest decline (relative to biomass per country) was recorded in the Ugandan portion of the lake (58.5%) followed by Kenya (51.8%) and least in Tanzania (23.8%). The decline was recorded in all strata with exception of three strata, SE inshore and Speke Gulf, Tanzania, and NE inshore strata, Kenya.

Table 3.29: Estimated standing stock of C. nilotica in Lake Victoria from the last three acoustics by country and by strata

Region parameters			Nov-15		Aug-16		Sep-17	
Quadrant	**Stratum**	**Areas (km^2)**	**Densities (t/km2)**	**Biomass (t)**	**Densities (t/km2)**	**Biomass (t)**	**Densities (t/km2)**	**Biomass (t)**
NW	Deep	6,226	0.8	4,849	2.1	13,170	0.2	1,215
NW	Coastal	4,865	4.6	22,270	2.5	12,046	1.4	6,723
NW	Inshore	3,115	2.0	6,226	6.7	20,907	4.2	12,928
NW	SI	2,494	1.0	2,525	3.6	8,941	1.5	3,763
NE	Deep	4,724	3.0	14,257	0.2	759	0.1	283
NE	Coastal	2,704	2.1	5,748	1.7	4,680	1.0	2,789
NE	Inshore	3,966	2.8	11,271	6.3	24,811	1.9	7,697
Sub-total				67,146		85,315		35,399

Source: Nyamweya et al. (2017)

3.10.3 Overall trends in fish catch for all water bodies in Uganda

Fish catch by water body Fisheries activities are mainly carried out in open water sources and provide an important source of livelihood for many people in Uganda. Open Water cover 15.3% of Uganda's total surface 241,039Km^2 and this comprises five major lakes (Victoria, Albert, Kyoga, Edward and George), which are a main contributor to capture fisheries in the country. In 2015 and 2016, the contribution of fish catch in for Lake Albert 44% surpassed that of Lake Victoria (40%) which had been the most important water body in Uganda both in size and contribution to the fish catch in the past years. As shown in Figure 3.1.2 F, Lake Kyoga was the third largest contributor to fish catch (10.5%).

Table 3.30: Fish catch by water body ('000 tonnes), 2013 - 2016

Water body	2013	2014	2015	2016
Lake Victoria	193,000	245,000	238,630	252,804

Lake Albert	160,000	152,000	149,040	148,159
Lake Kyoga	40,000	38,000	41,768	40,710
Lake Edward, George and Kazinga channel	6,248	6,246	6,354	6,638
Albert Nile	5,500	5,390	5,122	5,375
Lake Wamala	4,500	4,590	4,186	3,959
Other waters	10,000	10,500	9,760	9,883
Total	419,248	461,726	454,860	467,528

Source: UBOS 2018

3.4. To promote the sustainable use and equitable sharing of costs and benefits of biodiversity

3.4.1. By 2020, appropriate incentives for biodiversity conservation and sustainable use are in place and applied

3.4.1.1 Trends in the number and value of incentives, including subsidies, harmful to biodiversity, removed, reformed or phased out

Since the late 2000s, there has been an increase in the number of Government initiatives to cancel and/or reverse perverse subsidies that negatively impact on biodiversity and ecosystems. One of the most outstanding reverse of subsidies, was the Cabinet Decision on 16th April 2014 (Minute 114, CT 2014) to approve cancellation of land titles in wetlands on public land acquired unlawfully after 1995, as a measure to address the problem of wetland degradation.

The National Fisheries Policy (2004) introduced Beach Management Units (BMUs) to assist the technical officers in grassroots fisheries management. Whereas the operations of the BMUs started well, they later deteriorated leading to a decline in fish stocks due to overfishing. The decline in fish stocks was blamed on the limited capacity to regulate enforcement systems and use of authorised officer and subsequent mushrooming of imposters led to a further decline in fish stocks (Parliament of Uganda 2019). In November 2015, in accordance with section 3, of the Fish Act Cap 197, the President of Uganda formed the Fisheries Protection Force (FPF) to fill the law enforcement gap that had hit the fisheries sector. At the same time the presidential directive also halted the operations of BMUs. The Beach Management Units (BMUs) statute 2003, institutionalised BMUs as community institutions with co-management functions to develop, conserve and sustain the fisheries resources. However, implementation was faced with challenges including; increased encroachment on the lakes and rivers, and their catchments, overfishing, use of illegal fishing gear, poor landings and environmental degradation (Kamuturaki, 2015).

In 2008 and again in 2016, Uganda developed the first and second National Implementation Plans (NIP I and NIP II) for the Stockholm Convention on Persistent Organic Pollutants (POPs). Under the NIP I, management actions comprising elimination of POPs, restriction of POPs and management of Unintentionally produced POPs (NEMA 2008). The outcomes of NIP 1 were an action plan for the elimination of POPs pesticides that were imported, stockpiled and/or poorly disposed under government programmes for control of Tsetse fly, malaria control and pest management in agriculture. The target pesticides include; aldrin, Chlordane, Cheldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene and a non-pesticide Polychlorinated Biphenyls (PCBs) were historically used in transformers to stabilise oil and make it more heat tolerant.

In 2016, Uganda developed the Second NIP for the Stockholm convention in which management option was proposed for nine additional POPs (NEMA 2016). The 9 new POPs were; POPs pesticides-Gidane,

Chlodecone, Alpha Hexachlorocyclohexane (Alpha-HCH), Hexachlorochyclohexane (Beta-HCH) and Pentachloro mitro benzene (quintozene). Industrial POPs-vi) Tetrabromodiphemyl ether and Pentabromochohenyl ether (commercial penta-BDEs), vii) hexabromochphenyl ether and heptabromodiphenyl ether (commercocol octa-BDEs), viii) Hexabromobiphenyl and ix) Perflourooctane and sulphuric acid, its salts and Perfluorooctane Sulfonyl Fluoride (PFOs). An addition POPs pesticide endo sulfan was added to Annex A of the convention text for elimination, in 2013 Hexabromocyadodecane (HBCD) was also listed. These POPs bio accumulate in fatty tissues of living organisms including humans and are found in high concentrations in the food chain. Humans and wildlife exposed to POPs for extended periods of time and develop chronic toxic effects-resulting in negative immunological, neurological and reproductive health effects. POPs are semi-volatile chemicals that evaporate from the regions in which they are used and are transported over long distances in the atmosphere and aquatic ecosystems. They are also discharged directly, or through atmospheric deposition, into water ways, and are transported by movement of fresh waters.

3.4.2. By 2020 at least 2 partnerships established to ensure that wild harvested plant-based products are sourced sustainably

3.4.2.1 Partnerships with the private sector developed

The market structure for production, processing, local and international trade of wild plant based products is not well developed (NEMA 2015). There are some efforts based on studies and strategy development to streamline the organic and natural ingredients market. In an assessment of priority wild medicinal and food plants with potential for commercialization and value chain improvement for livelihood enhancement and poverty reduction in Uganda, Babirega et al. (2012) identified a total of 48 wild and semi wild food and medicinal plant species were recorded on the market (Table 3.35).

Table 3.31: Ranked food and medicinal plants

	Scientific name	Local name (Luganda)	Dominant
1.	*Luffa cylindrical*	Kyaangwe	Sponge/food
2.	*Cyphomandra betacea*	Binyaanya	Food
3.	*Physalis peruviana*	Ntuntunu	Food
4.	*Solanum Aethiopicum*	Nakati	Food
5.	*Mangifera indica*	Muyembe	Food
6.	*Amaranthus lividus*	Bbugga	Food
7.	*Cinnamon zeylanicum*	Budalasiini	Food
8.	*Amaranthus dubius*	Doodo	Food
9.	*Canariun schweinfurthii*	Mpafu	Food
10.	*Citrus limon*	Niimu	Food
11.	*Cleome gynandra*	Jobyo	Food
12.	*Persa Americana*	Ovacado	Food
13.	*Passiflora edulis*	Obutunda	Food
14.	*Albizia coriaria*	Omugavu	Medicine
15.	*Balanitis wilsoniana*	Nnaliggwalimu	Medicine
16.	*Affromomum angustifolium*	Matungulu	Food
17.	*Capsicum frutescens*	Kaamulali	Food
18.	*Hymenocardia acida Tul*	Mbaluka	Medicine
19.	*Prunus Africana*	Ntasesa	Medicine
20.	*Dioscorea praehensilis*	Bukupa	Food
21.	*Citrus reticulate*	Mangada	Food
22.	*Solanum anguivii*	Katunkuma	Food

	Scientific name	Local name (Luganda)	Dominant
23.	*Warbugia ugandensisa*	basi	Medicine
24.	*Warbugia ugandensis*	Mukuzanume	Medicine
25.	*Cocos nucifera*	Coco nut	Food
26.	*Artocarpus heterophylius*	Fene	Food
27.	*Morella kandtiana*	Nkikimbo	Medicine
28.	*Toddalia asiatica*	Kawule	Medicine
29.	*Mondia whitei*	Mulondo	Medicine
30.	*Citris sinensis*	Micungwa	Food
31.	*Ecuridaca longipeduculta*	Mukondwe	Medicine
32.	*Psorospermum febrifugum*	Kanzironziro	Medicine
33.		Musongola	Medicine
34.	*Vigna unguicata*	Gobe	Food
35.	*Citrus limon*	Niimu	Medicine
36.	*Solanum nigrum*	Nsuga	Food
37.	*Annona reticulate*	Bitafeeri	Food
38.	*Psidium guajava*	Mapeera	Food
39.	*Colocasia esculenta*	Mayuni	Food
40.	*Carica papaya*	Paw paws	Food
41.	*Syzygium jambos*	Mizabibu	Food
42.	*Dioscorea cirrhosa*	Balugu	Food
43.	*Syzygium cumini*	Jambura	Food
44.	*Dioscorea cayenensis*	Kyetutumula	Food
45.	*Vangueria apiculate*	Matugunda	Food
46.	*Sechium edule*	Nsuusuusti	Medicine
47.	*Rubus pinnatus*	Nkenene	Food
48.	*Brassica spp.*	Saaga	Medicine

Source: Barirega et al. 2012b

Similarly, Tugume et al. (2016) identified a total of 190 plant species of medicinal plants distributed in 61families and 152 genera were identified as used. Fabaceae contributed 27 species, followed by Asteraceae (17), Euphorbiaceae (13), Solanaceae (10) and Lamiaceae (9). Genera Solanum and Indigofera contributed five species each while Ficus, Vernonia, and Acacia contributed four species each. Preferred medicinal plant species Vernonia amygdalina was highly ranked and regarded most important in treatment of malaria in the study area. The diversity of medicinal plant species used and the associated indigenous knowledge are of great value to the local community and their conservation and preservation is paramount. The therapeutic uses of the documented plants provide basic data for further research focused on pharmacological studies and conservation of the most important species.

Onen and Oryem-Origa (2017) described five edible wild fruit species (Vitellaria paradoxa Gaertn, Vitex doniana Sweet, Borassus aethiopum Mart, Tamarindus indica L. and Annona senegalensis Oliv.) were earlier identified from household heads in Gulu district as most preferred. The main uses and products which were established included fruits, fuel-wood, charcoal, medicinal, timber among others. Modes of harvests varied with each product. No management system was in place for any fruit tree species. Wild fruits have several products not yet documented. Willingness to cultivate these fruit trees is low. The different ways by which products are harvested from the Preferred Edible Fruit Tree Species (PEWFTs) Products were harvested differently (Tab. 2). Most fruits were picked after falling naturally on the ground. Charcoal and timbers were obtained by felling down the whole tree.

Table 3.32: Different ways in which products harvested from the different edible fruit trees are used

Tree species	Ways by which different products are harvested											
	Fruits		Fuel wood			Charcoal	Timber	Medicines			Crafts/arts	
	Fruits fall when ripe (FFR)	Fruit harvested from tree (FHT)	Collect dry petioles (CDP)	Collect dry branches (CDB)	Cut whole tree (CWT)	CWT	CWT	Pluck leaves (PL)	Extracts root barks (ERB)	Extract stem bark (ESB)	CWT	Pick desired parts (PDP)
Vitex dontana	73	27	65	NP	35	39	11	10	2	1	100	NP
Vitellaria paradoxa	98	2	100	NP	NP	26	8	5	0	2	100	NP
Borassus aethiopium	97	3	NP	100	NP	NP	51	NP	NP	NP		100
Tamarandus indica	41	59	82	NP	18	18	NP	6	V			NP
Acacia senegalensis	9	91	45	NP	55	54	NP	2	NP	9	NP	NP

*NP – not a product

Source: Onen and Oryem-Origa (2017)

3.4.2.1.1 Private Public Partnerships: Case study of shea butter trees in Northern Uganda

According to the US Government Commercial Guide for Uganda (United States Department of Commerce 2017), Shea butter products are a part of a rapidly increasing market. Shea has become a popular input into chocolate, cosmetics, and natural products. While historically about 90 percent of shea butter was used in chocolates, cosmetics represents a rapidly growing market segment. Uganda exports Shea products to Germany, Japan, Kenya, India, Canada, Middle East, Rwanda, France and Kenya (Business Week 2019).

At the National Shea Exhibition, which occurred between 23 and 27 January 2019, Ten Shea Products makers participated in the exhibition. They included Moo Yao, Blessed Organic, Livara, Agago District Sheanut Collectors and Processors, Gulu Nanak, Shea House, Shea Care, Pelere Group, Shea Beauty Uganda and Crop Vet. However, less than 20% of the shea producers sell their nuts to organizations such as: The Northern Uganda shea Processors' Association - NUSPA) in Lira, Guru Nanak Oil Mills in Lira and CREAM in West Nile (Okullo et al. 2017). Uganda Export Promotions Board (UEPB) has set a target of supporting and enabling Shea Nut producers to have at least 200,000 to 500,000 tonnes of Shea Nut produced by 2022Figur. The government agency said this will be done by conserving and stopping the depletion of the Shea Nut trees, which are largely cut down for charcoal burning (Business Week 2019).

Figure 3.35: Map of shea belt in Uganda

Source: NEMA (2016): NEMA Corporate Report 2015-2016

In 2015, NEMA supported private sector and District Local Government stakeholders in the Shea Belt of Northern Uganda to develop a "National strategy for the conservation and sustainable use of the threatened Shea butter trees in Uganda" (Figure 3.35). Implementation of the strategy is estimated at a total to cost of US$ 21, 650,000 over the 10-year period. Implementation of the first five years is estimated at a cost of US$ 12, 650,000 which is US$ 2,530,000 per annum while the last five years (second phase) is estimated to cost US$ 9,000,000 which is US$ 1,800,000 per annum. Government of Uganda (GoU) and local governments are expected to provide the funds for implementation of the project. The Presidentail Director of 2006 on the protection of shea butter trees and value addition to shea-based products has helped in mobilization of political support at the national and local for the protection of the trees as well as value addition.

3.4.2.1.2 Case study of Aloesha Organic - Partnership on medicinal Plants

Aloesha Organic Natural Health Product is an incorporated company which was established in 2012. The company provides health services and beauty care through traditional herbal medicine, natural supplements and massage therapy treatments. The company produces natural health products like cosmetics and soap, immune boosters, and nutritional supplements. The company was incorporated in 2012 and it produces 113 natural health products in three categories – cosmetics and skin care products (13 products), nutritional food supplements / immune boosters (3 products) and herbal medicines / pharmaceutical products (97 products).

In December 2016, seven Aloesha Organic products qualified for the UNBS Q-mark which is awarded to products that meet the safety, health and quality standards for export. Aloesha Organic has also been certified by the National Drug Authority (NDA),

The price of a product standard ranges from Uganda shillings 20,000 to 50,000, depending on the number of pages it contains. In addition to purchasing product standards, one must also subject one's products to product testing which ensures that the products meet the required standard. Each product undergoes three tests. Product tests cost anywhere from Uganda shillings 300,000 to 700,000 depending on the nature of the product. Fortunately for Aloesha Organic, after they purchased over seven standards from UNBS, they received a grant from the Uganda Ministry of Trade, Industry and Cooperatives to cover the cost of product testing. The grant was offered under the Trademark East Africa funded Quality Infrastructure and Standards Programme (QUISP). Without the grant, Aloesha Organic would have made much slower progress towards standards certification. In 2016, Aloesha Organic employed 54 permanent staff and up to 200 casual labourers, depending on the season (UWEAL 2016).

3.4.3. By 2020, a well-established framework for implementing the Multilateral System of accessing and sharing of benefits arising from access to PGR in place

3.4.3.1 A framework in place for sharing the benefits from access to PGR in the country.

Uganda has signed and ratified all the relevant international conventions and protocols on ABS, namely the Convention on Biological Diversity (CBD), the Nagoya Protocol and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA).

The clear and well-structured ABS relevant regulatory measures are conducive to collaboration between main ABS actors. The legal basis for both, the Regulations and the Guidelines, was laid with the 1995 National Environment Act that provides for guidelines and measures "for the sustainable management and utilization of the genetic resources". Ancillary legislations, with indirect or case-to-case relevance to ABS, have been adopted: the Uganda Wildlife Act Cap 200, the Land Act Cap 227 and The Science and Technology Act Cap 209.

The regulatory pillar is the 2005 National Environment (ABS) Regulations, which not only recognizes the UNCST as the competent national authority (CNA) but also prescribes the procedure in accessing genetic resources for scientific research, commercial purposes, bioprospecting, conservation or industrial application. It further provides for the sharing of benefits derived from genetic resources and promotes sustainable management and utilization of genetic resources. The 2009 ABS Guidelines provide for detailed description of the ABS system and described the applicable procedures.

The 2015 memorandum of understanding (MoU) among NEMA, UNCST and NARO complements the ABS regulations as it details the relationship and division of responsibilities between these core ABS relevant institutions.

The CNA, for instance, facilitates the negotiation and conclusion of material transfer agreements and ensures that sufficient benefit sharing provisions are included therein. In addition, it makes certain that representative samples and specimens of genetic resources collected are deposited in Uganda and that the person accessing genetic resources undertakes technology transfer and information exchange. With the exception of the CNA, most institutions did not yet automate their parts in the application and permit issuance process.

The 2007 ABS Guidelines specify the provisions of the ABS regulations with the goal to enable "simple arrangements and procedures". The Guidelines specifically mention the obligation of the collector to share benefits arising from the intellectual property rights (IPR) accruing from genetic resources. In general, all benefits need to be shared based on mutually agreed terms (MAT) ensuring fairness and equity. Applicants for accessing genetic resources must adhere to a certain schedule in obtaining a PIC and entering into accessory agreements and materials transfer agreements (MTA) with the lead agency, local community or the owner of the resource. Foreign applicants do not require a local collaborator. Nevertheless, local communities receive special protection as they have the right to ask for benefits from knowledge and information they have provided with respect to genetic resources. A major gap in the system is opened by exempting national researchers to apply for PIC and negotiate MAT for domestic research against the background of the well-established cooperation system of these researchers with foreign institutions. If such cooperation would lead to the export of the nationally accessed genetic resources, PIC and MAT had to be sought. While the vast majority of this collaborative research indeed operates under research permits by UNCST, a formalised system to make the researchers apply for ABS permits does not exist.

Despite the well elaborated regulatory and legal ABS environment there is still room for improvement in order to make Uganda's ABS system more effective and efficient for the benefit of all national ABS stakeholders.

One major gap: the ABS framework is not fully compliant with the Nagoya Protocol. For instance, the regulations not provide for a checkpoint and an effective monitoring system for users under Ugandan jurisdiction. While protection of traditional knowledge associated with genetic resources (aTK) is mentioned in the regulations and guidelines, provisions for a clearly defined system of protection do not exist. This system should be strengthened. Although ex-situ collections outside Uganda fall within the scope of the law, clear provisions for accessing these materials in collaboration with the foreign ex-situ collections are missing. Clarity on PIC processes and benefit sharing would help the ABS process in this regard.

3.4.3.2 Documents prepared on indigenous knowledge on PGR for food, agriculture and medicine

The country acceded to the Nagoya Protocol in June 2014, ratified the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and is Party to the CBD. Uganda has also put in place national ABS relevant policies and legislation, including an ABS regulation and accompanying guidelines. The 2005 ABS regulation is well structured and has clear and definite procedures. It recognizes the Uganda National Council of Science and Technology (UNCST) as the competent national authority (CNA). The Council itself has a clear understanding of its role and seeks to ensure clarity and establish concrete ABS procedures and tools (Table 3.37). There exists a highly cooperative culture amongst authorities and institutions, including between environment (National Environment Management Authority, NEMA) and agriculture (National Agricultural Research Organization, NARO).

Indigenous peoples and local communities (IPLCs), their genetic resources and associated traditional knowledge (aTK) are fully covered by the ABS framework. IPLCs receive recognition in the environmental law system but do neither engage in valorisation of their genetic resources and associated traditional knowledge nor participate in the few existing small businesses that distribute local cosmetics on the domestic market. National scientists engage with local communities and traditional healers without

being bound by ABS rules to ensure benefit sharing based on ABS contracts. Also, governmental approaches to promote business incubation and science-business relationships are not well developed.

Whereas, the regulatory and institutional setting is favorable for ABS business engagement it has only resulted in one commercial ABS agreement on the industrial use of sandalwood for oil extraction. There are several opportunities for Shea Butter trees, Gum Arabica, and *Prunus Africana*, among others that have not been developed.

Table 3.33: Documents on Plant and Genetic Resources in Uganda

Document	Description
National Environment (Access to Genetic Resources and Benefit Sharing) Regulations, 2005.	The regulations apply to access to genetic resources or parts of genetic resources whether naturally occurring or naturalised, including genetic resources bred for or intended for commercial purposes within Uganda or for export whether *insitu* conditions or *exsitu* conditions.
Guidelines for accessing genetic resources and benefit sharing in Uganda National Environment Management Authority Ministry of Water and Environment First Edition, June 2007	The Guidelines provide for simple arrangements and procedures including measures for accessing biological and genetic resources of Uganda, their products and derivatives for scientific research, commercial and any other purposes connected therewith and to ensure equitable sharing of the benefits accruing therefrom in accordance with the National Environment (Access to Genetic Resources and Benefit Sharing) Regulations, 2005.
NARO/PGRC 2008 State of Plant Genetic Resources for Food and Agriculture in Uganda, Plant Genetic Resources Centre National Agricultural Research Organization (NARO), FAO Rome, available at http://www.fao.org/pgrfa-gpa-archive/uga/uganda-sow2.pdf	The report describes the state of plant diversity, the state of *insitu* conservation, the state of *exsitu* management, the state of national programmes, training and legislation, the state of regional and international collaboration, access to plant genetic resources for food and agriculture (PGRFA), sharing benefits arising out of their use and farmer's rights, and contribution of PGRFA management to food security and sustainable development.

3.4.3.3 Several communities based PGR management initiatives in place

Uganda has a quite strong ABS framework which fully covers IPLCs and associated traditional knowledge (aTK): local communities are clearly defined, traditional knowledge explicitly included and procedures for granting PIC and negotiating MAT are established through the 2007 ABS Guidelines. Land and resource rights of IPLCs are part of the customary land tenure system. IPLCs actually negotiate access to resources in protected areas (PA), not least because concrete benefit sharing systems exist between the authorities and local communities for entry fees in protected areas.

Despite these favorable regulatory prerequisites IPLCs have not been involved in any ABS cases. BCPs or other community procedures are non-existent albeit, as stated above, community-related procedures are defined in various laws and regulations. While awareness of the ABS process at the local level is very low in general, the local communities know of the potential value of their traditional knowledge for science and industry. The low level of recognition of local communities in business value chains seems to be partly rooted in lack of coordination and cooperation between them. On the other hand, local communities and NGOs cooperate quite well in securing their interests and coping with regulatory frameworks.

ABS cases with the participation of IPLCs could potentially be built upon the elaborate legal and procedural system. That applies all the more as governmental authorities are prepared to engage with

local communities. In terms of capacity building some IPLCs already received training in negotiating access to PAs for small scale logging, hunting and NTFP collection.

In the specific case of *Prunus africana* bark some IPLCs became aware of related business potential and expressed their wish to participate in the value chain. Following the CITES guidelines on Non Detrimental Findings (NDFs), the Ministry of Water and Environment has conducted three inventories of privately owned Prunus africana stocks between 2008 and 2016, which informed the computation of the current annual export quota of 252,567Kgs of dry bark. The entire bark is supplied by the local communities across 16 districts of Uganda. This makes Uganda the only Prunus africana exporting country among the Prunus range states where bark is exclusively sourced from privately owned trees through sustainable private natural forest management and domestication of the species in subsistence agroforestry systems, while the government stocks in protected areas are preserved. This approach has provided local communities with an additional livelihood option integrated in other traditional cash crops like coffee, cocoa and bananas. The bark is acquired with full consent of the tree owners, as required by the National Forestry and Tree Planting Act, 2003 and the National ABS regulations.

3.4.4. By 2016, the Nagoya Protocol on Access to Genetic Resources and Benefit Sharing in force

3.4.4.1 Improved regulatory framework for ABS in Uganda enforced with involvement of IPLCs

The National Environment (Access to Genetic Resources and Benefit-Sharing) Regulations, 2005, were adopted pursuant to sections 44 and 107 of the National Environment Act. The object of the regulations is to: (a) prescribe the procedure for access to genetic resources for scientific research, commercial purposes, bioprospecting, conservation or industrial application; (b) provide for the sharing of benefits derived from genetic resources, and (c) to promote the sustainable management and utilisation of genetic resources, thereby contributing to the conservation of the biological resources of Uganda.

The scope of the regulations is defined in article 4 to include access to genetic resources or parts of genetic resources, whether naturally occurring or naturalised, including genetic resources bred or intended for commercial purposes or for export. The regulations do not apply to certain situations, such as the exchange of genetic resources where the exchange is done by a local community among themselves and for their own consumption, or where the exchange is certified to be only for food, in cases of access to human genetic resources, and in cases of approved research activities intended for educational purposes. The Uganda National Council for Science and Technology (UNCST) is designated as the CNA. Its functions include facilitating the negotiation and conclusion of all accessory and material transfer agreements, including the terms and conditions upon which access is to be granted. It is also responsible for ensuring that these agreements contain sufficient provisions on benefit-sharing, and ensuring that representative samples and specimens of genetic resources collected are deposited in Uganda, and that technology transfer and information exchange in relation to genetic resources is undertaken by the persons accessing the genetic resources (Medaglia et al. 2014).

The role of indigenous peoples and local communities (IPLCs) is particularly strengthened at the point of access and benefit sharing. In Uganda, legislation is very explicit about where the ownership of the genetic resources lies: It is vested in the government for the benefit of the people of Uganda. To access genetic resources, the applicant must obtain a written prior informed consent (PIC) form, and enter into an accessory agreement with the lead agency, local community or owner. The applicant must also carry out

an environmental impact assessment where required, enter into a materials transfer agreement, and pay a fee. The nature of the person who can apply is undefined, but it appears that any individual or corporation can apply, and that foreign applicants do not require a local collaborator. The regulations provide schedules for PIC, the accessory agreement, and the material transfer agreement. The Material Transfer Agreements (MTA) must clearly state the rights and obligations of parties, guarantee the deposit of duplicates of all specimens of the genetic resources accessed, and require the collector to provide for the sharing of benefits arising from the intellectual property rights accruing from genetic resources. It may also provide for the future application and use of genetic resources, including the sharing of benefits arising from the future application and use of genetic resources.

The regulations require that benefits be shared in accordance with the principle of fairness and equity, and on mutually agreed terms. The regulations give examples of benefits, including monetary and non-monetary benefits. They also highlight that the PIC (prior informed consent), accessory agreement and MTA do not entitle any person to access genetic resources; rather, they enable an applicant to proceed with the application for an access permit. Applications must be submitted to the competent authority, which transfers them to the lead agencies that are responsible for the management and regulation of access to genetic resources under the Regulations. The lead agency (either of the National Environment Management Authority – NEMA; Uganda Wildlife Authority – UWA, the National Forestry Authority – NFA, and the Ministry of Agriculture Animal Industry among others) reviews the application and advises the competent authority, in writing, as to whether consent for access should be granted or not. In so doing, the lead agency must ensure that the rights of local communities are protected, including verifying compliance with consent requirements and ensuring that accessory agreements have been concluded between the applicant and all affected parties.

Where a collector has violated the regulations, the competent authority may revoke the access permit. Moreover, any person who breaches certain rules of the regulations (such as the obligation to obtain PIC, accessory agreement and MTA), commits an offence and may be liable to a fine or imprisonment, as well as other sentences. Lastly, the permit holder must submit regular status reports to the competent authority and the lead agency on research and development relating to the genetic resources concerned.

3.5. To enhance public awareness and education on biodiversity issues among the various stakeholders

3.5.1. By 2020 people are aware of the meaning and values of biodiversity and the steps they can take to use it sustainably

3.5.1.1 Trends in behavioural change particularly among decision makers and the general public towards biodiversity conservation and sustainable use;

Since 2008 when the Government changed its position over conversion of one-third of Mabira Central Forest Reserve into a sugar cane plantation, there has been an increase in Government Decisions in support of conservation actions. Table 3.38 tracks major undertakings by Government that show increased engagement to support biodiversity conservation actions for the period between 2014 and 2018.

Table 3.34: Trend line for key decision maker sections reflecting increased awareness and attitude change towards biodiversity conservation

Decisions	Years				

timeline	April, 2014	November, 2015	January, 2016	August, 2017	February, 2018
January	On the 16-04-2014, under Minute 114(CT2014), the Cabinet of the Government of Uganda approved the cancellation of land titles in wetlands on public land acquired unlawfully after 1995, as one of the measures to address the problem of wetland degradation.	President Directive suspends the operations of Beach Management Units (BMU). The action aims to reduce the open access, illegal and poorly regulated capture fisheries activities	NEMA coordinated and supported the restoration of critical and vital wetlands such as Limoto in Kibuku and Pallisa Districts (Mpologoma-Limoto system) of which about 35km² is recovering. worked closely with the District Local Governments, Resident District Commissioners (RDCs), the clergy and local communities and Environmental Protection Force (EPF) in the protection of wetlands. Notably, the RDC Lira District was appointed to coordinate and mobilize RDCs in eastern and northern Uganda to participate in environment protection while the Bishop of Soroti diocese George William Erwin was appointed to create awareness on the protection of the environment.	The GoU and UNDP signed a financing agreement for the Green Climate Fund (GCF) project to restore degraded wetlands, improve ecosystems, strengthen climate information and early warning systems. The project is the UN's response to the President of Uganda's Presidential Initiative on Wetlands ant it contributes to the Paris Agreements, 2030 Agenda, the second National Development Plan, Vision 2040 as well as the Global Sustainable Development Goals (SDGs). The eight-year project is supported with a US$24 million grant from the GCF, US$2 million from UNDP and US$18.12 million in co-financing from the GoU.	Presidential Directive - Government through ministry of Water and Environment has with immediate effect suspended any cutting, transportation and sale of Shea nut and afzelia africana tree logs and their products. The directive seeks to counter the endanger tree species. In November 2018, the Parliament passed the National Environment Bill 2017, and the Genetic Engineering Regulatory Bill 2018. The President assented to both Bills being made into law.

3.5.1.2 Trends in communication programmes and actions promoting social corporate responsibility

In Uganda there are few companies and organisations that have a holistic approach of CSR based upon the international understanding of the concept. Generally speaking, there is little knowledge and awareness on CSR as an integral business approach. This goes for both companies, governmental organisations and NGO's. Companies that are engaged in CSR tend to focus on single issues of certain elements of CSR. The concept CSR is very much associated with charity and community involvement (Bos et al. 2016). The companies that are actively implementing CSR are in general mostly big companies and/or exporting companies with international markets. Also foreign companies operating in Uganda tend to be engaged more in sustainable and inclusive business practices and could play a big role in awareness raising and sharing best practices. In order for CSR to become the way to go for the majority of businesses in Uganda, it must become an integral part of the business case, directly linked to operational results. Therefore, it is important that companies learn about the business opportunities of CSR, e.g. savings of energy costs, opportunities of export markets, new ways of working with your supply chain partners and encouraging employee's wellbeing thereby increasing productivity. Cooperation (within the sector, but also with governments, NGOs and communities), knowledge sharing, training, awareness raising campaigns are therefore essential.

The government has a very important role to play regarding CSR. First of all, the government itself has to be aware that sustainable economic development can only be reached in partnership between government, private sector and civil society. The role of the government is to support sustainable development by providing a supportive legal framework for companies. Moreover, the government can set the ambitions and a vision for sustainable development of the country. The government could also be an example for businesses, by being transparent and implement CSR in the governmental bodies itself.

There is a need for creation of awareness about CSR amongst the general public to make CSR initiatives more effective. This awareness generation can be taken up by various stakeholders including the media to highlight the good work done by the business sector. This will bring about effective changes in the approach and attitude of the public (and all stakeholders) towards CSR initiatives undertaken by corporate houses. This effort will also motivate other businesses (SME inclusive) to join the league and play an effective role in addressing developmental goals (education, health care, poverty, etc.).

There is a need for collaborative working between all stakeholders including the private sector, employees, local communities, the Government and society in general are either not effective or not effectively operational at the grassroots level in the CSR domain. This scenario often creates barriers in implementing CSR initiatives. Appropriate steps should be undertaken to address the issue of building effective bridges amongst all important stakeholders for the successful implementation of CSR activities. As a result, a long term and sustainable perspective on CSR activities should be built into the existing and future strategies of all stakeholders involved in CSR initiatives.

Businesses and NGOs should actively consider pooling their resources and building synergies to implement CSR best practices to scale up projects and innovate to reach out to more beneficiaries. This will increase the impact of their initiatives on the lives of the common people. After all, both corporate houses and non-governmental organizations stand to serve the people through their respective projects and initiatives. The scaling up and sustainability of CSR projects need to be safeguarded at all costs for their efficiency and efficacy.

A training program for government representatives about how to involve business in the social, environmental challenges of Uganda society could give a boost to the role that the government could play in the field of CSR.

Corporate and social responsibilities (CSRs); where some companies invest in environmental and socio-economic development like tree planting, education, health, water and sanitation projects as take back to community strategies. These companies usually support NEMA, Local Governments and community during the World Environment Day (WED) celebrations and other initiatives. They include Nile Breweries, the oil and gas companies (Total E&P and CNOOC), Eskom, Ecobank, Eaton Towers, Britania Foods Ltd, Rwenzori Beverages, Hima Cement, among others (NEMA 2018).

3.5.1.2.1 Case study 1: The Kampala Pollution Control Task Force

In 2015, the Kampala Pollution Control Task force was established. The PTF is coordinated by KCCA, and comprises of the Directorate of Water Resources Management (DWRM) - Ministry of Water and Environment (MWE), National Environment Management Authority (NEMA) and National Water and Sewerage Corporation (NWSC). Uganda Manufacturers Association (UMA) and Uganda Cleaner

Production Centre (UCPC) were also brought on board to enhance the engagement of the industrial sector through a Public-Private Dialogue (PPD) regarding cleaner production and improved resource recovery and reuse efficiency with focus on water, waste and energy optimization.

The PTF aims at strengthening cooperation between both the member regulatory agencies as well as between the public and the private sector. The key priorities of the task force include the following:

1. Establish an information exchange and collaboration platform among key government agencies to jointly engage the public and private sector regarding legal provisions and regulations on wastewater discharge and pollution control.
2. Initiate campaigns to enhance industrial compliance to DWRM/ NEMA permit regulations regarding wastewater discharge.
3. Conduct joint industrial assessments and disseminate pollution monitoring information to the public and private sector.
4. Engage potential priority polluters and the public sector in a Public-Private Dialogue, on wastewater management and pollution control to increase awareness and trust.
5. Promote transparency of policy making, regulation, and enforcement in order to empower stakeholders to act as partners of government authorities/agencies.

The outcomes of the increasing efforts of NEMA in environmental compliance and enforcement activities are; (i) Industrial facilities such as the cement industries, Hima and Tororo, sugar industries such as SCOUL – Kakira, food processing factories such as Britania, Mogas, Uganda Batteries, Harris International Limited and 20 industries, were trained under the Kampala Pollution Task force. These industries have demonstrated improved compliance by developing internal regulatory policies, systems and technologies like effluent treatment plants (ETPs), waste recycling and re-use, staffing for environment management, submissions of compliance reports to NEMA, and investments in c corporate and social responsibility (CSR) among others. (ii) There is increased awareness among the developers and the public as evidenced by the increasing demand for EIAs, voluntary audits, public interest litigations, and complains to NEMA.

3.5.1.2 The Uganda Biodiversity Trust Fund

Monday, March 1, 2017 the Uganda Biodiversity Fund, a national trust fund that will secure funding to support biodiversity conservation across Uganda, was launched. The United States Embassy made first commitment to protect the environment and wildlife, Ambassador Malac announced the U.S. would make the first financial commitment to the Fund with a $100,000 seed grant. The Uganda Biodiversity Fund will assist innovative approaches to promote conservation and militate human-wildlife conflict in the Albertine Rift region.

The Uganda Biodiversity Fund (UBF) is a national independent conservation trust fund incorporated in Uganda under the terms of the Trustees Incorporation Act. The goal is to mobilize sustainable monetary resources to bridge the financing gap currently standing at $80 million per year, according to Uganda's National Environmental Management Authority (NEMA), to help government and local institutions, and individuals to keep biodiversity, nature, and generally the environment secure. However, for the period between 2017 to 2022, our target is to realize $10 million in form of endowment and sinking funds to support biodiversity conservation projects worth $ 3.5 million.

3.5.1.3 Sustainable financing of the Rwenzori Mountains National Park: a business case and opportunities for the private sector in Uganda

The business case for financing the RMNP through CSR (group 2-5) is based essentially on image and reputation. All companies have CSR policies and subsidiaries of multinational companies allocate 1% of their net profit to CSR activities. CSR traditionally focus on health, education and culture, but companies increasingly include environmental activities (essentially tree planting). A number of them, banks in particular, focus on activities to develop alternative livelihoods (micro credit, financial education, training for youth employability) and increase the number of potential customers. CSR activities are generally implemented directly by companies but innovative public-private-partnerships have sometimes been established with water management institutions. This is the case for example of Coca Cola, which financed wetland restoration in the Rwizi catchment where one of its bottling plants is located.

Companies that do not depend on water will tend to engage in activities that have high return on investment ("low hanging fruits"), are highly visible and bring tangible results that can be easily measured. Good monitoring will therefore be a key argument to convince them to invest in the Rwenzori.

The RMNP can reduce its financial gap in several ways: increase its revenues (through PES as a seller of water, biodiversity and carbon credits to the private sector), reduce its costs (by increasing its efficiency or reducing its activities) or share its costs with other institutions such as the Ministry of Agriculture and the National Forestry Authority of the Ministry of Transport. There is great potential to use CSR contributions to co-finance some of the park's activities in the buffer zone, especially activities focusing on developing alternative livelihoods. Or to have CSR activities finance some components of the PES scheme, such as tree planting or farmers' training in soil conservation techniques.

Companies tend to be reluctant to finance UWA, which is perceived as a wealthy institution. They would prefer to work through an NGO such as WWF or a catchment management institution or alone. This needs to be worked out on a case-by-case basis. There are generalities however: companies will not engage over the long run but will finance a project, for 1-3 years, and renew the partnership on the basis of the results. They will need a proposal with clear expected results and monitoring plan. While companies showed a lot of interest, they also expressed the fact that they did not know much about the environment and linkages between conservation and development were not always clear to them. Learning on both sides will be necessary if partnerships are to be established with WWF.

In terms of recommendations, WWF-UCO should further engage with the private sector companies, which have shown the greatest interest during this first contact, starting with the companies WWF has or had partnerships with in the past. Proposals presented in a water or catchment management perspective have greater potential to attract interest from private sector companies than proposals focusing on the RMNP and biodiversity. Catchment management is at the heart of an important policy and institutional change in Uganda and water management, especially in the context of climate change and poverty alleviation (everyone cites the recent floods in Kasese), a priority for development. Positioning the RMNP as a key factor in catchment management to achieve water security and alleviate poverty is an important fund raising message for the Park.

Other recommendations include the necessity for learning on both sides (internal learning and knowledge sharing in WWF, and learning on environmental issues on the companies' side), communicating WWF experiences with the private sector and water management elsewhere (through dialogue and a short case study document), communicate WWF experience in the Rwenzori area to position WWF in biodiversity but also water management and strengthen its legitimacy, simplify the discourse to companies, pursue bilateral dialogue with companies already contacted with priority with companies in the sub-catchments and companies which already showed interest and potential, start the dialogue with a few new companies, in priority those WWF already developed partnerships with, engage with companies by joining the Conservation Learning Group, Pitch the discourse on water management in a climate change perspective rather than on biodiversity and national park, Develop a catchment management proposal with careful monitoring plan, Improve and communicate understanding of potential benefits from improved soil conservation and PES and outside the catchments focus on developing a few carefully selected partnerships to reduce transaction costs.

In all likelihood, sustainable financing of the RMNP will not be achieved by PES or tourism or CSR alone and certainly not in the short to mid-term. Other mechanisms should be envisaged to attract funding and generate funds from capital already invested. A Conservation Trust Fund on the model of what already exists in Uganda for other parks, or in the region, could be envisaged (or a "guichet" in an existing Fund). This type of financial set up is generally more attractive to private sector and they have been very successful for financing catchment management in Latin America or financing protected areas in Africa. Such a fund could also benefit from debt-for-Nature Swaps or biodiversity offset payments from future development projects (oil, gas and mining in particular). The Source Protection Initiative of the new water policy that requires development and infrastructure projects to make a one off contribution equivalent to 3% of their budget for water source protection offers an interesting possibility. Likewise, the national PES scheme being discussed in the context of the new environmental policy may be offering new possibilities and these developments need to be closely followed. Until now corporate water users have been paying a flat water user fee irrespective of the volumes used. The new legislation could provide an opportunity to request large water users to contribute a percentage of their net profit every year to finance catchment management activities, with part of it being allocated to the RMNP for its catchment management protection role. This new financing mechanism for catchment management has been incorporated in the new South Africa Water Policy.

3.5.2. By 2020 at the latest, students and teaching staff are aware of the values of biodiversity

3.5.2.1 Positive attitude and behavioural change among students and teachers in educational institutions

The Annual Corporate Report for NEMA FY 2015/16 (NEMA 2016) documented a survey conducted by NEMA to determine stakeholders' opinion on the operationalization of the ban on kaveera. The findings of the 348 survey points (industries, wholesale, supermarkets and retail shops reveal that; a) 82% are aware of the ban on kaveera; b) 31% are aware of the dangers of kaveera; c) 75% support the ban; d) 45% acknowledge and appreciate the role played by NEMA in the operationalization of the ban through public education/awareness and enforcement; e) 91.7% are aware of the alternatives to kaveera such as paper bags, boxes, sack bags, craft bags, recycled material bags, among others; and, f) General recommendation is for the ban on kaveera to begin with the major supply points; manufacturers, wholesale and supermarkets.

In addition, MWE, NEMA and the civil society continue to conduct school monitoring and documentation of environmental education practices in the Districts of Mpigi, Lyantonde, Mityana, Kayunga, Nakasongola, Kamwenge, Kyenjojo, Ntungamo and Rukungiri. In FY 2015/16, 108 schools were monitored. NEMA undertook Community Education for Sustainable Development (ESD) programmes through outreach activities that included training in four districts namely, Kibaale, Kamwenge, Mbarara and Kasese 300 participants were trained on sound environment management and prudent use of natural resources. The participants were mainly Sub county technical staff, community members especially farmers, opinion leaders, faith based representatives, CSO representatives, and political leaders at sub county levels. Environmental education public lecturers were conducted and reached over 900 students in 4 mainstream universities of Mbarara University of Science and Technology (MUST), Bishop Stuart University, Mountains of the Moon University, and Uganda Wildlife Training Institute, Kasese.

In FY 2016/17, NEMA, MWE and civil society continues to undertake the School Environmental Education Program (SEEP) through training of trainers (TOTs) in schools, and Education for Sustainable Development strategy (ESD) in Universities and Tertiary institutions. The SEEP activities were conducted in 200 schools in Busia, Manafwa, Kapchorwa, Kyegeggwa, Kabarole and Ntoroko Districts; and Mbale Municipal Council. The ESD activities were carried out in Ndejje University, Nyabyeya Forestry College, Uganda Martyrs' University, Nkozi (UMU,) and Islamic University in Uganda (IUIU).

In FY 2017/18, NEMA conducted media engagements included partnerships with New Vision to spearhead an information and education campaign using the Newspaper in Education (NiE) platform where NEMA used the weekly NiE pull-out to disseminate environmental education messages targeting young readers in the range of 7 - 16 years; and NTV Go Green Program which focuses on the new and emerging environmental concerns that need public attention, responsiveness and participation. The sensitization programs were expected to create positive attitude among communities and the public at large, and to develop a sense of responsiveness to participate effectively in environment management activities and ensure environmental compliance. School Environmental Education competitions were conducted in Soroti Municipal schools. The competitions were undertaken in phases between April to July, 2018. Over 1,000 pupils from 32 schools; primary schools and 64 teachers participated in the competitions.

3.5.2.2 Biodiversity integrated into the National School Curriculum

In FY 2015/16, NEMA and MWE supported the National Curriculum Development Centre to integrate environmental issues into both academic and non-academic school and university programs. This has facilitated environmental education in schools and universities as entry points for public and community education and participation.

In addition, NEMA library has been digitized to improve access to environmental information and education to address the new and emerging environmental issues and challenges related to oil and gas, climate change, biodiversity loss, electronic waste among others. Such interventions include the establishment of the E-board and a special section for oil and gas in the library. The readership of NEMA library includes among others MDAs, local governments, EIA practitioners, schools, Universities and research institutions.

3.5.3. By 2020, international cooperation and networking is effective enough to enhance communication of the value of biodiversity conservation and sustainable use

3.5.3.1 Adequate and active participation in regional and global fora by Ugandans

Ugandans actively participates in regional and global fora on biodiversity conservation. Uganda's participation in the international and regional fora is largely based on the focal points and the national institutions they represent. The national institutions with focal points for the CBD include; the National Environment Management Authority (NEMA), the Ministry of Finance Planning and Economic Development (MFPED), Makerere University, Uganda Wildlife Authority (UWA), Uganda National Council of Science and Technology (UNCST) and the National Agricultural Research Organisation (NARO).

Table 3.35: Uganda's National Focal Points on the Convention on Biological Diversity

Focal Points	**Responsibility**
Mr. Francis Meri Sabino Ogwal Natural Resources Management Specialist (Biodiversity and Rangelands) National Environment Management Authority (NEMA) NEMA House, 2nd Floor Plot 17/19/21 Jinja Road P.O. Box 22255 Kampala Uganda	CBD Primary NFP, CHM NFP, SBSTTA NFP +256 414 251 064, 5, 8 +256 414 257 521 sabinofrancis@gmail.comfogwal@nemaug.org
Ms. Pauline Akidi Principal Economist Ministry of Finance, Planning and Economic Development Finance Headquarters Building Plot 2-12, Apollo Kaggwa Road P.O. Box 8147 Kampala Uganda	Resource Mobilization FP +256 414 707000 +256 414 230163; +256 414 234023 pauline.akidi@finance.go.ugpaulineakidi@gmail.com
Dr. Mary Namaganda Principal Assistant Herbarium Curator College of Natural Sciences, Department of Biological Sciences Makerere University P.O. Box 7062 Kampala Uganda	GTI NFP mnamaganda@cns.ac.ug
Mr. Daniel J. Babikwa Environmental Education Coordinator, National Environment Management Authority	CEPA Informal Advisory Committee dbabikwa@nemaug.org
Mr. Aggrey Rwetsiba Monitoring and Research Coordinator Uganda Wildlife Authority Plot 7 Kira Road, Kamwokya P.O. Box 3530 Kampala Uganda	Protected Areas NFP +256 41 346 288, 355000 +256 41 346291 aggrey.rwetsiba@ugandawildlife.orgaggreyrwetsiba@yahoo.com
Cartagena Protocol on Biosafety	
Isa Katwesigye Forestry Sector Support Department, Directorate of Environment Affairs, Ministry of Water and Environment	Cartagena Protocol Primary NFP, Cartagena Protocol emergency contact point, BCH NFP
Nagoya Protocol on Access and Benefit-sharing	
Mr. Francis Meri Sabino Ogwal Natural Resources Management Specialist (Biodiversity and Rangelands) National Environment Management Authority (NEMA) NEMA House, 2nd Floor Plot 17/19/21 Jinja Road P.O. Box 22255 Kampala Uganda	ABS National Focal Point +256 414 251 064, 5, 8 +256 77 2 517 045 +256 414 257 521 sabinofrancis@gmail.com francis.ogwal@nema.go.ug
Uganda National Council for Science and	ABS Competent National Authorities

Focal Points	Responsibility
Technology Plot 6 Kimera Road, Ntinda, P. O. Box 6884, Kampala 256 Uganda	+256 414 705 500/4; +256312 314 800 j.ecuru@uncst.go.ug

3.6. To harness modern biotechnology for socio-economic development with adequate safety measures for human health and the environment

3.6.1. By 2018, public awareness, education and participation in biotechnology and biosafety are enhanced

3.6.1.1 Increased participation and support of biotechnology by policy makers and the general public

Uganda passed the biotechnology and Biosafety policy in 2008, as a commitment to the Cartagena Protocol on Biosafety which was ratified on 30th November 2008. Uganda established the National Biosafety Committee (NBC) in 1996. The NBC provides an institutional framework to carefully manage the generation, development and application of biotechnologies because they biosafety implications. This means that the process and final products are safe for human consumption and the environment.

The NBC is an independent technical committee established under Section 5 of the Uganda National Council of Science and Technology Act (Cap 209). It is one of several biosafety mechanisms the government put in place to facilitate the testing and development of potentially useful genetically engineered organisms. Through the NBC, UNCST registers and permits confined field studies and ensures adherence to the guidelines and safety to humans and the environment. Since 2016, UNCST, the competent authority for biosafety in Uganda, adopted the concept of an annual Biosafety platform for the NBC, Institutional Biosafety Committees (IBCs), policy makers, media, civil society and researchers involved in Gene technology research. Participants convene to discuss scientific advances and biosafety regulations and their implications in Gene technology research developments in Uganda. The first Biosafety Forum (2016) took place between (February 1-2, 2016) in Kampala. The theme of the Forum was "Building Trust Regulatory System for Biotechnology". Participants were drawn from NBC members, IBC members, scientists/ researchers, regulatory authorities, UNCST staff members, representatives from government agencies, and media.

The second forum took place between the 1st and 2nd February 2017. The Government was represented by the Minister of Science, Technology and Innovations (MOSTI), Hon. Elioda Tumwesigye, the Chairman of the Parliamentary Committee on Science and Technology, Hon. Kafeero Sekitoleko; members of the Parliamentary Committee on Science and Technology-Hon. Rose Mutonyi Masaba, Hon. Micheal Timuzugu, Hon.Fred Bwino Kyakulaga, and the Permanent Secretary-MOSTI, Mr. David O.O Obong.

Uganda is only one of the 12 countries with Confined Field Trials (CFTs) on Genetically Modified (GM) biotechnology. However, unlike the other 11 countries, Uganda does not have a biosafety law. Only Burkina Faso, Sudan and South Africa have GM commercialised crops, while Nigeria, Malawi and Kenya have recent environmental release approvals (UNCST 2017).

3.6.2. By 2020, national capacity for biotechnology applications and use is adequate

3.6.2.1 Mechanisms for continuous human and infrastructural resource capacity development, deployment retention put in place

In 2008, when the Government of Uganda adopted the National Biotechnology and Biosafety Policy, it contained a guiding principle on building human resource and infrastructure capacity, so as to strengthen research, development and innovation in Biotechnology. The Genetic Engineering Regulatory Bill 2018 also showed considerable capacity development needs for regulation for biosafety. Baguma et.al.2013 conducted a study on agricultural biotechnology capacity in Uganda. The assessment established that the biotech tools in Uganda include; tissue culture, genetic engineering, marker assisted selection, vaccine production, artificial insemination, sex reversal in fisheries, disease diagnostics (livestock and crops), and gene discovery and characterisation (Baguma et al. 2013). The major biotechnology research activities are;

Table 3.36: Major Research and Development activities

Commodity	**Areas under Research**
Crops	
Banana	Pro-vitamin A; bacterial wilt resistance
Maize	Drought tolerance; disease/pest resistance
Cassava	Brown streak disease resistance; mosaic resistance
Cotton	Herbicide tolerance; boll worm resistance
Rice	Nutrient use efficiency
Livestock	Vaccine production; disease diagnostics; breeding
Fisheries	Breeding; disease diagnostics

Source: Baguma et al. 2013

Uganda has steadily built a human resource base that is actively engaged in biotechnology research and development. Currently, there are 24 PhD-level scientists, 50 MSc-level scientists, and more than 70 personnel with bachelor degrees or diploma certificate level training (Zawedde et al. 2018).

Several physical structures exist and/or have been improved for genomics (4 labs), tissue culture (7 facilities) and plant transformation (2 labs), microbiology and immunology (>10 labs), biochemical assay, and contained and confined testing facilities that follow established testing guidelines (3 sites). Biotechnology infrastructure and human capacity investments have supported the initiation and implementation of a number of active research programs focused on developing potential products that will meet Uganda's specific needs. Various biotechnology R&D activities using a number of tools are on-going for crop and livestock improvement as well as fisheries development. While Uganda has built critical capacity for research on modern biotechnology, other areas such as management support structures-intellectual property policy, resource planning, and quality assurance - need attention

In 2018, Zawedde et al. (2018) reviewed the readiness for environmental release of genetically engineered plants in Uganda. Research and development of genetically engineered (GE) crops in Uganda was initiated in 2003 with the launch of a national agricultural biotechnology centre at Kawanda in central Uganda. The country has now approved 17 field experiments for GE plants, which were first established

in 2006 with the planting of a banana confined field trial that evaluated performance of plants modified to express resistance to black sigatoka disease.

The National Biotechnology and Biosafety Policy (2008) requires establishment of an institutional framework to support the regulatory process and articulate strategies for capacity building, infrastructural development and technology transfer. Uganda has established an interim institutional framework to operationalize the biosafety regulatory system (Baguma et al. 2013). The current institutional biosafety framework, as described below, comprises of the national competent authority, the national focal point, the national biosafety committee, the inspection mechanism and institutional biosafety committees. The UNCST is the designated national competent authority to supervise and coordinate implementation of biosafety in the country. The competent authority houses the secretariat of the national biosafety committee. Among its functions, the on Biological Diversity (CBD) Secretariat on matters regarding the implementation of the Protocol. The government of Uganda designated the Ministry of Water and Environment as the National Focal Point (NFP) for the Cartagena Protocol on Biosafety. The Competent Authority works closely with the National Focal Point. UNCST with technical support from development partners like Program for Biosafety Systems (PBS), African Biosafety Network of Expertise (ABNE), and International Centre for Genetic Engineering and Biotechnology (ICGEB) has built inspection capacity to oversee and/or enforce regulatory compliance to the terms and conditions of approval. Inspectors were identified from UNCST, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), NARO, Uganda National Bureau of Standards (UNBS), universities, Ministry of Water and Environment and the National Environment Management Authority (NEMA). Trained and certified inspectors are designated by UNCST and deployed whenever required.

Uganda has made tremendous progress in developing human and infrastructural capacity for risk analysis, and biosafety management and enforcement (UNCST, 2016). Currently, there are nine universities that offer biotechnology related courses within a wide scope of other biology-based disciplines. Makerere University, Kyambogo University, Uganda Christian University, and Bugema University in Central region, Busitema University, and Islamic University in Eastern Region, Gulu University in Northern region, and Bishop Stuart University and Mbarara University in Western region. Uganda has also strengthened its biosafety system through short-term training programs for its biosafety practitioners including NBC and IBC members and inspectors. The country has built more than 10 public biotechnology laboratories, hosted at various universities and research centres. These facilities are capable of conducting basic and advanced biotechnological applications including molecular screening, bioinformatics, plant transformation, tissue culture, and nutrition assays among others. NARO has the most advanced among facilities hosted at Kawanda and Namulonge. About six private agricultural biotechnology institutions are operational, specializing in micro-propagation of coffee, banana, sweet potato, pineapple and potato. There are currently two regulatory focused laboratories addressing GE food safety and GE testing. The existing human and infrastructural capacity can readily be drawn upon for risk analysis, enforcement and management.

3.6.3. By 2018, the national biotechnology and biosafety law in place

3.6.3.1 National Biotechnology and Biosafety Bill 2012 passed into law

On 4th October 2017, the 10th Parliament of Uganda passed the National Biotechnology and Biosafety Bill 2012. The Bill provides for establishment of an Inter-Ministerial Policy Committee on Biotechnology and

Biosafety to be chaired by the Prime Minister and consisting of Ministers responsible for Science, Technology and Innovation (STI), Health, Trade and Industry, Agriculture, Education, Lands and Defence.

In November 2018, the President proposed that the Bill be renamed the Genetic Engineering Regulatory Bill 2018. Nonetheless, the President declined to assent to the proposed law raising several issues that required improvement of the Bill passed by Parliament. Among the concerns raised by the President are (Parliament of Uganda 2018)

i. Establishment of several gene banks and seed banks across the country to preserve the indigenous biodiversity. The banks will preserve the uncontaminated indigenous plants and animal varieties.
ii. The law should make it clear that genetic modifications are restricted to plants and domestic animals, and not to human beings
iii. Containment of Genetically Engineered Materials (GEM) so that they do not mix with indigenous organisms and cause problems when there is no fall back option
iv. That the developers of GEM be fully liable for any negative repercussions that arise from a GEM
v. A person who owns a patent to GEM is strictly liable for any harm it may cause and must be tasked to explain

In November 2018, one-year after the President had declined to assent to the Biotechnology and Biosafety Bill 2012, Parliament passed the Genetic Engineering Regulatory Bill 2018. The approved Bill is awaiting assent of the President.

3.6.3.2 National Biosafety Committee effectively supported to perform its functions

A clear institutional framework has been proposed in the new legislation (Figure 3.36). This framework aims to support sound decision-making while building a trusted regulatory system that demonstrates competence, credibility and integrity. The proposed role of the Competent Authority is to link all actors together to ensure safe application of modern biotechnology. The ministry responsible for science and technology will play a policy oversight role as well as act as the national focal point for the Cartagena Protocol for Biosafety. The national focal point role was previously the responsibility of environment ministry. Other relevant ministries, departments and agencies are expected to continue respective mandates of relevance to environmental release of GE crops. The National Environmental Management Authority (NEMA), which is the principal agency in Uganda for the management of the environment is mandated to coordinate, monitor and supervise all activities in the field of the environment. As such, NEMA will play a significant role of participating in the pre-release environmental risk assessment, and in closely monitoring the possible post-release adverse effects of GE plants on conservation and sustainable use of biodiversity. The Government of Uganda is currently at advanced stages of amending the National Environment Act (1995) to among other considerations, codify environmental risk assessment of GE organisms prior to general release.

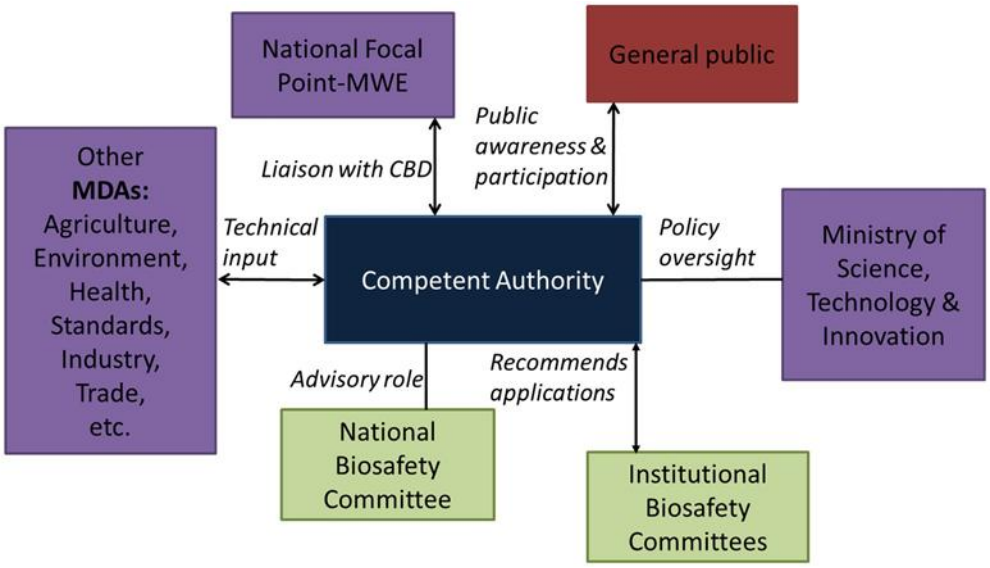


Figure 3.36: Institutional framework for implementation of the Genetic Engineering Regulatory legislation
Source: Zawedde et al. (2018)

The current role of overseeing inspection of research for compliance with phytosanitary measures, the Ministry of Agriculture, Animal Industry and Fisheries through its Crop Protection department will play a role of regulating import and export of GE organism and regulated agricultural products. Upon approval for environmental release of a GE crop by the competent authority, the agriculture ministry will ensure that variety release procedures are followed prior to commercial release of a GE crop. The Crop Protection department may be delegated by the competent authority to participate in post release monitoring of the GE plant.

The Ministry of Health through its National Drug Authority (NDA) is responsible ensuring the availability of efficacious and cost-effective drugs to the entire population of Uganda. A number of drugs are generated from plants. Plans are underway to use genetic engineering to enhance production of drugs active ingredients in local herbs. It is expected that if some of these trials prove promising and safe, then NDA will play a critical regulatory and safety assessment role prior to approval of the drugs for wider use and application in Uganda. This makes the regulatory agency for drugs in Uganda an important stakeholder in biosafety management.

Ministry of Trade, Industry and Co-operatives is an important player in environmental release of GE plants because it has to advise on socio-economic considerations such as effects on industrial development and on trade. This ministry also provides policy oversight on the Uganda National Bureau of Standards (UNBS). UNBS enforces standards in protection of public health and safety and the environment against dangerous and substandard products. The main relevance of UNBS for biosafety is their role in ensuring standards for safety of foods (both locally produced and imported) before they are allowed to be sold or distributed on the Ugandan market. The proposed institutional framework is inclusive. Its efficiency for environmental release of GE plants will benefit from strengthening the linkages and working relations among relevant ministries, departments and agencies; defining a clear

mechanism for compliance enforcement, providing feasible mechanisms for public participation, and building the relevant capacity for risk assessment and risk management within the relevant regulatory agencies.

3.6.4. By 2018, the Nagoya–Kuala Lumpur Supplementary Protocol on Liability and Redress under the Cartagena Protocol on Biosafety in operation and implemented

3.6.4.1 Increased compliance with national and international requirements

The Nagoya – Kuala Lumpur Supplementary Protocol to the Cartagena Protocol on Biosafety was adopted by the Conference of the Parties serving as the meeting of the Parties to the Cartagena Protocol on Biosafety on 15 October 2010. In accordance with its Article 17, the Supplementary Protocol was opened for signature on 7 March 2011 at the United Nations Headquarters in New York by Parties to the Cartagena Protocol on Biosafety. It remained open for signature until 6 March 2012. The Supplementary Protocol entered into force on 5th March 2018, the ninetieth day after the date of deposit of the 40th instrument of ratification, acceptance, approval or accession (Article 18).

3.6.5. By 2020, there is widespread application and use of biotechnology and its products for national development

3.6.5.1 Biotechnology applications and use widely accepted by the Ugandan public

Research and development of genetically engineered (GE) crops in Uganda was initiated in 2003 with the launch of a national agricultural biotechnology centre at Kawanda in central Uganda. The country has now approved 17 field experiments for GE plants, which were first established in 2006 with the planting of a banana confined field trial that evaluated performance of plants modified to express resistance to black sigatoka disease. Researchers leading the GE experiments have indicated that some of these GE plants are ready for environmental release that is moving beyond confined field testing toward commercialization (Zawedde et al. 2018).

3.6.5.1.1 Tissue culture

Tissue culture is one of the most widely accepted plant biotechnology in the country. The application of tissue culture in Uganda began in the early 1980s with its incorporation into banana research at the Department of Agricultural Production (formally Department of Crop Science), Makerere University. Since then, there are currently about five institutions involved in tissue culture activities. Key institutions include both public and private sectors. In the public domain, four institutions are involved: Makerere University, National Agricultural Research Laboratories (NARL) based at Kawanda, National Crops Resources Research Institute (NaCRRI), Kachwekano Zonal Agricultural Research Institute (KZARDI), based at Kabale. The three institutes (NARL, NaCRRI and KZARDI), are sister institutes under the National Agricultural Research Organisation (NARO), which has the mandate for coordinating agricultural research in Uganda. The private sector is represented by Agro-Genetic Technologies (AGT), the only private company in Uganda (Masiga et al. 2013.

3.6.5.1.2 Artificial insemination

Until the 1950s, efforts to improve dairy production in the country were based almost entirely on selective breeding within indigenous cattle with fear that exotic breeds were likely to be adversely affected by the prevailing climate (save for the high altitude regions). Realizing that selective breeding with the local

cattle population would be too slow to match the rate of development of Uganda's agriculture, introduction of European-type cattle and AI of indigenous cattle with exotic semen was started in 1959, and since then there has been continued importation of semen. This led to an increase in the improved cattle population in Uganda from apparently none in 1958 to about 18,000 in 1969, and from 209,000 in 1994 to 279,000 in 1999. A variety of dairy breeding services are currently available to farmers, ranging from natural service to AI. An important consideration is whether the farmers choose the service or they are constrained in their choice. Although availability of improved breeding services is key to sustained dairy development, access to AI in Uganda is reportedly low, averaging between 2% and 15%, and this is probably concentrated mainly in the central region. The suboptimal use of AI is attributed to low availability, high cost, and uncertain reliability (Mugisha et al. 2014).

3.6.5.1.3 Gene discovery and characterisation

There is wide use of gene discovery and characterisation in Uganda. Examples include Genome-Wide Characterization of Selection Signatures and Runs of Homozygosity in Ugandan Goat Breeds (Onzima et al. 2018); Selection of Superior Sesame Lines Based on Genetic and Phenotypic Characterisation for Uganda (Okello-Anyanga et al. 2017);

Germplasm collections serve as valuable resources, thus, their adequate characterisation is of utmost importance. Germplasm characterization not only produces valuable agronomic and breeding data, but it is also useful for the identification of duplicates within and between collections. Furthermore, when genetic resources are kept ex situ, seeds are frequently regenerated to keep their viability and to replenish seed stocks. During this process, certain extent of gene flow may occur as the result of cross-pollination, as well as through physical mixing of seed lots. As a result, the quality and integrity of the germplasm might get severely reduced. Thus, especially when handling cross-pollinating species, additional planning, care, and special techniques are needed in order to ensure the physical/reproductive isolation of accessions that is required to preserve their genetic identity (Okello-Anyanga et al. 2017.)

Uganda is a tropical country with a population in excess of 30 million, >80% of whom live in rural areas. Bananas (*Musa* spp.) are the staple food of Uganda with the East African Highland banana, a cooking banana, the primary starch source. Unfortunately, these bananas are low in pro-vitamin A (PVA) and iron and, as a result, banana-based diets are low in these micronutrients which results in very high levels of inadequate nutrition. This inadequate nutrition manifests as high levels of vitamin A deficiency, iron deficiency anaemia, and stunting in children. A project known as Banana21 commenced in 2005 to alleviate micronutrient deficiencies in Uganda and surrounding countries through the generation of farmer- and consumer-acceptable edible bananas with significantly increased fruit levels of PVA and iron. A genetic modification approach was adopted since bananas are recalcitrant to conventional breeding (Paul et al. 2018).

Since the mid-2000s, medical research in Uganda has employed gene characterisation to assess infection and disease in the country (Stein et al. 2008). In veterinary medicine, Namatovu et al. (2015) used gene characterisation for characterization of Foot-And-Mouth Disease Viruses (FMDVs) from Ugandan Cattle Outbreaks during 2012-2013.

3.6.5.1.4 Marker assisted selection

Economic analysis in this paper demonstrates that market assisted breed (MAB) can significantly improve the efficiency of the cassava breeding process and have major economic benefits. The incremental net

benefits of MAB over conventional breeding (CB) for developing varieties with resistance to Cassava Mosaic Disease (CMD), green mite and whitefly were estimated at $34 million for Uganda (Rudi et al. 2010). These incremental benefits result mainly from earlier release of new varieties and the fact that the costs of MAB are relatively low compared to the benefits. MAB is estimated to save four years in the breeding process as compared to CB, but could potentially save as much as seven years. The net benefits of MAB over current varieties for the management of CMD, green mite and whitefly are even higher, and total approximately $53 million for Uganda. The total benefits for varieties including delayed post-harvest physiological deterioration (PPD) are approximately US$280 million for Uganda. In MAB, marker genes are found on a chromosome in close proximity to the gene of a desired trait. The marker gene is placed on a genetic map which indicates its recombination frequency relative to other genes (Okogbenin et al., 2006). Genes that are close in a genetic map are usually carried over in breeding crosses. Marker genes are used to determine whether a breeding cross has transferred the desired trait. If the marker gene is present, it is highly probable that the desired trait will be present in the progeny (Ribaut & Hoisington, 1998). MAB has several potential advantages over CB. Molecular markers can reduce the number of generations required for backcrossing, saving time in the breeding process. CB requires 12 to 16 years to develop a new cassava variety with the desired traits. One reason it takes so long is that backcrosses are needed to eliminate unwanted traits (linkage drag) that come along with the desired traits during the breeding process. With the use of genetic markers, breeding is more precise, thereby eliminating several backcrosses and time consuming phenotypic (visual) evaluations. Undesirable traits are often difficult to eliminate using CB alone (Collard & Mackill, 2008). With minimal linkage drag, MAB facilitates stacking of genes or combining (introgressing) genes for multiple desirable traits without introducing undesirable ones. An additional benefit of MAB is that it does not experience the regulatory hurdles and delays associated with genetically modified organisms because in most cases genes are not transferred from one species to another.

3.6.5.1.5 Vaccine production

In medical and health care applications, more than 250 biotech healthcare products, 400 biotech drugs are under clinical trial in Uganda. They include tests for HIV, cancer and malaria which are safer and more accurate (Afedraru 2018). At Makerere University and the Walter Reed Project are working on a malaria vaccine, RTS, S/AS01, which has been approved by the World Health Organization for pilot testing. Work also is underway on a promising HIV vaccine. Ebola and Marburg vaccine tests have been ongoing. And the results published in 2017 suggested that the vaccine is safe, while inducing antigens with immune responses.

Since 2016, An Ebola vaccine trial has been underway in Uganda, as part of global search for an effective vaccine. The vaccine candidate was co-developed by the National Institute of Allergy and Infectious Diseases (NIAID), part of the United States National Institutes of Health (NIH), and GlaxoSmithKline (GSK), a United Kingdom-based pharmaceutical company. The trial vaccine is known by its scientific name, ChAd3-EBOZ. The candidate vaccine is based on a type of chimpanzee cold virus, called chimp adenovirus type 3. The study is being conducted under the auspices of the US Food and Drug Administration agency (USFDA), the Ugandan National Drug Authority (NDA) and Uganda National Council for Science and Technology (UNCST), and the Makerere University-Walter Reed Project (MUWRP).

3.6.5.1.6 Sex reversal in fisheries

Recent aquaculture research in Uganda has focused on Tilapia pond aquaculture. The reproductive biology, feeding and spawning habits of Tilapia are well known (Godfrey Mbinzireki, personal communication, 2003). The Aquaculture Research and Development Centre, Kajjansi has successfully combined Tilapia (surface feeder) and Catfish (bottom feeder) in pond aquaculture. It estimates that yields of 5 kg of Tilapia and 3 kg of Catfish per square meter per year are feasible. The very low growth rates (1 kg Tilapia and 3-4 kg of Catfish in about 30 months) under current farmer management (compare with Table 11) and stocking limit the incentives to invest in aquaculture. They are partly attributed to poor feeding techniques and overcrowding in fishponds. New sex reversal techniques developed at the Kajjansi Aquaculture Research Centre will help reduce overcrowding, which is related to the fact that some Tilapia species start to reproduce already at about seven to nine months (Nyombi and Bolwig 2004).

Tilapia fry is subjected to a hormone treated feed that produces about 95% sex reversed fry (all males). Hatchery operators (e.g. SON) use the hormone in stock solution made up of 1667 ml absolute alcohol (95%) and 10 grams 17 alpha methyl testosterone (MT) hormone. The stock solution is kept under lock and key at room temperature. The hormone impregnated feed is made by mixing 15 ml of stock solution with 1.5 kg of fry meal and stored in a well-ventilated room. Fry (< 1g) stocked in happas or tanks are fed to satiation for 21 days using a feeding ring. The fry would have reached at least 1-1.5 g which is either sold directly to other fish farmers or transferred to nursing ponds to be raised to 5-10 g (these are destined for cage farming). After the 21st day the sex reversed fry is transferred to nursery holding ponds where they are fed with a different meal without hormone (Mwanja et al. 2017).

Seed The average stocking density for the interviewed tilapia farmers in 2014 was about 2.5 fish/m^2; the average price of tilapia fingerlings was US$0.12 per piece. On average, 1 319 tilapia fingerlings were stocked in a 531 m^2 pond and farmed for eight months to table size. The number of fish harvested was 916, which implies about a 70 percent survival rate. The 2011 EU study indicated that sex-reversed tilapia fingerlings (15 grams) could cost US$0.1 per piece. The size of the fingerlings could reach 550 grams after eight months in a fed, green pond system, and a 10 ha farm could produce 100 tonnes of tilapia in one cycle (Hyuha et al. 2017).

3.7 Promote innovative and sustainable funding mechanisms to support NBSAP implementation

3.7.1 By 2015, a study is undertaken in respect of CBD Decision X/3 and guidelines for financing biodiversity in Uganda developed

3.7.1.1 Guidelines and action plans for financing biodiversity in Uganda developed and implemented

In May 2015, the Government of Uganda through NEMA developed; "Guidelines and action plans for financing biodiversity in Uganda". These guidelines and action plans aim at establishing appropriate guidance to enable mobilization and proper use of financial resources for financing biodiversity conservation in Uganda. The actions proposed as part of the action plan were

(i) Operationalize national biodiversity resource mobilisation focal point & governance framework
(ii) Coordination framework for resource mobilisation;
(iii) Management of biodiversity in protected areas
(iv) National Biotrade Programme

(v) Regulations on access to genetic resources and benefit sharing
(vi) Information sharing mechanisms
(vii) Implementation of National Invasive Species Strategy and Action Plan
(viii) Local communities' participation in biodiversity management
(ix) Integration of indigenous knowledge & practices in biodiversity conservation
(x) Public awareness on biodiversity
(xi) Biotechnology and Biosafety
(xii) Inland Water Biodiversity
(xiii) Agro-biodiversity
(xiv) Mountain Biodiversity
(xv) Biodiversity and Climate Change
(xvi) Environmental impact assessment for biodiversity conservation

The aggregate financing gap for biodiversity finance was estimated to stand at US$455 million/year, although overall financial resource requirement is US$670 million/year. The guidelines and action plans indicate a strategy for mobilising finances and the biodiversity conservation actions to be undertaken between 2015 and 2025, while the Guidelines will be reviewed two years before it expires to give another life span of 10 years.

In terms of implementation the Guidelines and action plans for financing biodiversity were integrated into the NBSAPII. The information generated from the guidelines was a starting basis for implementation of the Biodiversity Finance Initiative (BIOFIN) in Uganda. Many of the actions proposed were developed into financing solutions for the National Biodiversity Finance Plan, specifically; operationalize national biodiversity resource mobilisation focal point and governance framework, coordination framework for resource mobilisation, elements of the National Biotrade Programme, Local communities' participation in biodiversity management and Environmental impact assessment for biodiversity conservation. Other components of the guidelines and action plan were included in the Uganda Green Growth Development Strategy (UGGDS) including biodiversity and climate change and agro-biodiversity. Between 2015 and 2019, the Government of Uganda implemented a GEF funded project on Conservation and Sustainable Use of the Threatened Savannah Woodland in the Kidepo Critical Landscape in North Eastern Uganda. The project combines components of: Management of biodiversity in protected areas, national biotrade programme, information sharing mechanisms, local communities' participation in biodiversity management, integration of indigenous knowledge and practices in biodiversity conservation, public awareness on biodiversity and agro-biodiversity.

3.7.1.2 Trends in financial resources mobilized

There are three new outstanding windows of funding for biodiversity conservation that have emerged since 2014. The Green Climate Fund (GCF) towards wetland restoration and climate change adaptation, the East African Development Bank and KfW (Kreditanstalt für Wiederaufbau[2]) a German Government development fund supported Biodiversity Investment Fund (BIF), and the European Union and other partners support to implementation of the Uganda Green Growth Development Strategy (UGGDS), the Uganda Biodiversity Trust Fund.

2 Kreditanstalt für Wiederaufbau Translated Reconstruction Credit Institute

a) Global Climate Fund: 2018 to 2025, $44.3 million mobilised for wetland restoration and climate resilience for subsistence wetland dependent communities

The Building Resilient Communities, Wetlands Ecosystems and Associated Catchments in Uganda is a project which is focused on enhancing llivelihoods of people and communities and restoration of ecosystems and generation ecosystem services. The total project investment is US $44.3 million. The GCF grant instrument will provide US$24.1 million of which 10.8% has already been disbursed. Co-financing for the project includes a grant from UNDP to a tune of US $2.0 million and the Government of Uganda US $18.1 million. The project was approved in December 2016, and the implementation period is eight years with the early completion date set at 30th June 2025. The project has components of climate change and biodiversity conservation synergies. Enhancing Ugandan subsistence farmers' ability to deal with climate impacts. An estimated 4 million people who live in and around Uganda's wetlands rely on them for food security. The impact of climate change, coupled with other environmental stresses, is increasing the degradation of wetlands and associated ecosystems. This grant-based project will assist the Government of Uganda take climate change effects into account in managing wetlands. Climate effects include increased climate variability and extreme weather events, such as droughts, floods, high temperatures and violent storms. This project will help Uganda to: restore critical wetlands to improve ecosystem services - such as replenishing ground water, improving flood control, and enhancing the livelihoods of subsistence farming communities through fishing and agriculture; enhancing the skills of people to diversify their livelihoods and become more resilient to climate shocks; and improve the ability of communities in sensitive wetland areas to reduce climate risks and prepare them for climate-related disasters (including through decentralized early warning systems).

This project is being implemented in south-western and eastern regions in Uganda, home to some of this Least Developed Country's most vulnerable people - more than half of them women. While this climate initiative is based on grant financing, positive spillover effects are envisaged in the private sector as new revenue opportunities open up for people in rural areas.

b) East African Development Bank/ KFW – EUR 6 million mobilised for private sector biodiversity investments

The East African Development Bank (EADB) launched of the Biodiversity Investment Fund. The fund offers competitive project financing in Ugandan shillings for viable businesses operating in target sectors that contribute towards biodiversity conservation. The businesses must operate in or near a significant biodiversity area and demonstrate a measurable positive impact in the location.

The purpose and vision of the BIF is to promote a diversified and sustainable economy that supports healthy biodiversity. The EADB Biodiversity Investment Fund provides attractive loan financing to Ugandan registered businesses that can demonstrate a positive impact or contribution towards biodiversity conservation in Uganda. The loans available may have a tenor of up to 10 years, a value of between Ugandan Shillings 450 million to 3.5 billion and may be used for capital expenditure, business development, and/or working capital.

The target sectors are: Organic Agriculture; Tourism; Aquaculture and Fisheries; Forestry, including non-timber forest products (e.g. honey, bamboo, shea nuts); Renewable Energy; and Wildlife-based Enterprises. The primary focus is to provide attractive commercial financing to projects that promote the conservation and sustainable use of biodiversity.

c) EUR 207,350 000 for Promoting Inclusive Green Economy in Uganda CRIS No: UG/FED/041-153 financed under the 11th European Development Fund (EDF)

The overall objective of this project is to contribute to Uganda's transition towards an inclusive, green and competitive low carbon economy and the creation of green jobs in all 5 sectors laid down under the Ugandan Green Growth Development Strategy, amongst them sustainable energy, sustainable agricultural production and value chains, planned green cities, and natural capital management and development, notably providing access to finance (EU 2018). The specific objectives are: 1. Access to Energy: to improve quality of life of remote households and to support private businesses through better access to affordable clean energy sources. 2. Access to finance: to contribute to develop green businesses and eco-entrepreneurship, with a particular focus on women and youth, through fostering access to finance and helping improve the country's policy and legal conduciveness to business. 3. Planned Inclusive Green Cities: to contribute to sustainable working patterns in several Ugandan urban areas, especially for the most vulnerable populations, as well as improve quality of life with a value chain approach so as to engage the private sector in sustainable urban development and wetlands conservation/restoration.

The expected results are:
1. Access to Energy: (i) Populations of 125 to 150 villages, especially in Northern Uganda, are electrified, benefiting from the services of a reliable, clean and affordable electricity; (ii) Business development initiatives and employment are boosted in the affected villages in key value chains; (iii) Support is provided to improve the regulatory framework enabling private sector investment in mini-grid development in adherence with the Ugandan off-grid strategy is improved.

2. Access to Finance: (i) MSMEs have better access to credit, in a more conducive business environment; (ii) Green agribusinesses performance and sustainability are improved; (iii) scale-up and replication of selected green and inclusive MSMEs in agriculture and non-agriculture green sectors is promoted and green jobs are created.

3. Planned Inclusive Green Cities (Kampala, Gulu, Nakivale settlement): (i) Local planning is improved (housing, water) and reliable social and economic services (water, sanitation, waste management) are provided in a planned and sustainable manner; (ii) Living and working conditions of vulnerable groups and businesses are improved, their awareness to green economy is raised and the wetlands were they lived are restored; (iii) Private sector investments in green interventions/value chains (including solid waste management, wastewater treatment and urban wetlands) are leveraged.

Total estimated cost: EUR 207,350,000 Total amount of European Development Fund (EDF) contribution: EUR 60,000,000 This action is co-financed in joint co-financing by: - Kreditanstalt für Wiederaufbau (KfW) for an amount of EUR 15,000,000 - United Nations Office for Project Services (UNOPS) represented by Cities Alliance for an amount of EUR 200,000 - Food and Agriculture Organization of the United Nations (FAO) Investment Centre for an amount of EUR 200,000 - Danish International Development Agency (DANIDA) for an amount of EUR 15,000,000- Eligible Development Finance Institutions, private sector: EUR 115,750,000 - German Federal Ministry for Economic Cooperation and Development (BMZ) for an amount of EUR 1,200,000.

3.7.1.3 Biodiversity Finance Plan for resource mobilization developed and implemented

In March 2019, Uganda completed the development of its National Biodiversity Finance Plan (NBFP). The *vision* for Uganda's NBFP is *"*sustainable and innovative financing for biodiversity conservation and management attained by 2027/28*"*. The *mission* of the NBFP is *"*to mobilise adequate additional resources to meet the biodiversity funding gap as well as ensure that funds are used efficiently and effectively to address the biodiversity and ecosystem challenges in biodiversity and ecosystem conservation and management.*"*

The goal of the plan is to achieve "optimal and sustainable financing for biodiversity conservation and management attained by 2027/28." Three objectives complement the goal of the NBFP. The objectives are: (i) to develop and implement a biodiversity and ecosystem index and payments for ecosystem services; (ii) enhance the use of economic instruments as incentives for biodiversity conservation and management; and (iii) scale up innovative biodiversity management and conservation actions that enhance livelihoods and increase national revenue. The eight finance solutions are:

1. Implementing ecological fiscal transfers: Piloting forest landscape restoration.
2. A national programme on payments for ecosystem services.
3. Scaling up bottom-up enforcement for biodiversity and ecosystem management based on community regulatory systems and incentives model.
4. Develop transport channel for transport and ecotourism for Lubigi wetland system with livelihoods incentives for wetland adjacent communities.
5. Upgrading the value chain for natural ingredient of Shea in Northern Uganda.
6. Rationalise and implement revised charge systems for biodiversity and ecosystem conservation and management.
7. A financing model for biodiversity conservation for central forest reserves.
8. Standardize and regulate implementation of biodiversity offsets.

3.7.2. By 2017, finance resources for effectively implementing NBSAPII is increased by at least 10% from the current level

3.7.2.1 Trends in National financial resource allocation for biodiversity conservation

Aggregate biodiversity expenditure across the four ministries doubled from UGX 67.3 billion in 2009/10 to UGX 147.8 billion in 2014/15. The largest expenditure on biodiversity management was from tourism and wildlife management followed by the Agriculture Ministry. The large rise in biodiversity expenditures can be largely attributed to the inclusion of the Uganda Wildlife Authority's (UWA) locally earned revenues in the budget documents for 2014/2015. Otherwise biodiversity expenditures have remained relatively stable over time and have generally decreased relative to total government budgets as is the case of the three main environmental ministries as indicated in Table 3.41.

Table 3.37: Aggregate biodiversity management for MEMD, MWE, MAAIF and MTWA

Fiscal Years	Amount (UGX billion)				
	MEMD	**MWE**	**MAAIF**	**MTWA**	**Total**
2009/10	0.9	12.85	32.68	21	67.43
2010/11	0.72	14.46	33.82	6.63	55.63
2011/12	1.27	22.43	24.26	13.52	61.48
2012/13	2.7	13.46	27.83	14.94	58.93
2013/14	1	19.5	21.95	18.92	61.36
2014/15	3.76	19.97	48.64	75.43	147.8
Average	**1.7**	**17.1**	**31.5**	**15.0**	**75.4**

3.7.3. By 2018, new financing mechanisms are operational and new funding mobilized for biodiversity conservation

3.7.3.1 Trends in funding for biodiversity conservation

As part of implementation of NBSAP II, five new funds have emerged. The Uganda Biodiversity Trust Fund (UBTF) an independent conservation fund currently hosted by the Wildlife Conservation Society (WCS). Since its launch in 2016, the trust fund has mobilised $100,000 from the United States Government. The target is to mobilise up to $5 million in the first five years. The first two years were used for establishment of the institutional arrangements, awareness creation and capacity building. Under the National Environment Bill (2018) that was passed by Parliament a new environmental audit charge was proposed, which will raise an expected UGX 6 billion. Additional instruments on payments for ecosystem services and re-enforcement of the Environmental Impact Assessment fees and other instruments in the new legislation have not been assessed.

The UGGDS has drawn financing for the five focus areas of agriculture, green cities, sustainable transport, sustainable energy and natural capital management. The European Union office in Uganda has supported the mobilisation of at least EUR 207.35 million for implementation of biodiversity conservation and management related activities.

Table 3.38: New funding opportunities for biodiversity conservation

Type of fund	Target	Funds mobilised so far	Funds disbursed
1. Uganda Biodiversity Trust Fund	$5 million in 5 years	$100,000	unknown
2. Environmental Audit Fees	UGX 6 billion/year	None	None
3. Green Climate Fund	$ 44.3	$26.1	$2.6
4. UGGDS	**EUR 207,350 000**	None	None
5. Biodiversity Investment Fund	EUR 10 million	**EUR 6 million**	All funds available at EADB

3.8. New and Emerging issues

3.8.1. By 2016, oil exploration and production are being guided by biodiversity friendly regulations

3.8.1.1 Biodiversity conservation and ecosystem resilience are being maintained adjacent to oil exploration and production areas

1. Oil and Policy for Uganda 2008

After Uganda discovered commercial volumes of oil and gas in the Albertine Graben, the Government developed the National Oil and Gas Policy (2008) to support coordination of oil and gas exploration and development activities in the country. The policy clearly delineated the importance of biodiversity and environmental management and the role of lead agencies including the National Environment Management Authority (NEMA), Uganda Wildlife Authority (UWA), the National Forestry Authority (NFA), District Local Governments, the Ministry of Water and Environment (MWE) and its Directorate of Water Resources Management (DWRM), and the Ministry of Agriculture, Animal Industry and Fisheries. The agencies take respective lead on environmental management, wildlife management, forestry management, natural resource management at sub-national level, water resources management, agro-ecosystems and fisheries. The policy aligned oil and gas development with the existing policy, legal and institutional arrangements in place.

2. Strategic Environment Assessment (SEA)

In order to further strategically align oil and gas development with ecosystems and biodiversity within the Albertine Graben, the Government carried out the Strategic environmental assessment between 2011 and 2013. The 2013 SEA stated the major risks associated with oil and gas development. The specific risks to management were impacts on water resources, on wildlife resources, on existing livelihoods, settlements, impacts on wetlands and agro-ecosystems. As part of the implementation of the SEA, the government proposed development of a water resources development and management plan for oil and gas, review and revision of the general management plans for the affected national parks and wildlife reserves and inclusion of the risks identified in the SEA in all subsequent Environmental and Social Impact Assessments (ESIA). Also, an oil spill contingency plan was to be developed by NEMA to enhance regulation on oil and gas activities.

3. The Oil and Gas Laws

In 2013, the Government passed two laws to support the oil and gas exploration and development activities in the country. The two laws are The Petroleum (Exploration, Development and Production) Act 2013; and The Petroleum (Refining, Conversion, Transmission and Midstream Storage) Act 2013. The two laws also delineate the roles of lead agencies in ensuring that biodiversity and ecosystem service damage is minimised and commitment that developers will undertake to ensure that environmental impacts are avoided, minimised, mitigated against and residual impacts offset for.

1. ESIAs for exploratory phase completed

The first exploratory phase for the oil and gas industry in Uganda generally took place between 2008 and 2015. Several ESIAs were conducted during the exploratory phase and where environmental impacts occurred mitigation actions were undertaken. The main international private sector partners for the

Government of Uganda were Tullow Oil Pty, Total ENP, Heritage Oil Ltd, and CNOOC (China National Offshore Oil Corporation) Uganda Ltd.

2. The National Environment (Oil Spill Prevention, Control and Management) Regulations, 2014

In 2014, NEMA drafted the oil spill prevention, control and management regulations for the oil and gas industry in Uganda. It is expected that with the passing of the National Environment Bill (2018), the regulations will be adopted and/or revised and adopted. The purpose of these Regulations is to provide for- (a) the prevention, control and monitoring of oil spill caused by oil and other harmful or dangerous substances in waters and on land under Ugandan jurisdiction and other matters; (b) the establishment of basic principles to be observed in handling oil and other harmful or dangerous substances in facilities, platforms and vessels in Uganda; (c) role of the NEMA and other spill responders; (d) enforcement of spiller responsibility; (e) access and right-of-entry to spill sites; (f) contractor selection and call-out; (g) emergency response to fire and safety hazard; (h) confining and containing oil releases; (i) corrective action; (j) personal health and safety protection during an oil spill; (k) equipment training, calibration, and maintenance; (l) proper management of spill residuals and debris; and (m) quality assurance and quality control procedures.

3. ESIAs for the development phase - Tilenga, East African Crude Oil Pipeline (EACOP) and Oil Roads under UNRA

Compliance and enforcement of biodiversity and ecosystem conservation and management regulations were included in the approved ESIAs for the development phase for the oil and gas sector. The projects whose ESIAs were approved include the oil and gas development in the northern Albertine Graben referred to as the Tilenga project. The Tilenga projects includes a Central Processing Facility (CPF) with capacity to process 190,000 barrels of oil per day, and over 412 wells (including 189 injectors, 190 producers and 33 observers) which are planned to be drilled on 35 well pads. The CPF is an infrastructure used to process crude oil, which is received directly from the oil wells, by removing impurities and water and also separating the produced gas from the crude oil. The Tilenga project is also planned to have 250 kilometres flow lines which will transport crude oil within the oil fields and a 110 km feeder pipeline which will transport the processed crude oil from the CPF in Buliisa to the export hub and refinery in Kabaale. pre-development activities being undertaken included; Development of a Land Acquisition and Resettlement Framework (LARF), Environment and Social Impact Assessments, Biodiversity studies and Resettlement Action Planning among others. In 2018, NEMA cleared the ESIAs submitted for the 10 critical oil roads. The critical oil roads will be bituminous roads constructed in the Albertine Graben to support the movement of equipment and materials for the planned oil and gas developments. The roads infrastructure is an essential requirement for oil industrial development. On-going studies include the ESIA for the East African Crude Oil Pipeline (EACOP) and the second oil and gas development area, the **Kingfisher Project**. CNOOC (U) Ltd has commenced pre-development work on the Kingfisher oil field starting with construction of infrastructure to support the operations. The approval of the ESIAs which were subjected to public hearing and international and national technical reviews is expected to ensure comprehensive integration of biodiversity and ecosystem management actions.

3.8.2. By 2018, the development and use of biofuels are widespread in Uganda to complement hydrocarbon fuel sources

3.8.2.1 Proportion of hydrocarbon fuel sources substituted by biofuels

The development of biofuels was premised on the use of biofuels as part of the oil mix for the country, i.e. proportion of hydrocarbon fuel sources substituted by biofuels. The decision on whether to include biofuels into the mix for hydrocarbons fuel has not been made by the Government although it is under consideration. Therefore, no specific development in the development of biofuels in the country has occurred since 2014.

3.8.3 By 2020, Uganda's biodiversity is reasonably protected from natural disasters

3.8.3.1 Disaster Risk management strategy in place to address potential biodiversity risks and hazards

The goal of Uganda's National Policy for Disaster Preparedness and Management (2010) is to establish institutions and mechanisms that will reduce the vulnerability of people, livestock, plants and wildlife to disasters in Uganda. The policy objectives include; establishing Disaster Preparedness and Management institutions at national and local government levels, integration of Disaster Preparedness and Management into development processes at all levels, generation and dissemination of information on early warning for disasters and hazard trend analysis, and creating timely, coordinated and effective emergency responses at national, district and lower level local governments.

There are two categories of disasters in Uganda; natural disasters and human-induced disasters. Natural disasters in Uganda include:

- Drought that is the prolonged shortage of water often caused by dry weather conditions. Water, drought and famine are related; Famine or Food Security which is a severe shortage of food that may lead to malnutrition and death;
- Floods. floods occur when large amounts of water cover a place that is meant to be dry. Floods build up slowly;
- Landslides and Mudslides. Landslides and mudslides are rapid movement of a large mass of mud, rocks, formed from lose soil and water;
- Human epidemics. This is the prevalence, in a particular community and at a particular period, of a disease whose magnitude goes beyond normal/expected levels. The diseases include; cholera, meningitis, hepatitis E, Marburg, plague, and Ebola, sleeping sickness;
- Crop and Animal and Epidemics. Animal epidemics include swine fever, foot and mouth, Nangana, bird flu while crop diseases epidemics include coffee wilt, banana bacterial wilt, cassava mosaic, brown steak;
- Pandemics which is a disease epidemic that occurs when there are more cases of that disease than normal. A pandemic is a worldwide epidemic of a disease. For example, an influenza pandemic may occur when a new influenza virus appears against which the human population has no immunity;
- Heavy Storms in Uganda are often accompanied by hailstorms, thunder storms and violent winds;
- Pests Infestation due to unwanted and destructive insects or any animals that attack food or livestock both during the growing and post-harvest seasons;
- Earthquakes result from sudden violent movements of the earth's surface, sometimes causing tremendous loss of lives and property.

Human Induced Disasters include:

- Transport Related Accidents The increasing numbers of accidents that take place during road, air, water and railway transportation are occasionally fatal and hazardous.
- Fire hazards include the unplanned and massive burning which may cause destruction of equipment, settlements, property and life.
- Internal Armed Conflicts and Internal Displacement of Persons Since independence, Uganda has been characterised by successive internal armed conflicts which have led to loss of lives and massive displacement of communities.
- Mines and Un Exploded Ordinances (UXOs) Mines are ammunitions designed to explode within proximity or in contact with a person or a vehicle.
- Land Conflicts Land conflicts continue to be a common disaster across the country. They result into loss of life, landlessness and loss of property.
- Terrorism is coordinated crime and brutal aggression against government establishments and communities.
- Industrial and Technological Hazards Uganda's long term vision for development and socio-economic transformation focuses on agricultural modernisation and industrialisation.
- Cattle Rustling A cattle rustling involves members of one community raiding and taking livestock from another community.
- Other Retrogressive Cultural Practices There are a number of cultural practices that are hazardous to humanity. These include; female genital mutilation, child sacrifice, forced early marriages and ritualised defilement. Many of these practices lead to deaths and/or permanent disability and social disorders.
- Environmental Degradation results from poor land use patterns and other practices that lead to waste and destruction of ecological patterns. Environmental degradation is exemplified by overgrazing, destructive tilling practices on sloping landscapes, monoculture, unguided and uncontrolled use of fertilizers and pesticides, bush burning, overfishing, deforestation,

As part of implementation of the policy, the Government established District Disaster Management Committees for all Districts in the country, and District Contingence plans for disaster prone Districts in the country. The establishment of the District Disaster Management Committees has been instrumental in institutionalising the early warning systems at local government level. In all the study districts, the committees were found to be functional and at the forefront of managing disaster preparedness and prevention in their respective districts. Similarly, through District Contingence Plans, Districts have mapped common disasters in their areas and in some cases taken action including resettling some of the people from the worst affected areas as well as soliciting for funds from development partners to fund their risk reduction.

A review conducted by NEMA on the level of integration of biodiversity and ecosystem management into disasters in flood and landslide prone buffer Districts of the Mt. Elgon National Park found that there has been a general decline in the population of mammals in the Mt. Elgon National Park at the same time that the landscape has experienced an increase in natural disasters of floods and landslides. The exploratory study suggests that occurrence of natural disasters may have a negative impact on the conservation of wildlife; however, a more detailed correlation study may be needed to provide scientific proof.

PART II. EVALUATION OF THE EFFECTIVENESS OF THE MEASURES TAKEN, THE IDENTIFICATION OF LESSONS LEARNED, AND OF TECHNICAL, SCIENTIFIC AND CAPACITY NEEDS FOR IMPLEMENTATION SUPPORT

4. EFFECTIVENESS OF MEASURES TAKEN

4.1 Effectiveness of measures and actions undertaken in implementing NBSAP II

The measures and actions undertaken as part of Uganda's NBSAP comprise seven strategic objectives an additional strategic objective on new and emerging issues. The strategic objectives comprise 34 targets and several outcome and output indicators. The effectiveness of the measures and actions was based on a guided standard assessment framework build into an excel format. The methodology for assessment and approach builds from the outcome indicators provided for in the NBSAP II. The measures considered in the effectiveness assessment were the strategies for achieving the targets while the actions were assessed based on the description of actions in the NBSAP II.

4.1.1 Effectiveness of measures and actions to strengthen stakeholder coordination frameworks for biodiversity management

The strategic objective has three strategies a matching number of targets. Strategy one on integrating biodiversity values integrated into the National Development Plan, Budget Framework Papers, Ministerial Policy Statements and District Development Plans is to mainstream the biodiversity values. The specific actions consist of enhancing capacity and development of policy frameworks, which are actively under implementation while the guidelines for mainstreaming biodiversity into national, sectoral and district plans was completed. Many actions under implementation are still at the early stage of development including gender mainstreaming for biodiversity with partnerships being development between the national environmental regulator NEMA and non-governmental organisations such as the International Union for Conservation of Nature (IUCN) to widen the landscape of intervention. NEMA established four regional offices for Central, Northern, Eastern and Western Uganda to enhance coordination of biodiversity, and other environmental management actions at the sub-national level (Table 4.1).

The second measure under strategic objective one is to review, update and initiate a participatory and inclusive process of implementation of NBSAP. Whereas the NBSAP II was widely distributed among stakeholders, regular cross-sectoral consultations and the facilitation of regional and district outreach are under implementation, gender responsive guidelines for implementing NBSAPII. The third measure under strategic objective one to put in place a monitoring and evaluation framework has not yet been implemented. The NBSAPII Monitoring and Evaluation strategy with SMART indicators are expected to be completed by the end of 2019.

Table 4.1: Effectiveness of measures and actions for strategic objective 1

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
1.1	Mainstream biodiversity issues in the NDP, Sectoral and District	1.1.1 Strengthen the capacity of the biodiversity coordination mechanism	Actively under implementation	Measure taken has been effective	Number of projects being undertaken to strengthen biodiversity coordination mechanism
		1.1.2 Develop an integrated biodiversity management policy	Planning stage or early	Measure taken has been partially effective	review of key policies and regulations (Revised NEMP, National Environment Act

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
	Development Plans	framework	implementation		2018, National Wildlife Policy 2014)
		1.1.3 Map relevant stakeholders (women and men) at different levels, and establish/reinforce networks and task forces, including especially on gender and women's empowerment	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions with NEMA staff, IUCN, Natural Chemotherapeutics Research Institute (NCRI), Ministry of Gender Labour and Social Development (MoGLSD)
		1.1.4 Conduct capacity building sessions on the NBSAP, gender and biodiversity, and implementing conservation plans and initiatives with a gender perspective across the environmental sector	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions with NEMA staff, IUCN, MoGLSD, and Buikwe, Jinja, Kasese, Masindi, Hoima, Rubirizi, Mbale District Local Governments (DLGs)
		1.1.5 Lobby Government and other relevant stakeholders to put in place a coordination mechanism for implementation of Multilateral Environmental Conventions	Actively under implementation	Measure taken has been effective	Literature Review and Key informant discussions with NEMA staff, MEAs Project staff and District Local Governments (DLGs)
		1.1.6 Develop and utilize biodiversity and ecosystem services valuation tools to quantify and monitor the environmental, economic and social value of biodiversity	Actively under implementation	Measure taken has been effective	Literature Review and key informant discussions with NEMA EIA office; Lead Agencies in Environmental Compliance; and NGOs
		1.1.7 Develop guidelines for mainstreaming biodiversity into national, sectoral and district plans	Completed	Measure taken has been effective	Document review; Key informant discussion with BIOFIN project Uganda staff and coordinator
		1.1.8 Undertake and utilize biodiversity and ecosystem services valuations to mainstream biodiversity into decision making and to develop a business case for biodiversity		Measure taken has been effective	Literature Review and key informant discussions with NEMA EIA office; Lead Agencies in Environmental Compliance; and NGOs
		1.1.9 Undertake mapping of the status and trends of ecosystems (especially forests, wetlands and rangelands)	Actively under implementation	Measure taken has been partially effective	Literature/ document review and key informant discussions
National Target 1.2	Review, update and initiate a participatory and inclusive process of implementation of NBSAP	1.2.1 Develop a gender responsive guidelines for implementing NBSAPII	Not yet started		
		1.2.2 Produce and disseminate NBSAPII to stakeholders	Completed	Measure taken has been effective	Key informant interview with CBD Focal Point Uganda; document review
		1.2.3 Facilitate the mainstreaming of NBSAPII actions in national, sectoral and district plans and programmes	Actively under implementation	Measure taken has been partially effective	Key informant interview with CBD Focal Point Uganda and NPA Manager Production, Trade and Tourism Planning; document review
		1.2.4 Undertake regular cross-sectoral consultations on NBSAPII implementation	Actively under implementation	Measure taken has been effective	Literature Review and Key informant discussions with NEMA staff, MEAs Project staff and District Local Governments (DLGs)
National Target 1.3	Put in place a monitoring and evaluation framework	1.3.1 Develop and implement a gender responsive NBSAPII Monitoring and Evaluation strategy with SMART indicators	Not yet started		
		1.3.2 Undertake Monitoring and Evaluation of the implementation of NBSAPII	Not yet started		

4.1.2 Effectiveness of measures and actions to facilitate and build capacity for research, monitoring and information management

There are three targets under the second strategic objective of NBSAPII. The measures currently implemented are; (i) support research in strategic areas of biodiversity conservation and sustainable use, (ii) capacity building for information management and exchange in taxonomy, and (iii) strengthen the role

of indigenous peoples and local communities in biodiversity conservation and management including gender considerations (Table 4.2)

Five out of the seven actions under the strategy on research are under active implementation while the other two are in the planning stage. The actions to support innovative research, science and technology in management of biodiversity are coordinated under the Uganda National Council of Science and Technology (UNSCT). Most of the research actions are undertaken under the National Agricultural Research Systems (NARS) which covers research on crops, livestock, fisheries, forestry and biotechnology under the public sector including the National Agriculture Research Organisation (NARO) and its seven research institutes, as well as research by universities and in private sector, and non-governmental organisations including international partners under the CGIAR, IUCN, UNDP, FAO and UNEPWCMC, among others. Research on wetlands, environmental management and other biodiversity areas is conducted by the Ministries, Departments and Agencies (MDAs), universities and non-governmental organisations. Measures undertaken to research and development of a marketing system for shea butter for example have been largely successful. Innovative research in wetlands management led to development of innovative financing solutions under the community environment conservation fund (CECF). Through a partnership involving private sector, NGOs, Government and communities, a threshold level of community livelihoods investment was identified that can create an adequate and appropriate incentive for wetland conservation for communities in northern, eastern and western Uganda, among others. Whereas, many sectors have research objectives, only a few can state that the purpose was for biodiversity conservation linked to the NBSAP. Nonetheless, the country is set for a new phase of development planning for the 2020/21 – 2024/25 planning/ development period. There will be a strengthened emphasis on biodiversity conservation over the five-year timeline. There has been limited monitoring of the benefits from international cooperation and opportunities for information exchange and support in the field of biodiversity at the local, national, regional and international level. However, Uganda is implementing a number of projects including the Natural Capital Accounting projects under the World Bank and UNEP WCMC, as well as the CONNECT (mainstreaming biodiversity information into the heart of government decision making) project which will enhance community level benefit from international cooperation on information.

Building capacity for information management and exchange in taxonomy was included as a priority in NBSAP II planning. There are concerns that whereas taxonomy courses are taught at universities, institutions generally have limited capacity of experienced taxonomists particularly as the economic development challenges increase and put increased pressure on biodiversity. The taxonomy development strategy as envisaged in NBSAP II has largely been unfulfilled. The highest success was registered with expansion of the taxonomic knowledge bases of biodiversity in formats that are accessible to women and men and other end users and improvement of taxonomic infrastructure and tools to provide adequate taxonomic information. The Makerere University based National Biodiversity Data Bank remains the leading taxonomic knowledge base in the country. There have been efforts under NARO to enhance capacity of the Plant Genetic Resource Centre (PGRC) and the Ministry of Agriculture's National Animal Genetic Resource Centre and Data Bank (NAGRC &DB). Use of taxonomy information has generally increased and included decisions on environmental social impact assessment (ESIA), and in crop science research. But the scale of capacity building in taxonomy was indicated to be limited for many public agencies including the likely loss of institutional memory occurring in agencies such as the National Forestry Authority (NFA), the Uganda Wildlife Authority (UWA) and in NARO.

The momentum on strengthening the role of indigenous peoples and local communities in biodiversity conservation and management is mixed. Successful value chains such as for Shea butter have strengthen

the communities that have maintained the important value chains, especially the women who collect and do most of the primary process of the Shea nuts. The decline of Gum Arabica means that many communities that were originally empowered in the Karamoja region have not realized the economic benefits promised from the commodity enterprise. Many indigenous communities have to increasingly compete with emergence of economic opportunities associated with mineral, and oil and gas development in the Albertine Graben and in the Karamoja region, respectively. Increasingly, the Government is adopting biodiversity offsets strategies to minimize impact on indigenous communities from emerging development opportunities.

Table 4.2: Effectiveness of measures and actions for strategic objective 2

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
National Target 2.1	Support research in strategic areas of biodiversity conservation and sustainable use	2.1.1 Support innovative research, science and technology in the management of biodiversity with particular focus on value addition, product development and innovation with due considerations of women, men and youth	Actively under implementation	Measure taken has been effective	Key informant interview with CBD Focal Point Uganda and KCL Project Manager; document review
		2.1.2 Support Product testing and quality assurance and standards development	Actively under implementation	Measure taken has been partially effective	Key informant interview with CBD Focal Point Uganda and KCL Project Manager; document review
		2.1.3 Undertake taxonomic research to improve knowledge of little known taxa (especially those which may have commercial value)	Actively under implementation	Measure taken has been effective	Key informant interview with Staff of Plant Genetic Resource Centre (PGRC); and National Crop Resources Research Institute (NACCRI)
		2.1.4 Develop sector research priorities in biodiversity	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions with staff of NARO (NaFORRI; NAFIRRI; NaCCRI), Universities; UNCST; and NEMA
		2.1.5 Promote research and bioprospecting on PGR, including medicinal plants	Actively under implementation	Measure taken has been partially effective	Key informant discussions with staff of NARO (PGRC); UNCST; and NEMA
		2.1.6 Enhance national capacity in information management and research which supports biodiversity conservation	Actively under implementation	Measure taken has been partially effective	Key informant interviews; document review
		2.1.7 Ensure that Uganda benefits from international cooperation and opportunities for information exchange and support in the field of biodiversity at the local, national, regional and international levels	Early implementation	Measure taken has been partially effective	Key informant interviews; document review
National Target 2.2	Build capacity for information management and exchange in taxonomy	2.2.1 Conduct awareness raising on the role of taxonomy in biodiversity conservation in public and private institutions	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions with Environment Management Compliance Department/ NEMA; WCS staff
		2.2.2 Create awareness on the application of taxonomic information in many production sectors of the country such as agriculture, trade, health, development and regulatory agencies as well as local communities	Planning stage or early implementation	Measure taken has been partially effective	Key informant interviews; document review
		2.2.3 Support institutions with taxonomic data and information (through funding, increased personnel or better infrastructure) to make this information easily available to end -users	Planning stage or early implementation	Measure taken has been partially effective	Key informant interviews; document review
		2.2.4 Support and train women, including women's indigenous groups and women's organizations, on taxonomy, taxonomic data, information	Not yet started	Unknown	
		2.2.5 Develop taxonomic knowledge bases of biodiversity in formats that are accessible to women and men and other end users	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions; literature review
		2.2.6 Improve taxonomic infrastructure and tools to provide adequate taxonomic information	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions; literature review
		2.2.7 Establish Centre(s) of Taxonomic excellence	Not yet started	Unknown	
		2.2.8 Undertake human resource capacity development in taxonomy at all levels and retain taxonomists with job descriptions in their	Not yet started	Unknown	

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
		institutions			
		2.2.9 Provide incentives/employment opportunities to women and men graduates with taxonomic backgrounds to retain them e.g. prioritizing taxonomy in Environmental Impact Assessments (EIA)	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions with Environment Management Compliance Department/ NEMA; Uganda Association for Impact Assessment
National Target 2.3	Strengthen the role of indigenous peoples and local communities in biodiversity conservation and management including gender considerations	2.3.1 Promote the role of traditional knowledge, innovations and practices in the management and use of biodiversity	Actively under implementation	Measure taken has been partially effective	Key informant discussions; literature review
		2.3.2 Document traditional knowledge and practices of women and men that promote conservation and sustainable use of biodiversity e.g. in herbal medicine	Actively under implementation	Measure taken has been partially effective	Key informant discussions; literature review
		2.3.3 Develop Community Action Plans for biodiversity conservation in strategic areas	Actively under implementation	Measure taken has been effective	Key informant discussions; literature review
		2.3.4 Develop access and benefit sharing arrangements with indigenous peoples and local communities, with respect to intellectual property rights	Not yet started	Unknown	

Box 4.1: UGANDA WILDLIFE AUTHORITY HANDS OVER LAND WORTH UGX180 MILLION TO BATWA COMMUNITY

The Minister of Tourism, Wildlife and Antiquities Prof. Ephraim Kamuntu handed over two pieces of land measuring 7.5 acres worth UGX 180 Million to a group of 35 people of the Batwa community neighbouring Mgahinga Gorilla National Park. One piece of land is situated in Musana while the other is situated in Nyagacence both in Kisoro District. He said that Community participation in conservation has been beneficial in and around the protected areas of Uganda and Mgahinga in particular. "Communities participate in a number of activities such as problem animal management, resource access (dry bamboo, fire wood, handcraft materials, honey extraction, medicinal herbs), employment both formal and informal therefore their participation cannot be taken for granted". Prof. Kamuntu further said that the existence of the protected area comes along with projects that help in improving the livelihoods of the community. "Because of this protected area, projects such as road construction, electricity extension to the park and the neighbouring areas, water extension to the neighbouring communities, Community enterprises and Revenue sharing projects among others have come up and as a result, communities are able to transport their goods, access clean water and electricity that has contributed to the growth of small scale enterprises".

The Executive Director UWA Sam Mwandha, said that the beneficiary group is composed of those people who have been working with UWA to give tourists a memorable experience while in the park but have been facing a challenge of inadequate land for settlement and cultivation. As a result, it was agreed that UWA buys them land out of the revenue generated from the Batwa trail product. "The revenue generated from this product is shared equally between UWA and the Batwa. The share for the Batwa is saved on their development account and it is from these accumulated funds that the land was purchased for them" Mr Mwandha expressed optimism that with acquisition of land, the Batwa community have will start engaging in farming and hence alleviate poverty. "It is my hope that the Batwa will use this land for farming projects such as Irish potato growing and livestock rearing. The crops will be used for food and the surplus sold for income to meet other household needs, as well as education of their children"

The Batwa leader Kyakabingi Hagumimana thanked UWA for knowing their problem and solving it. He said that they will use the land to cultivate crops for the market to earn income and educate their children. The beneficiaries of this land are a community of 35 who work on the Batwa Trail product and are registered under Mgahinga Batwa Cultural Development Company Limited. The land belongs to the company and nobody is allowed to sell it. The role of UWA is to provide technical support as well ensuring proper land ownership rights.

Source: UWA 2019 (April 26th)

4.1.3 Effectiveness of measures and actions to reduce and manage negative impacts while enhancing positive impacts on biodiversity

The main component of Uganda's NBSAP II is to reduce and manage negative impacts while enhancing positive impacts of biodiversity. In the strategic objective are 10 strategic measures and several actions for each of the measures.

Improve management effectiveness of Protected Areas

The strategy on improved management effectiveness of protected areas (PAs) is one of the best performing strategies. All the National Parks have General Management Plans (GMPs). The General Management Plans were developed as part of the UWA Strategic Plan 2013-2018. The authority has developed a new strategic plan will lead to the development of new GMPs, however, considerable preparatory work has taken place including PA valuation for Murchison Falls Protected Area and Semuliki National Park, and biodiversity offsetting guidelines for national parks. In 2014, a new National Wildlife Policy was completed, and the revision of the Wildlife Act is also ongoing. The maintenance of effective wildlife corridor remains an important challenge with the support of the Wildlife Conservation Society (WCS) UWA has established the wildlife corridors in the Albertine Rift while with the support of UNDP and NEMA, UWA has also established the wildlife corridors in the Karamoja region of north eastern Uganda. Human wildlife conflict management was formally integrated in the Wildlife Policy and strategies, actions and financial resource allocation are included in the GMUs. To address the challenge of wildlife corridors and human wildlife conflict with regard to the Mountain Gorillas in Bwindi Impenetrable National Park (BINP) a GMU was developed for the Nkuringo Sector. Occasionally, in Nkuringo area Gorillas and other wild animals come into human settlement creating negative impact on both the conservation of Gorillas and the livelihoods of the people. The major problem has been that the habituated Gorillas spend 60% of their time on community land and in the process cause damage to crops and injury to human beings. The contact between humans and gorillas increases the risk of contracting diseases (UWA/Nkuringo GMP 2019). The buffer zone management actions include community livelihoods, community health outreach programmes, and integration of enterprise that are less desirable for the Mt. Gorillas, for example, tea under the Nkuringo Buffer Zone GMP (2015-2019).

Implement climate change mitigation and adaptation for biodiversity conservation including disaster risk reduction from climate change impacts

The climate change and biodiversity conservation strategy is implemented through the REDD+ progamme, afforestation, tree planting and reforestation activities, promotion and support for restoration of degraded wetlands, establishment of buffer zones for protection of critical conservation areas with high biodiversity within PAs , monitoring and control bush burning in fire prone areas, and collecting and storing diverse gene pools, including through community and women-led seed banks as a basis of genetic adaptation to climate change and for enhancing food and nutritional security. Uganda's REDD+ Strategy was completed in 2018 and alongside the Forest Investment Plan (FIP) and Forest Landscape Restoration (FLR) seeks to restore 2.5 million ha of forest estate of Uganda as part of the Bonn challenge. For Uganda FLR is also aligned with targets included in Vision 2040. All the necessary strategies and forest investment plans for the Northern Moist and Karamoja landscapes have been completed (MWE and IUCN 2019). However, the actual investments on ground are still disjointed. The major incentives are the NFA programme to attract private sector investment into restoration of degraded central forest reserves, and the private sector commercial tree planting supported under the Sawlog Production Grant Scheme (SPGS). Plantations are the only component of Uganda's forests that increased between 2010 and 2015, all the other forest covers; woodlands and tropical high forests continued to decline. The

carbon pool in Uganda's forests is expected to have decline as the forest cover declined further. In terms of management, the deforestation rate generally declined from 6.4%/year between 2005 and 2010 to 2.2%/year between 2010 and 2015. For protected areas of national parks and wildlife reserves there was an average annual increase in forest cover of 0.8%/year between 2010 and 2015. Over the same period, deforestation for central forest reserves was very low at just 0.1%/year even though deforestation for private land was still high at 4.4%/year.

Identify and implement measures for protection of threatened and vulnerable species

The core measures for protection of threatened and vulnerable species are through law enforcement and community engagement largely through providing incentives to communities to support conservation through revenue sharing arrangements. Enforcement measures were core to UWAs Strategic Plan (2013-2018) and they tackled the need to contain illegal activities in all wildlife areas. Specifically, by strengthening Intelligence, law enforcement and security operations. In the 2016/17 management year, law enforcement received 25 per cent of the annual operational budget in QEPA and 33 per cent in MFPA (staff salaries are not included in this figure). Most of the budget is spent on ranger patrols. For example, MFPA patrols accounted for 26 per cent of the annual operational budget in 2016/17. Other activities include gathering intelligence and bringing prosecutions. UWA's emphasis on law enforcement as the main way to combat wildlife crime is also clear from the General Management Plans for both parks (Travers, H et al. 2017).

Box 4.2: UWA gives UGX 4.48 billion to communities neighbouring Bwindi-Mgahinga Conservation Area.

On April 25, 2019, Uganda Wildlife Authority (UWA) handed over cheques worth UGX 4.48 billion under the revenue sharing scheme to communities surrounding Bwindi Mgahinga Conservation Area. The cheques were handed over by the Minister of Tourism, Wildlife and Antiquities Prof. Ephraim Kamuntu to the district leaders of Kisoro, Kanungu and Rubanda at the Bwindi Conservation Area head office in Buhoma. While handing over the cheques, Prof. Kamuntu noted the government's appreciation of the contribution of communities neighbouring protected areas in the conservation of wildlife in Uganda. He appealed to the communities and leaders to support efforts of fighting illegal activities in protected areas. Prof. Kamuntu said that the money disbursed under the revenue sharing scheme keeps on increasing because of the ever increasing number of tourists who visit the parks to track gorillas and urged them to work closely with the park management by ensuring that wrong elements do not infiltrate to parks so that visitor numbers keep on increasing. "The revenue share to the Districts will continue to increase, in response to the increasing number of tourists who come to our protected areas. The Minister appealed to everyone to play their role to ensure the parks and their surroundings do not get infiltrated by wrong elements that can cause insecurity".

The UWA Executive Director Sam Mwandha described the event as historic and in line with UWA's mission which emphasizes, among others, benefits to the community from wildlife conservation. The sum released was composed of 20% park entry fees and $10 per gorilla tracking permit sold in Bwindi Impenetrable National Park and Mgahinga Gorilla National Park. The money is used to improve the livelihoods of communities and alleviate poverty. The Executive Director indicated that the funds would be adequately monitored to ensure they are put to good use. Additionally, UWA will continue to improve tourism facilities in all conservation areas in order to offer visitors the best experience. The funds will finance a total of 76 projects: 17 in Kisoro, 24 in Rubanda and 35 projects in Kanungu. The disbursement will finance four community camp sites (In Bujengwe, Mpungu, Ruhija Sub County and Karangara) plus one community Resource Centre in Mukono Parish, Kayonza Sub County. Once completed, the community tourism camp sites will generate more revenue from the increasing tourism business to the community. This will be an additional benefit from Bwindi Impenetrable National Park besides several other benefits which the neighbouring community is already deriving from the park.

Source: UWA 2019

Community-based interventions could help to combat wildlife crime in Ugandan protected areas. Putting aside other potential benefits, such as poverty alleviation, community engagement has long been heralded by many as an important tool to protect wildlife. Regarding the effectiveness of law enforcement patrols, research finding show that many households near the protected areas are involved in wildlife crime, the largely protectionist policies pursued by UWA at both QEPA and MFPA appear to be having some effect. The latest aerial censuses of wildlife in both parks show increasing or stable populations of nearly all of the species surveyed (Wanyama et al. 2014a; Wanyama et al. 2014b). As with protected areas elsewhere, this apparent success of protectionist policies reduces the incentive for UWA to implement community-based interventions. A strong argument for community-based interventions is that a more balanced approach between community-based and law enforcement interventions can help to cut wildlife crime by helping to win local support for conservation.

Put in place measures for protection of genetic diversity cultivated plants and domesticated animals

Community seed banks range from a single farm family seed bank to a community level seed bank. They could deal with local landraces, introduced landraces or improved cultivars. CSBs are community driven and community-owned effort to conserve and use both local and improved varieties for food security and to improve the livelihoods of farmers (Otieno et al. 2017). A total of 15 farmer groups with seed banking initiatives; five located in south-western, three in northern, five in West Nile region and one from the eastern part of Uganda and one established in the Central region; were inventoried. The seed banks are managed by farmers themselves and are registered as Community based organizations (CBOs). Their operations are based on by-laws developed by beneficiary communities; hence trust and social capital form the core principles of their functioning and sustainability. The gene banks have management committees composed of the gene bank manager, records manager, distribution manager, quality assurance manager and community mobilizers. The management committees operate on a voluntary basis and are elected every two years. There is a lot of intraspecific and interspecific diversity of genetic resources for food and agriculture being held by the community groups ranging from 12 crops within a single CSB to 69 varieties of a single crop being held within a CSB.

Uganda's domestic animals are generally managed in situ with no gene banks. Indeed, as Kabi et al. (2015) observed cattle keepers have developed and maintained variations of indigenous cattle phenotypes and genotypes suited to their agro-ecological zones through traditional management practices and socio-cultural aspects. The Ankole (*Bos taurus indicus*), East African short-horn Zebu (*Bos indicus*) and their crossbred cattle constitute the main indigenous breeds, adding up to 93.3 percent of the Ugandan herd. With intensions to increase productivity, state policies encourage livestock farmers to upgrade local genotypes towards high yielding exotic dairy cattle. This if not appropriately planned is likely to result into loss of local genetic diversity, well endowed with resilience to local climatic conditions, endemic diseases and feed resource constraints. The challenge of protecting Uganda's domestic animal genetic diversity has not been adequately addressed even though NAGRC&DB had included domesticated animal genetic diversity in its strategic programmes (NAGR&DB 2019).

Institute and implement measures to stop further loss of natural habitats

With exception of National Parks and Wildlife Reserves measures to reduce further loss of natural habitats comprising tropical forest reserves, woodlands, grasslands and wetlands have generally been ineffective. Out of the six know habitats of biodiversity only two experienced an increase in land cover between 2010 and 2015. The two habitats that increased were forest plantations and grasslands. Forest plantations both broadleaved and conifers increased from 64,738 to 107,7723 ha, while grasslands

increased from 5.068 to 5.097 million ha. Conversely, tropical high forests, bushlands, and woodlands all reduced in area. The gains in grasslands observed between 2010 and 2015 were a continuation of the trends observed between 2005 and 2010 when the grasslands expanded by 1.0 million ha. At the same time, tropical high forests, bushlands, and woodlands the declining trends in 2010 to 2015 were a continuation of the decline from the previous five years. Even though, the conservation programmes may have had limitations in effectiveness the loss in land cover for the habitats was much less between 2010 and 2015 than between 2005 and 2010 (MWE 2016).

Improve management in terms of agricultural practices, and forests for biodiversity conservation and sustainable use

NBSAPII sought to improve sustainable agricultural practices, forestry and sustainable land use through adoption of sustainable practices in agriculture, implementation of REDD+ and sustainable land management. Land cover change statistics suggest that the practices may not be effective as the areas under small scale farmlands has continued to increase while crop productivity has declined. Indeed, commercial farmlands also increased at the expense of forest lands. Small sale farmlands increased from 9.77 to 10.24 million ha while commercial farmlands increased from 134,916 to 255,850 ha between 2010 and 2015. It is unlikely that sustainable land uses such as organic agriculture could have increased substantially given the rapid increase in small scale farmlands. Whereas farmlands expanded by 590,934 ha between 2010 and 2015, organic agriculture expanded by only 22,085 between 2014 and 2017. Therefore, whereas sustainable practice may have increased, it was likely outweighed by the continuation of sustainable small scale farmland expansion. On the other land, the rapid decline in natural forest cover of tropical high forests and woodlands as discussed in the section above indicates limited effectiveness of the measures and actions.

Monitor and support management of pollution levels and waste in vulnerable ecosystems

There has been an improvement in monitoring of effluent standards with the improved capacity at the Directorate of Water Resources Management. The capacity has been improved decentralization of water resources management functions to Water Management Zones (WMZs) as well as the development of catchment management plans. The sector performance reports have report an increased reporting on effluent standard compliance among facilities that applied. However, the increase of urban settlements and the increase in urban areas means a proliferation of cottage industries such as low cost breweries, abattoirs, other processing facilities and social institutions such as schools and housing estates whose effluent is not monitored (NEMA 2017). The impact of agrochemicals on pollinators has been monitored through academic studies conducted in the country. Recent research conducted by Amulen et al. (2017) showed that various traces of insecticides and fungicides in bees and bee products were found from three agro-ecological zones in Uganda (West-Nile, Mid-Northern, Eastern). The common chemical classes of insecticides detected included neonicotinoids, carbamates, tetrazines and diacylhydrazines. Almost all detected chemicals were found in the beeswax and in the samples derived from neighbouring citrus (Eastern) and tobacco (West-Nile) cropping systems, but the detected levels were below the minimum regulatory levels (MRL) set by the EU as well as the lethal acute doses for honeybees. The presence of neonicotinoids and systemic fungicides suggests that while MRLs are low, possible sub-lethal impacts of several substances may present a threat to honeybees in the region. Robust risk assessment of pesticides or chemical contaminants is need to improve understanding of the resilience of Ugandan honeybee genotypes in a contaminated environment. The management of solid wastes is a decentralized function for district local governments. There has been a reported improvement in the facilities for solid waste

management in the larger urban areas partly due to implement of the Municipal Solid Waste (MSW) in collaboration between NEMA and the World Bank (NEMA 2017). Increasingly, however, solid waste management is a successful business activity that has led to the creation of private solid waste collection and disposal companies in the leading urban areas across the country (NEMA 2017).

Put in place eradication and control measures for alien invasive species

In 2012, Uganda launches its National Invasive Species Strategy, Action Plan (NISSAP). The strategy was developed from lessons learned during the GEF-funded project, "Removing Barriers to Invasive Plant Management in Africa (RBIPMA). However, a consolidated invasive species programme has not developed. There are interventions undertaken principally by the National Agricultural Research Organisation, under the fisheries institute (NaFIRRI), and actions undertaken by UWA within the National Parks. Specifically, Lake Mburo and Queen Elizabeth National Parks. The threats identified in Murchison Falls National Park are generally integrated in the general management plan for the National Park. The efforts of NaFIRRI have been towards management of the Kariba weed (giant Salvinia, *Salvinia Molesta*) and the water hyacinth.

The Government intends to replicate the successful biological control followed by mechanical removal of water hyacinth that was effective in reducing the cover of hyacinth from 90% cover of the Lakes Victoria, Albert and Kyoga to about 20% between 1997 and 2017 to also control the Kariba weed. Ongoing efforts have included research activities that started in 2015 conducted by NARO including breeding a biological control beetles *Cytobagas salvinia*. After successful trial, NARO was multiplying the first half of 2019 before deploying the beetles into the lake in the second half of 2019 (NARO 2019).

Sustainable manage fisheries resources

The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) intensified enforcement of fisheries practice in the country. In May 2015, Under a Presidential Directive, the Government established a Fisheries Protection Force (FPF). The force was formed by President Museveni and constitutes personnel from the Uganda People's Defense Force (UPDF) Marine Unit and the Police. The FPF monitors and enforces fishing standards on lakes, including impounding fish captured illegally and arresting culprits. Between 2015 and 2018, MAAIF in partnership with other Government Agencies increased enforcement activities on the water bodies across the country. The result of the increased enforcement was the reversal in the declining trend of the quantity and value of fish and fish products. As a result of the increased enforcement on the water bodies, the country has started realizing an increase in the fish exports from 18,052 MT valued at USD 117.6 million in 2015 to 19,546 MT valued at USD 121.5 million in 2016 (MAAIF 2018).

The National Fisheries and Aquaculture policy (2018) was finalized. The Ministry will also table the Fisheries Bill (2018) which will streamline the roles of different fisheries enforcement agencies, standards and fishing requirements. Under aquaculture, MAAIF will rehabilitate and operationalize regional aquaculture parks and hand them over to the private sector though Public Private Partnerships; and, rehabilitate regional hatcheries to multiply fish seed for private sector. The National Fisheries and Aquaculture Policy (2018), and the Fisheries Bill (2018) address the challenges highlighted in the NBSAP II including; putting in place and implement control measures for the Water Hyacinth, and the congress weed, promoting sustainable aquaculture for local communities including women and men for socio-economic development, undertake SEA/EIA on policies, programmes or projects that are likely to have significantly negative impacts on aquatic biodiversity, developing and or implementing appropriate mitigation measures against habitat degradation of open water resources including by identifying and promoting alternative livelihood sources for women and men, promoting private sector investment and

participation in aquatic biodiversity conservation and support transboundary management of fisheries resources.

Promote sustainable harvesting of fish and invertebrate stocks

Since March 2015, the Government scale down the activities of Beach Management Units (BMUs). The BMUs were unable to effectively control illegal fishing practices on the lake. Initially when BMUs were introduced, the number of landing sites decreased from 597 in 2000 to 435 in 2008. However, since 2010, the number of landing sites increased. Fisheries surveys conducted in 2010 showed an increase to 503 landing sites, 2012 showed 555 with a slight increase to 567 in 2014 and a slight decrease to 556 in 2016 (MAAIF/DiFR 2018).

The overall percentage decrease in usage of legal mesh size (≥5 inch) was 65.3%. In the 2016 Frame survey most of the indicators of fishing effort increased. Total gillnets declined by 126.6%, Long lines decreased by 2.2% Traps decreased by 33.2%, Monofilament nets increased by 46.1%, Boat/Beach seines increased by 58.6%, Fishers increased by 4.4% and Fishing crafts increased by 4.1%. In the 2016 Frame survey, the number of fishers increased by 3.5%, the number of fishing crafts increased by 4.1%. Regarding major gears, Hook and Line (HL) increased by 39%, Longline (LL) decreased by 1.6% while Gill nets decreased by 63%. The trend between 2014 and 2016 was partly attributed to shift to use of monofilament which increased by 46% due to reduced Monitoring, control and surveillance (MCS) from 2015 following Presidential directive on enforcement (MAAIF/DiFR 2018).

Secondly it appears the Nile perch and tilapia fisheries which are in a state of depletion were not encouraging new investments into gill net fishing. The Mukene fishery was the only one where there was substantial expansion of effort indicated by a sharp increase of lift (Lampara) nets small seines by 1129.7% and scoop nets by 17.5% between 2014 and 2016. Expansion of the fishery is likely to have contributed to slight increase in number of fishers (4.4%) because this fishery is more labour intensive, engaging three to five person per boat, unlike the Nile perch and tilapia fisheries which normally engage two persons per boat (MAAIF/DiFR 2018).

Illegal beach/boat seines that target very small sizes of Nile perch were still encountered in the lake with continued increased between 2014 (1819) and 2016 by 1,913 or a 5.7% increase. Similarly, illegal monofilament gillnets were encountered and they increased 21793 to 31876 (by 46%) between 2014 and 2016. More dedicated efforts are required to eradicate these destructive gears from the lake.

Table 4.3: Effectiveness of measures and actions for strategic objective 3

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
National Target 3.1	Improve management effectiveness of Protected Areas	3.1.1 Develop and implement participatory PA management plans	Actively under implementation	Measure taken has been effective	Key informant discussions; literature review; document review
		3.1.2 Promote protected areas as core drivers for nature-based tourism development in the local economy	Actively under implementation	Measure taken has been effective	Key informant discussions; literature review; document review
		3.1.3 Establish/maintain viable wildlife/biodiversity corridors with respect to community safeguards	Planning stage or early implementation	Measure taken has been ineffective	Literature reviews
		3.1.4 Support gender-responsive alternative livelihood options for communities adjacent to PAs	Actively under implementation	Measure taken has been partially effective	Key informant discussions
		3.1.5 Identify and implement PA networks to conserve ecologically sensitive vegetation types, habitats, species and	Actively under implementation	Measure taken has been partially effective	Key informant discussions; document review

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
		genetic diversity			
		3.1.6 Mitigate human wildlife conflicts	Actively under implementation	Measure taken has been effective	Key informant discussions; document review
		3.1.7 Strengthen partnerships with adjacent communities to PAs for mutual benefits (Supporting REDD+)	Actively under implementation	Measure taken has been partially effective	Key informant discussions; document review
National Target 3.2	Implement climate change mitigation and adaptation for biodiversity conservation including disaster risk reduction from climate change impacts	3.2.1 Reduce deforestation and increase timber stocks countrywide to reduce pressure on current stocks, especially in natural forests	Actively under implementation	Measure taken has been partially effective	Key informant discussions; document review
		3.2.2 Develop guidelines and capacities for ensuring gender-responsive, equitable and transparent implementation of REDD+ in partnership with CSOs, including women's organizations	Actively under implementation	Measure taken has been partially effective	Key informant discussions; literature review
		3.2.3 Enhance carbon stocks and storage by mainstreaming climate change into the REDD+ strategy as well as in sector policies, plans and projects	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions; literature review
		3.2.4 Support afforestation, tree planting and re-forestation activities at all levels	Actively under implementation	Measure taken has been partially effective	Key informant discussions; literature review
		3.2.5 Promote and support restoration of degraded wetlands	Actively under implementation	Measure taken has been ineffective	Key informant discussions; literature review
		3.2.6 Enhance biodiversity and ecosystems' resilience to climate change especially in biodiversity hotspots	Actively under implementation	Measure taken has been partially effective	Literature review and key informant discussions
		3.2.7 Establish buffer zones for protection of critical conservation areas with high biodiversity within PAs	Planning stage or early implementation	Measure taken has been ineffective	Key informant discussions; document review
		3.2.8 Monitor and control bush burning in fire prone areas	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions; literature review
		3.2.9 Collect and store diverse gene pools, including through community and women-led seed banks as a basis of genetic adaptation to climate change and for enhancing food and nutritional security	Actively under implementation	Measure taken has been partially effective	Key informant interviews; document review
National Target 3.3	Identify and implement measures for protection of threatened and vulnerable species	3.3.1 Protect threatened, endemic and vulnerable species inside and outside protected areas	Actively under implementation	Measure taken has been partially effective	Key informant discussions
		3.3.2 Support ex-situ conservation of plant and animal resources	Actively under implementation	Measure taken has been partially effective	Key informant interviews; document review
		3.3.3 Engage local communities including women, men and youth in curbing destructive use of threatened plant species	Not yet started	Unknown	
		3.3.4 Effectively combat poaching and illegal wildlife trade and trafficking through strengthening law enforcement	Actively under implementation	Measure taken has been effective	Literature review and key informant discussions
		3.3.5 Strengthen the capacity of CITES Management Authority and CITES Competent Authorities	Actively under implementation	Measure taken has been effective	Key informant discussions
		3.3.6 Strengthen PA institutional capacity and coordination for effective monitoring of wildlife	Actively under implementation	Measure taken has been effective	Key informant discussions
National Target 3.4	Put in place measures for protection of genetic diversity cultivated plants and domesticated animals	3.4.1 Collect through local and gender-responsive approach information on availability of plant and animal germplasm	Actively under implementation	Measure taken has been effective	Key informant discussions
		3.4.2 Support national and local repositories for plant and animal genetic resources	Actively under implementation	Measure taken has been effective	Key informant discussions
		3.4.3 Identify, collect and conserve indigenous species and varieties	Actively under implementation	Measure taken has been effective	Key informant discussions
		3.4.4 Reintroduce germplasm of species extinct in the country	Actively under implementation	Measure taken has been effective	Key informant discussions
		3.4.5 Strengthen human and infrastructural capacity for genetic resources conservation and management	Actively under implementation	Measure taken has been effective	Key informant discussions

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
		3.4.6 Educate local farmers including women, men and youth on the importance of preserving genetic diversity	Actively under implementation	Measure taken has been effective	Key informant discussions
National Target 3.5	Institute and implement measures to stop further loss of natural habitats	3.5.1 Identify, map and prioritize degraded habitats including forests and wetlands	Actively under implementation	Measure taken has been partially effective	Literature review and key informant discussions
		3.5.2 Assess the rate of conversion of the degraded/ threatened habitats by human activities	Actively under implementation	Measure taken has been partially effective	Literature review and key informant discussions
		3.5.3 Estimate the productivity of the degraded/threatened habitats	Actively under implementation	Measure taken has been partially effective	Literature review and key informant discussions
		3.5.4 Estimate the proportion of land affected by desertification	Actively under implementation	Measure taken has been partially effective	Literature review and key informant discussions
		Promote awareness on regulations that protect fragile ecosystems	Actively under implementation	Measure taken has been partially effective	Literature review and key informant discussions
		3.5.6 Sensitize policy makers on drivers of habitat loss, and for support to reverse the rate of habitat loss	Actively under implementation	Measure taken has been partially effective	Literature review and key informant discussions
		3.5.7 Put in place species recovery plans for the degraded/ threatened habitats	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions and literature reviews
		3.5.8 Restore and safeguard ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being	Actively under implementation	Measure taken has been partially effective	Literature review and key informant discussions
		3.5.9 Develop mechanisms for fair and equitable sharing of costs and benefits of using wetlands	Actively under implementation	Measure taken has been partially effective	Literature review and key informant discussions
National Target 3.6	Improve management of agricultural practices, and forests for biodiversity conservation and sustainable use	3.6.1 Promote agricultural practices which minimize the negative impacts of agricultural production on biodiversity and ecosystem functioning	Actively under implementation	Measure taken has been ineffective	Key informant discussions
		3.6.2 Promote agro-forestry practices among local communities with particular focus on women and men farmers (supporting REDD+)	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions
		3.6.3 Strengthen tenure rights, including of women farmers to support sustainable land management (SLM) practices that conserve agro-biodiversity	Actively under implementation	Measure taken has been partially effective	Key informant discussions
		3.6.4 Promote sustainable management practices to support the conservation and sustainable use of biodiversity in forests	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions
		3.6.5 Support local communities including IPLCs, women and men to diversify their livelihoods through biodiversity friendly enterprises which ease pressure on the resource base	Actively under implementation	Measure taken has been partially effective	Key informant discussions
		3.6.6 Promote women's enterprises to enhance their participation and leadership in biodiversity conservation	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions
		3.6.7 Implement forest management planning that zones and protects timber production to meet demand whilst restocking for future needs (supporting REDD+)	Actively under implementation	Measure taken has been partially effective	Key informant discussions
		3.6.8 Improve forest timber harvesting and utilization technologies (supporting REDD+)	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussions
National Target 3.7	Monitor and support management of pollution levels and waste in	3.7.1 Monitor and enforce compliance to effluent standards requirements	Actively under implementation	Measure taken has been partially effective	Document review; Key informant discussions
		3.7.2 Monitor the impact of agrochemicals on selected pollinators	Planning stage or early implementation	Measure taken has been partially effective	Document review; Key informant discussions

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
	vulnerable ecosystems	3.7.3 Manage all forms of waste in an effective and efficient manner to reduce its negative impact on the environment, including through local-level waste management and recycling initiatives	Actively under implementation	Measure taken has been partially effective	Document review; Key informant discussions
National Target 3.8	Put in place eradication and control measures for alien invasive species	3.8.1 Develop and implement management plans to prevent the establishment and introduction of alien invasive species	Actively under implementation	Measure taken has been partially effective	Document review; Key informant discussions
		3.8.2 Eradication or control existing alien invasive species	Actively under implementation	Measure taken has been partially effective	Document review; Key informant discussions
National Target 3.9	Sustainable manage fisheries resources	3.9.1 Put in place effective control measures to manage fishing and alien fish species such as the Nile Perch *Salvinia molesta* including promoting awareness of existing regulations	Actively under implementation	Measure taken has been effective	Key informant interviews; review of literature on projects under implementation in NaFIRRI; and document review for MAAIF (DFR)
		3.9.2 Put in place and implement control measures for the Water Hyacinth, and the congress weed	Actively under implementation	Measure taken has been partially effective	Key informant interviews; review of literature on projects under implementation in NaFIRRI; and document review for MAAIF (DFR)
		3.9.3 Promote sustainable aquaculture for local communities including women and men for socio-economic development	Actively under implementation	Measure taken has been effective	Key informant interviews; review of literature on projects under implementation in NaFIRRI; and document review for MAAIF (DFR)
		3.9.4 Undertake SEA/EIA on policies, programmes or projects that are likely to have significantly negative impacts on aquatic biodiversity	Actively under implementation	Measure taken has been partially effective	Key informant interviews (NEMA, MAAIF staff); review of literature on projects under implementation in NaFIRRI; and document review for MAAIF (DFR);
		3.9.5 Develop and or implement appropriate mitigation measures against habitat degradation of open water resources including by identifying and promoting alternative livelihood sources for women and men	Actively under implementation	Measure taken has been partially effective	Key informant interviews (MAAIF staff); review of literature on projects under implementation in NaFIRRI
		3.9.6 Promote private sector investment and participation in aquatic biodiversity conservation	Actively under implementation	Measure taken has been partially effective	Key informant interviews (MAAIF staff); review of literature on projects under implementation in NaFIRRI
		3.9.7 Support transboundary management of fisheries resources	Actively under implementation	Measure taken has been effective	Key informant interviews (MAAIF, NaFIRRI and MWE staff); review of literature on projects under implementation in NaFIRRI
National Target 3.10	Promote sustainable harvesting of fish and invertebrate stocks	3.10.1 Strengthen community and resource use groups participation in fisheries management, including by identifying gender-differentiated roles across the sector	Actively under implementation	Measure taken has been partially effective	Key informant interviews (MAAIF staff); review of literature on projects under implementation in NaFIRRI
		3.10.2 Regulate and control importation and usage of fishing gears	Actively under implementation	Measure taken has been effective	Key informant interviews (MAAIF staff); review of Uganda Revenue Authority (URA) Customs reports
		3.10.3 Strengthen monitoring, control and surveillance fishing activities	Actively under implementation	Measure taken has been effective	Key informant interviews (MAAIF staff); review of literature on projects under implementation in NaFIRRI
		3.10.4 Develop and implement gender-responsive community fisheries management plans	Actively under implementation	Measure taken has been effective	Key informant interviews; review of literature on projects under implementation in NaFIRRI; and document review for MAAIF (DFR)
		3.10.5 Provide adequate support to Beach Management Units (BMU)	Actively under implementation	Measure taken has been partially effective	Key informant interviews (MAAIF staff).

4.1.4 Effectiveness of measures and actions to promote sustainable use and equitable sharing of cost and benefit of biodiversity

Introduce incentives for conservation and sustainable use of biodiversity

Develop economic instruments to encourage activities that enhance biodiversity conservation and discourages activities that impact negatively on biodiversity

The Government is implementing a series of policy and legislative reforms, as well as revisions of regulations to strengthen as well as introduce new instruments including economic instruments for biodiversity conservation. The National Environment Act (2018) has formally introduced biodiversity offsets as an instrument for managing residual impacts of development projects that undertaken Environmental and Social Impact Assessments (ESIA). Whereas, biodiversity offset implement was initiated as a best practice for the World Bank funded Bujagali Hydropower Plant (BHP), biodiversity offsetting took a foothold in managing residual impacts for protected areas, and there are plans to introduce offsets for wetlands as well (NEMA et al. 2019). Other reforms include revisions in EIA and introduce of Environmental Audit fees, and reforms in water resource management changes, among others. Ongoing review of the Wetlands Policy and the development of Wetland Bill (2019) will also spur development of new economic instruments to support biodiversity conservation.

An assessment of economic instruments for biodiversity management undertaken as part of the Biodiversity Finance Initiative (BIOFIN) found that economic instruments generally have not served their purpose of reducing negative impacts on biodiversity and promoting positive impacts on biodiversity. Forestry and wetland fees and charges at both national and sub-national level have not led to an improvement of the state of those resources. There are exceptions in tourism package fees and payments for ecosystem services where positive results have occurred. Tourism fees provide about 90% of the revenue for Uganda Wildlife Authority (UWA) and the major source of finance for management of Uganda's 10 National Parks, 12 wildlife reserves, five community wildlife management areas and 13 wildlife sanctuaries. Payments for ecosystem services are employed for agro-forestry practice in agricultural landscapes and for wetlands management under the Trees for Global Benefits (TGB) initiative of the Environmental Conservation Trust (ECOTRUST) of Uganda and Community Environment Conservation Funds (CECF) under the International Union for Conservation of Nature (IUCN). These models are being replicated forest landscape restoration and catchment management in the country (NEMA et al. 2017a).

Identify and support women groups to adopt more sustainable alternatives for household and income-generating activities to enhance livelihoods and biodiversity conservation

The National Environment Act 2018, provides for identifying and support women. Under Section 2, subsection 1 (b) on The principles of environment management referred to providing for equitable, gender responsive and sustainable use of the environment and natural resources, including cultural and natural heritage, for the benefit of both present and future generations. Examples of best practice exist for both the TGB initiative and the CECF initiatives. For example, TGB is a cooperative community carbon offset scheme developed to enable poverty reduction through effective management and protection of forestry ecosystems on which local people depend. TGB reduces unsustainable exploitation of forest resources and the decline of ecosystem quality, while diversifying and increasing incomes for rural farm families. This is most often achieved through Payments for Ecosystem Services (PES), decreasing unsustainable pressure on natural resources, reducing CO_2 emissions, and building community resiliency. Small-scale landholders in rural areas have been involved in tree planting activities since TGB's inception in 2002. TGB strives to have a positive social impact. Both men and women are given an opportunity to attend trainings, plant trees, and access carbon finance through TGB and program recruitment involves the entire household. Women who have purchased or inherited or been granted access to land by their spouses are

encouraged to plant trees and TGB has also put in place provisions for inheritance of the program by the spouse or children in case of death. One of the most successful carbon groups under TGB is Bitereko Women's Group in Bushenyi District, which mobilizes farming households, particularly women, to participate in the enterprise. Women lead 25% of TGB projects.

Introduce pro-poor environmental taxes and levies and market-based instruments

Whereas no new environmental taxes have been introduced in Uganda since 2015, the environmental levy represents a major fiscal tax reform in the country. The Environmental Levy was introduced under the Public Finance Management Act (2015). The tax imposes an environmental levy on motor vehicles. The Traffic and Road Safety (Amendment) Act 2018 introduced reforms with the imposition of a ban on the importation of motor vehicles which are 15 years old or more. The Act extended the age of cars exempted from environmental levy to eight years from the original five years. The environmental levy tax burden now shifts to older cars.

Promote and support Green Procurement through purchasing of environmentally preferable products or services, taking into consideration the necessity, not only for quality and price, but also for biodiversity conservation-conscious business

The Uganda Green Growth Development Strategy (UGGDS) was developed to support implementation of the green economy strategy espoused in the National Constitution (1995) and the Vision 2040 (Uganda's long-term development strategy). The pursuit of green procurement was adopted as one of the strategies for implementation of the strategy (GoU/NPA 2017).

There is no specific green procurement policy in Uganda. However, there are examples of regulatory and policy interventions that support green value chains. Some of these include; Income Tax Act exempts interest earned by a financial institution on a loan granted to any person for the purpose of forestry exempted from withholding tax; Value Added Tax (VAT) exemption for the supply of accommodation in tourist lodges and hotels outside Kampala City (MWE 2017). The UGGDS document efforts by Kasese District Local Government to adopt a green procurement policy for all wood related products purchased by the District Local Government (GoU/NPA 2017).

Undertake Environmental Impact Assessments (EIA) of all policies, programmes or projects which have the potential for negative—or positive—impacts on biodiversity

The National Environment Act (2018) was passed by the Parliament of Uganda and assented to by the President. The new law is a revision of the National Environment Act Cap 153. The new law consolidated all activities on environmental and social assessments under Part X of the Law. The law describes the purpose of environmental and social impact assessment, the responsibilities of project developer, projects for which project briefs are required, categorisation of projects for purposes of environmental and social impact assessment, environmental risk assessment, the mitigation hierarchy, biodiversity or other offset and compensation mechanisms, and decommissioning of projects. The increased focus on the mitigation hierarchy, management of residual impacts, compensation and decommissioning will strengthen the role of EIA and ESIA in managing potential negative impacts and enhancing positive impacts on biodiversity.

Integrate biodiversity accounting into national accounting and reporting processes

With the support of the United Nations Statistics Division (UNSD), the UN Environment World Conservation Monitoring Centre (UNEPWCMC), the World Bank, the United Nations Economic Commission for Africa (UNECA), UNREDD+ and the Government, Uganda has since 2015 been

implementing a series of Natural Capital Accounting (NCA) projects. The focus of the NCA revolves around land, forest, wetlands, tourism, soils and water accounts. The Initial Physical Land Accounts for Uganda are to be adopted by the National Accounts in the Uganda Bureau of Statistics (UBOS) in August 2019, while the forest accounts, wetland accounts, soils accounts, water accounts and tourism accounts are under development. The accounts are being developing using the System of Environmental Economic Accounting (SEEA) of the United Nations, and the accounts development is focused on the SEEA Central Framework for the land, water and forest accounts, as well as the SEEA Ecosystem Accounts for forests, wetlands, soils and tourism. The project activities are being implemented between 2018 and 2020 with the initial outputs approved by Government starting in August 2019 and new outputs are envisaged every six months.

A National Plan for Advancing Environmental Economic Accounting in Uganda was developed by the Government, under the auspices of the UBOS with support from UNSD and it is expected to be launched in November 2019 alongside a road map for NCA in the country.

Promote Public Private Partnership (PPP) for sustainable use of biodiversity

The focus of biodiversity conservation based value chain development as part of NBSAP II implementation in Uganda, for the period between 2014 and 2018, was the Shea Nut tree. Shea occurs in a belt of northern Uganda that covers, the Acholi, Lango, West Nile and Karamoja sub-regions (UBOS/UNHS 2012; NEMA 2017). Shea nuts fruits are pods that grow in shea trees and have wide use from vegetable oil, cosmetics (such as vaselines or deodorants), food additivities, and the fruit and shell can also be used for biomass energy or eaten fresh. Shea trees are generally naturally occurring within the landscape although they can also be propagated. The shea fruits are generally picked by women (80%) (Akullo 2017). A few owners of gardens with shea trees have the right to the trees while most of the trees occur on communal land. The shea markets remain traditional, concentrated in the shea producing areas, with low volumes of sales and high levels of domestic consumption. Shea products trade involves gathering of nuts, storage, processing of oil and marketing. The current value chain for shea is dependent on the high levels of consumption of the shea oil in the shea belt. The shea business is dominated by local producers and consumers. The same persons who gather nuts, process and sell the oil in the local markets found mainly in the shea zone. A relatively small market, less than 20%, exist outside the zone because limited awareness about the qualities of shea oil among communities outside the shea zone (Akullo 2017). Local market players comprise retailers, itinerant traders, wholesalers and business organizations. Other players include; Northern Uganda shea Processors' Association _NUSPA) in Lira, Guru Nanak Oil Mills in Lira and CREAM in West Nile.

Since 2015, with support from the Global Environment Facility (GEF) through UNDP, the Government through NEMA, the Uganda Export Promotions Board (UEPB) in the Ministry of Trade, Industry and Cooperatives (MITC) alongside NFA and UWA has been support upgrading of the shea value chain in the shea belt of Uganda. Government signed a memorandum of understanding (MOUs) with Achwa and Ngetta-Zonal Agricultural Research and Development Institutes (ZARDI), which part of NARO, to undertake shea nut tree propagation to scale up planting and production of shea in northern Uganda. NEMA with support from the Environment Protection Force (EPF) supported the districts of Napak, Nakapiriprit and Katakwi to fight the vice of rampant charcoal which has constrained preservation of tamarind and shea butter trees.206 These species have high demand due to their health benefits and if well maintained, the country's export earnings will significantly improve and further accelerate industrialization that will create jobs and improve household incomes. To support enhanced value

addition as well as market exposure and awareness beyond the shea belt, the project partners have supported exhibitions both locally and nationally, and some of the shea processors have been allocated space in international exhibitions promoted by the MITC and UEPB. There has been an introduction of technologies for small processors under producer groups, as well as construction of offices and units to house local processing facilities for farmer groups in the shea belt districts.

Promote synergies in the implementation of ITPGRFA, CBD and the Nagoya Protocol on ABS

In 2007, NEMA started implementing guidelines for accessing genetic resources and benefit sharing in the country in accordance with the National Environment (Access to Genetic Resources and Benefit Sharing) Regulations, 2005. The Guidelines is to provide for simple arrangements and procedures including measures for accessing biological and genetic resources of Uganda, their products and derivatives for scientific research, commercial and any other purposes connected therewith and to ensure equitable sharing of the benefits accruing therefrom in accordance with the National Environment (Access to Genetic Resources and Benefit Sharing) Regulations, 2005. Before one is given an Access Permit to access genetic resources in Uganda, the person intending to access the genetic resources must obtain a Prior Informed Consent (PIC) and an Accessory Agreement with the resource owners, enter into and sign a Material Transfer Agreement (MTA) with the Lead Agency responsible for management of the resources and carry out environmental impact assessment where found necessary.

Uganda recognises and protects the rights of local communities to benefit from their traditional knowledge and to receive compensation for any use of such knowledge. Holders of traditional knowledge have the right to ask for benefits from the knowledge and information have provided with respect to a genetic resource that a person would like to access. They have the right to extend or refuse their approval for such access (GOU/NEMA 2017).

Once a person has been given permission to access genetic resources in Uganda, the applicant is required to indicate whether the genetic resource/material is for export or whether it will be used within Uganda. Each time an applicant with a valid Access Permit wishes to export genetic material they have to obtain an Export Permit from the CITES Management Authority in the Ministry of Trade Industry and Cooperatives (MTIC). In addition to this, export of specimen of a species by the importing country requires the issuance of a Certificate of Origin by the exporting country. A monitoring system used by the lead agencies shall be applied to track and keep record on the genetic resources being accessed in Uganda as well as the extent of benefit sharing that has been achieved. This system will help in monitoring the effectiveness of implementing these guidelines. The mandate for this is with the UNCST in collaboration with NEMA.

The Government of Uganda through NEMA is in the process of developing a full size project on "Institutional capacity strengthening for implementation of the Nagoya protocol on Access to Genetic Resources and Benefit Sharing in Uganda." Therefore, existing mechanisms and international best practices will be harmonised with the capacity strengthening project.

Disseminate traditional knowledge information/ documents to enhance sustainable use of biodiversity (planning for food security and health care, i.e. medicinal plants)

The National Science, Technology and Innovation Plan (NSTP) 2012/2013 - 2017/2018 aims to provide a comprehensive framework for actualizing Uganda's Science, Technology and Innovation (STI) development aspirations that are enshrined in the National Science, Technology and Innovation Policy (2009). The NSTP will pursue 16 strategies as means of achieving the stated vision and goals for science and technology development and societal transformation. Strategy 9: Support basic and applied research

for enriching the STI information and enhancing both indigenous and imported technology. Traditional and indigenous knowledge systems play a critical role in the livelihoods of millions of people and are the basis for local based technological advancement. In addition to protecting intellectual property rights over traditional knowledge, there is a need to identify, document and preserve traditional knowledge of relevance to biodiversity and of importance to livelihoods (UNCST 2013).

The expected results are: Public awareness developed to promote and popularize these technologies within the communities using appropriate media. Community learning centres established by local governments, community bodies and/or non-governmental organizations, programs are some of the mechanisms through with these technologies will be disseminated.

UNCST has been supporting dissemination of indigenous knowledge by organizing events in recognition and support of the indigenous knowledge efforts in different parts of the country. In western Uganda, UNCST partnered with in partnership with Igongo Cultural Centre to showcase achievements from value addition to indigenous products such as, millet, milk, bananas. The show case and dissemination show demonstrated the significance of indigenous knowledge to the development of Uganda's culture and economy. Close to 30 exhibitors showcased at the event, UNCST supported Jena Herbals, Blessed Organic Release and Afri-Banana products (UNCST 2017). Indigenous knowledge is crucial in preserving language, culture and biodiversity of a given society. The open day for indigenous knowledge attract individuals and organisations whose innovations draw inspiration from culture, they included; food, clothing, medicine, crafts and music. This is the major source of employment for most communities in this region. Similar show case exhibitions for other regions are being planned.

Initiate and support community based PGR management initiatives in various parts of the country
Currently, one of the successes of implementation of ABS in Uganda are the community seed banks. Community seed banks in Uganda are still few, although the number of community seed banks and related initiatives has increased from only one in 2008 to four in 2017, with a fifth one to be established in early 2018. These community seed banks have been established thanks to technical and financial support from Diversity International through various projects in partnership with the National Agricultural Research Organization – Plant Genetic Resources Centre (NARO-PGRC) (Andersen et al. 2017). These community seed banks are linked to the national gene bank of Uganda, which has not only helped to restore lost local varieties by providing repatriation of germplasm from its ex-situ collections but has also provided back-up of community collections. The community seed banks have received training in the production of Quality Declared Seed (QDS) and are currently producing QDS of two varieties of beans. Annual seed fairs are held at the community seed-bank locations, and exchange of seeds and knowledge is encouraged between and among farmers. The community seed banks have also been used as learning platforms for training farmers in seed production, storage, preservation, community seed-bank management and conservation.

Domesticate the Nagoya Protocol on ABS, with particular consideration of social safeguards
Uganda has made progress with regard to the Nagoya Protocol. Accession to the protocol was achieved in June 2014. The country still relies on the National Environment (Access to Genetic Resources and Benefit Sharing) Regulations, 2005, and the guidelines for accessing genetic resources and benefit sharing in Uganda National Environment Management Authority Ministry of Water and Environment First Edition, June 2007 for regulation and implementation of ABS measures. There are plans for implementation of reforms as part of institutional capacity building on ABS and to align the ABS regulations and guidelines with the National Environment Act (2018). The institutional capacity building will also address the gaps for proposed actions on promoting and regulating bioprospecting and biotrade activities, which are partially covered by the Wildlife Act Cap 200 and the National Forestry and Tree

Planting Act (2003), as well as the National Environment Act (2018) and support to establish a functional Intellectual Property (IP) regime on ABS.

Table 4.4: Effectiveness of measures and actions for strategic objective 4

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
National Target 4.1	Introduce incentives for conservation and sustainable use of biodiversity	4.1.1 Develop economic instruments to encourage activities that enhance biodiversity conservation and discourages activities that impact negatively on biodiversity	Actively under implementation	Measure taken has been partially effective	Key informant interviews and document review (NEMA, IUCN, ECOTRUST, WWF Uganda, UWA)
		4.1.2 Identify and support women groups to adopt more sustainable alternatives for household and income-generating activities to enhance livelihoods and biodiversity conservation	Actively under implementation	Measure taken has been partially effective	Key informant interviews and document review (NEMA, IUCN, ECOTRUST, WWF Uganda, UWA)
		4.1.3 Introduce pro-poor environmental taxes and levies and market-based instruments	Planning stage or early implementation	Unknown	
		4.1.4 Promote and support Green Procurement through purchasing of environmentally preferable products or services, taking into consideration the necessity, not only for quality and price, but also for biodiversity conservation-conscious business	Planning stage or early implementation	Unknown	Key informant discussions (Natural Resources Office - Kasese District) and NPA staff
		4.1.5 Undertake Environmental Impact Assessments (EIA) of all policies, programmes or projects which have the potential for negative—or positive—impacts on biodiversity	Actively under implementation	Measure taken has been partially effective	Key informant interviews and document review (NEMA)
		4.1.6 Integrate biodiversity accounting into national accounting and reporting processes	Actively under implementation	Measure taken has been partially effective	Key informant interviews and document review (UBOS; NPA; NEMA; MWE; REDD+ Secretariat)
National Target 4.2	Promote Public Private Partnership (PPP) for sustainable use of biodiversity	4.2.1 Promote PPP to collect, harvest and process plant based products for commercialization	Actively under implementation	Measure taken has been effective	Key informant interview with CBD Focal Point Uganda and KCL Project Manager; UNBS, UWA, NFA, NEMA and private shea farmers and processors. document review
		4.2.2 Support value addition on plant based products for commercialization by local community groups	Actively under implementation	Measure taken has been effective	Key informant interview with CBD Focal Point Uganda and KCL Project Manager; document review
National Target 4.3	Promote synergies in the implementation of ITPGRFA, CBD and the Nagoya Protocol on ABS	4.3.1 Develop and implement mechanisms for sharing the benefits from access to PGR in the country	Actively under implementation	Measure taken has been effective	Key informant discussion
		4.3.2 Document traditional knowledge, innovations and practices in PGR	Actively under implementation	Measure taken has been effective	Key informant discussion
		4.3.3 Disseminate traditional knowledge information/ documents to enhance sustainable use of biodiversity (planning for food security and health care, i.e. medicinal plants)	Planning stage or early implementation	Measure taken has been partially effective	Key informant discussion (PGRC-NARO; and he Natural Chemotherapeutic Research Institute)
		4.3.4 Initiate and support community based PGR management initiatives in various parts of the country	Actively under implementation	Measure taken has been effective	Key informant discussion
National Target 4.4	Domesticate the Nagoya Protocol on ABS, with particular consideration of social safeguards	4.4.1 Accede to the Nagoya Protocol on ABS	Completed	Measure taken has been effective	Key informant interviews (CBD Focal Point Uganda)
		4.4.2 Review the ABS Regulations and incorporate relevant elements of the Nagoya Protocol	Actively under implementation	Measure taken has been effective	Key informant interviews (CBD Focal Point Uganda); and staff of UNCST
		4.4.3 Build capacity to enforce the Nagoya protocol on ABS	Planning stage or early implementation	Unknown	
		4.4.4 Promote and regulate bioprospecting and biotrade activities	Actively under implementation	Measure taken has been partially effective	Key informant interview with CBD Focal Point Uganda, staff of UWA, NFA. Document reviews
		4.4.5 Support the Establishment of a functional Intellectual Property (IP)	Planning stage or early implementation	Unknown	

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
		regime on ABS			

4.1.5 Effectiveness of measures and actions to enhance public awareness and education on biodiversity issues among the various stakeholders

The promotion of awareness of NBSAP II was conducted at several levels. The NBSAPII was integrated into the National Development Plan II, and this provided an entry point for the subsequent Uganda Green Growth Development Strategy (UGGDS) that recognized natural capital linking biodiversity and ecosystem services to the green economy strategy of Uganda. The Ministry of Water and Environment (MWE) through the Water and Environment Week, NEMA through the World Biodiversity and World Environment day and UNCST through National Biosafety Forums have produced IEC materials and expanded the plat form for discussions on NBSAP II. At the sub-national level, MWE and NEMA have operationalized regional offices that have also increased outreach to district local governments. Promotion of public hearings as part of public engagement on environment and social impact assessments (ESIA) has also enhanced the outreach to sensitize communities on biodiversity management considerations. The National State of Environment Report (2017) reported that lack of awareness and information was a contributory cause of natural resources degradation. The literature indicates that 11% of forest and wetland degradation can be attributed to ignorance amongst the population (UBOS, 2016). There seems to be an improved response from public engagement. In June 2019, the National Forestry Authority (NFA) indicated that while there has been an increase in forest cover from 1.95 to 2.022 million ha largely attribute to forest plantations on private lands and for leased land in central forest reserves, largely due to increased public campaigns on tree planting (Diisi 2019).

Since 2018, NEMA has partnered with IUCN to strengthen the gender-responsiveness of the biodiversity public awareness materials. There are no immediate results. However, programmes that have deliberately targeted gender-responsive measures including reforestation of agricultural landscapes under the Trees for Global Benefits (TGB) initiative and the CECF initiative showed an increased response of communities. The Kidepo Critical Landscape (KCL) project specifically targeted women in the message for shea tree restoration (Akullo 2017). The women are the major collectors and beneficiaries of conservation programmes for restoration of the shea and increased value addition and market structure improvement.

Develop and implement educational programs on biodiversity issues relevant to Uganda

MWE, NEMA and the civil society have continued to conduct school monitoring and documentation of environmental education practices in the Districts. Together, NEMA, MWE and civil society undertake the School Environmental Education Program (SEEP) through training of trainers (TOTs) in schools, and Education for Sustainable Development strategy (ESD) in Universities and Tertiary institutions. Additionally, NEMA conducted media education engagements on information and education campaign using the Newspaper in Education (NiE) platform with the New Vision newspaper (with the widest distribution in the country) where NEMA used the weekly NiE pull-out to disseminate environmental education messages targeting young readers in the range of 7 - 16 years. Similarly, NEMA engaged with Nation Television (NTV) and the Go Green Program which focuses on the new and emerging environmental concerns that need public attention, responsiveness and participation. Surveys conducted on the effectiveness on the public awareness programmes showed that 82% of respondents who represent the Uganda society are aware of the ban on polythene bags (kaveera); b) 31% are aware of the dangers of kaveera; c) 75% support the ban; d) 45% acknowledge and appreciate the role played by NEMA in the

operationalization of the ban through public education/awareness and enforcement; e) 91.7% are aware of the alternatives to kaveera such as paper bags, boxes, sack bags, craft bags, recycled material bags, among others; and, f) General recommendation is for the ban on kaveera to begin with the major supply points; manufacturers, wholesale and supermarkets (NEMA 2016, 2017).

Support equitable participation in regional and international cooperation programs on biological diversity

Only two out of the seven focal points under biodiversity related conventions are women and would immediately obtain both international national support to attend regional and international fora relevant to biodiversity. However, Uganda's focal points for biodiversity related agreements and conventions are spread across seven public institutions including government agencies such as NEMA, NFA, UWA, Universities (Makerere University) and ministries (the Ministry of Finance Planning and Economic Development – MFPED and MWE).

Mobilize support and financial resources at international level for biodiversity programs

Uganda has been active in supporting the developing biodiversity projects and programmes at national and sub-national level. Since 2014, Uganda has implemented several projects including the Biodiversity Finance Initiative (BIOFIN), the Connect project, the Rio Multilateral Environmental Agreements project, the Karamoja Critical Landscape (KCL), and Building Climate Resilience through wetland restoration project. There are four on-going projects implementing Natural Capital Accounting (NCA) in relation to biodiversity conservation. The projects have generally been implemented with financial support from GEF, the Government, UN Environment, UNDP, the World Bank, the European Union and the German Government, among others. There are many other proposals that are different stages of development. For example, the BIOFIN project proposed eight finance solutions which are in early stages of project development all aligned with the NBSAP II.

Table 4.5: Effectiveness of measures and actions for strategic objective 5

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
National Target 5.1	Promote awareness of NBSAPII among key stakeholders Policy makers, professionals, private sector, general public Develop stakeholder /public awareness programmes on biodiversity and its values	5.1.1 Undertake intensive awareness raising on the content of NBSAPII at all levels	Planning stage or early implementation	Measure taken has been partially effective	Key informant interview with CBD Focal Point Uganda, staff of UWA, NFA.
		5.1.2 Develop and disseminate user-friendly and gender-responsive Information Education and Communication materials (IECs) for popular campaigns targeting women as agents of change for conservation	Planning stage or early implementation	Measure taken has been partially effective	Key informant interview with CBD Focal Point Uganda, staff of UWA, NFA.
		5.1.3 Sensitize local communities including IPLCs on biodiversity conservation	Planning stage or early implementation	Measure taken has been partially effective	Key informant interview with CBD Focal Point Uganda, staff of UWA, NFA, Plant Genetic Research Centre; Natural Chemotherapeutic Research Institute (Ministry of Health)
		5.1.4 Develop and disseminate gender-responsive biodiversity public awareness materials	Planning stage or early implementation	Measure taken has been partially effective	Key informant interview with CBD Focal Point Uganda, staff of UWA, NFA.
National Target 5.2	Develop and implement educational programs on biodiversity issues relevant to Uganda	5.2.1 Develop and implement educational programs on biodiversity issues relevant to Uganda	Actively under implementation	Measure taken has been partially effective	Key informant interview with Ministry of Education and Sports (MoES), Uganda Wildlife Education Centre (UWEC), UWA and NEMA, NFA.
		5.2.2 Strengthen and/or establish environmental clubs or societies	Actively under implementation	Measure taken has been effective	Key informant interview with Ministry of Tourism Wildlife and Antiquities (MTWA), Uganda Tourism Board (UTB), Ministry of Education and Sports

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
					(MoES), UWEC, UWA, NEMA, NFA.
		5.2.3 Develop and disseminate gender responsive educational materials on biodiversity	Planning stage or early implementation	Measure taken has been partially effective	Key informant interview with NEMA and IUCN.
National Target 5.3	Support equitable participation in regional and international cooperation programs on biological diversity	5.3.1 Seek support to enable women and men personnel to attend regional and international fora relevant to biodiversity	Planning stage or early implementation	Measure taken has been effective	Key informant interview with CBD Focal Point and National Focal Points for biodiversity related protocols and conventions.
	Mobilize support and financial resources at international level for biodiversity programs	5.3.2 Develop proposals for supporting biodiversity conservation programs at national level	Actively under implementation	Measure taken has been effective	Key informant interview with CBD Focal Point and National Focal Points for biodiversity related protocols and conventions.

4.1.6 Effectiveness of measures and actions to harness modern biotechnology for socioeconomic development with adequate safety measures for human health and the environment

Communication, Education and Public Awareness (CEPA) strategy implemented for biotechnology and Biosafety

The actions proposed for achieving targets on CEPA are to; conduct a baseline study on level of public awareness and education on the benefits and risks of biotechnology and Biosafety, establish and operationalize Biosafety Clearing House (BCH), conduct specialized trainings in Biosafety for regulators and inspectors, conduct specialized biotechnology communication for media specialists, and conduct trainings in biotechnology and biosafety for women and men. A specific baseline on the level of public awareness and education on biotechnology and biosafety has not been conducted. Even though UNCST conducts surveys on innovations in the country including innovations on biotechnology. The BCH has not been established even though NEMA has been working on developing partnerships and financing for establishment of a BCH. Specialized training on biotechnology and biosafety has been conducted by the National Agriculture Research Organisation with support from the National Forestry Resources Research Institute (NaFORRI) and the National Agricultural Laboratories (NARL), Kawanda.

Since 2016, UNCST has organised an annual Biosafety Forum every February, as a platform for interaction among the various actors in biosafety and biotechnology. UNCST, the Competent Authority for Biosafety in Uganda adopted the concept of an annual Biosafety platform for the National Biosafety Committee (NBC), Institutional Biosafety Committees (IBCs), Policy Makers, Media, Civil Society and researchers involved in Gene Technology research. Participants convene to discuss scientific advances and biosafety regulation and their implications on Gene technology research developments in Uganda. The forum is also intended to keep the regulatory authorities abreast of new and emerging techniques in GM technology, discuss likely effects on the biosafety regulatory process and furthermore increase the knowledge and understanding of global scientific trends on GM technology

Since 2016, the Forum has managed to bring together over 160 participants who include members of Institutional Biosafety Committees, National Biosafety Committee members, principal investigators from academic and research institutions in Uganda, representatives of regulatory bodies, media practitioners, as well as experts in Biotechnology and Biosafety. The Forum is also an outreach for the media and public outreach. UNCST has also provided an opportunity for public engagement on biotechnology and

biosafety through participation in the National Agricultural Show in Jinja City eastern Uganda, in July of every year. At a regional level, UNCST also participates in the African Biennial Biosciences Communication Symposium 2019 (ABBC2019). The symposium brings together stakeholders with an interest in science to explore how to effectively communicate about genome editing. Additionally, it will interrogate the various regulatory options and implications for adoption and application of the genome editing technology. This year's symposium will be held in Pretoria, South Africa.

Support capacity building for biotechnology and Biosafety

Uganda has had effective capacity in biotechnology and biosafety since 2013. Baguma et al. (2013) indicated that Uganda had capacity of 24 PhD-level scientists, 50 MSc-level scientists, and more than 70 personnel with bachelor degrees or diploma certificate level training. Several physical structures exist and/or have been improved for genomics (4 labs), tissue culture (7 facilities) and plant transformation (2 labs), microbiology and immunology (>10 labs), biochemical assay, and contained and confined testing facilities that follow established testing guidelines (3 sites) (Zawedde et al. 2018). In 2003 when research and development of genetically engineered (GE) crops in Uganda was initiated, only one national agricultural biotechnology centre at Kawanda in central Uganda existed. The country has now approved 17 field experiments for GE plants, which were first established in 2006 with the planting of a banana confined field trial that evaluated performance of plants modified to express resistance to black sigatoka disease (Zawedde et al. 2018).

Uganda has made tremendous progress in developing human and infrastructural capacity for risk analysis, and biosafety management and enforcement. Currently, there are nine universities that offer biotechnology related courses within a wide scope of other biology-based disciplines. Makerere University, Kyambogo University, Uganda Christian University, and Bugema University in Central region, Busitema University, and Islamic University in Eastern Region, Gulu University in Northern region, and Bishop Stuart University and Mbarara University in Western region. Uganda has also strengthened its biosafety system through short-term training programs for its biosafety practitioners including NBC and IBC members and inspectors. The country has built more than 10 public biotechnology laboratories, hosted at various universities and research centres. These facilities are capable of conducting basic and advanced biotechnological applications including molecular screening, bioinformatics, plant transformation, tissue culture, and nutrition assays among others. NARO has the most advanced among facilities hosted at Kawanda and Namulonge. About six private agricultural biotechnology institutions are operational, specializing in micro-propagation of coffee, banana, sweet potato, pineapple and potato. There are currently two regulatory focused laboratories addressing GE food safety and GE testing. The existing human and infrastructural capacity can readily be drawn upon for risk analysis, enforcement and management (Zawedde et al. 2018).

The Genetic Engineering Regulatory Bill 2018 was passed by Parliament in November 2018 and the law was assented to by the president. The phase of undertaking widespread awareness on the benefits and risks associated with biotechnology under the new legislation and the biotechnology and biosafety policy is being developed for new programming in the FY 2019/20 period. As part of implementation of the new law, it expected that popular versions of the law and policy will be disseminated as well as the development of appropriate regulations and guidelines. The new regulatory structure will enhance the regulatory performance of the

National Biosafety Committee (NBC) and Institutional Biosafety Committees (IBC), and promote public-private partnerships (PPP) in biotechnology development.

Domesticate the Nagoya- Kuala Lumpur Supplementary Protocol on liability and redress

Whereas Uganda is a Party to the Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety to which it acceded in June 2014, there has been limited implementation of the protocol outside of the development of the Genetic Engineering Act (2018). In June 2017, the Parliamentary Committee on Science and Technology used the protocol to review the then National Biotechnology and Biosafety Bill. The Committee adopted the message that the protocol takes into account risks to human health by providing international rules and procedures in the field of liability and redress relating to Living Modified Organisms (LMOs).

The Committee supported improvements on the law that included amendments that would allow for the public to be consulted in decision making processes regarding GMOs, identification of GMOs for any person manufacturing or importing GMOs, and a criterial for refusal or granting approval of a GMOs that indicated the most recent peer reviewed information given an option to conduct the risk assessment and inclusion of explicitly stated socioeconomic considerations, including gender considerations. Other proposals added to the Bill were increase stringency on the high level of risk associated with development of GMOs and potential adverse effects to public health and the environment and liability extended to include compensation in case of harm and animal health which may have suffered due to the release of a GMO, controlling unfair competitive practices of seed companies which end up taking monopoly stakes in markets, and payment of royalties to communities that provide genetic material used in development of biotechnology..

Gender-responsive national and local stakeholder awareness creation campaigns on biosafety have not yet been held. However, Several Universities in Uganda already include biosafety in their long-term programmes. Short term courses are generally conducted by NARO, even short term awareness sessions on banana-tissue culture production are included in the Farm Clinic exhibitions conducted by the University at the Makerere University Agricultural Research Institute Kabanyolo (MUARIK). NEMA and UNCST are in the process of developing a capacity building project on the full implementation of the Nagoya Supplementary Protocol on Liability and Redress in Uganda

Support biotechnology applications and use for National development

By 2015, Uganda was one in only six other countries (Ghana, Kenya, Malawi, Nigeria, Uganda and Zimbabwe) that had begun confined and/or multi-location field trials. Animal health and livestock experts are using biotechnology discoveries to improve animal health and production. For example, in Uganda, recombinant vaccines have been developed for East Coast fever (theileriosis) and New Castle diseases. The bulk of biotechnology work in Uganda is conducted and led by institutions under the NARO. Uganda is one of the leading African countries in the testing of genetically modified crops under confined field trials. Approved CFTs include the drought-tolerant WEMA, cassava resistant to the mosaic disease and the cassava brown streak disease, bananas with engineered resistance to black sigatoka disease and Bt cotton with insect-resistant and herbicide-tolerant (‘roundup-ready’) genes. Trials are under way on a banana variety bio-fortified with vitamin A and iron (UNECA 2015). The School of Agricultural Sciences at Makerere University has a good biotechnology laboratory that has produced many protocols for banana-tissue culture production; the Department of Crop Science developed most of the protocols

used in tissue culture banana in the region. This technique has facilitated the production and quick multiplication of disease-free planting material. The use of clean planting material has increased by over 40% compared to the yield of most vegetatively propagated plants, like cassava, sweet potato, banana and so on. The school has also developed molecular diagnostic tools for a number of diseases, including the banana bacterial wilt, sweet potato viral disease, cassava brown streak and the passion fruit woodiness virus.

There is limited indication of ESIA or risk assessment on biotechnology plans, programmes and projects. However, the Regional Eastern and Central Africa Agricultural Transformation (ECAAT) Project developed an Environmental and Social Management Framework (ESMF) that also includes consideration for biotechnology and biosafety (NARO/MAAIF, 2018). The ESMF for ECAAT-P was prepared in accordance with applicable World Bank safeguard policies and Uganda environmental impact assessment guidelines, which involved data literature reviews; field reconnaissance studies, public consultations and discussions with relevant sector institutions.

Uganda's Genetic Engineering Act (2018) establishes a monitoring system for biotechnology use and applications based on the establishment of a National Biosafety Committee (NBC) and Institutional Biosafety Committees (IBCs). Uganda's NBC was established in 1996 Under Section 5 (e) of the Uganda National Council for Science and Technology Act (Cap 209). The NBC is one of several biosafety mechanisms that government has put in place to facilitate the testing and development of potentially useful genetically engineered organisms. The UNCST through the National Biosafety Committee (NBC) registers and permits confined field studies and ensures adherence to the guidelines and safety to humans and the environment.

Table 4.6: Effectiveness of measures and actions for strategic objective 6

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
National Target 6.1	CEPA strategy implemented for biotechnology and Biosafety	6.1.1Conduct a baseline study on level of public awareness and education on the benefits and risks of biotechnology and Biosafety	Actively under implementation	Measure taken has been partially effective	Literature review (NARO; UBIC); UNCST; NEMA.
		6.1.2 Establish and operationalize Biosafety Clearing House (BCH)	Planning stage or early implementation	Measure taken has been partially effective	Literature review (NARO; UBIC); UNCST; NEMA.
		6.1.3 Conduct specialized trainings in Biosafety for regulators and inspectors	Planning stage or early implementation	Measure taken has been partially effective	Literature review (NARO; UBIC); UNCST; NEMA.
		6.1.4 Conduct specialized biotechnology communication for media specialists	Planning stage or early implementation	Measure taken has been partially effective	Literature review (NARO; UBIC); UNCST; NEMA.
		6.1.5 Conduct trainings in biotechnology and biosafety for women and men	Planning stage or early implementation	Measure taken has been partially effective	Literature review (NARO; UBIC); UNCST; NEMA.
National Target 6.2	Support capacity building for biotechnology and Biosafety	6.2.1 Assess national capacities in biotechnology and Biosafety	Planning stage or early implementation	Measure taken has been partially effective	Literature review (NARO; UBIC); UNCST; NEMA.
		6.2.2 Support the development of skilled human resources for biotechnology and Biosafety	Actively under implementation	Measure taken has been partially effective	Literature review (NARO; UBIC); UNCST; NEMA.
		6.2.3 Promote infrastructural Development and Research on biotechnology and Biosafety.	Planning stage or early implementation	Measure taken has been partially effective	Literature review (NARO; UBIC); UNCST; NEMA.
		6.2.4 Develop and apply biotechnology tools for identification, characterization and conservation of biodiversity	Planning stage or early implementation	Measure taken has been partially effective	Literature review (NARO; UBIC); UNCST; NEMA.
National Target 6.3	Support the passing into law of the Biotechnology and Biosafety Bill 2012	6.3.1 Undertake widespread awareness on the benefits and risks associated with biotechnology	Planning stage or early implementation	Measure taken has been partially effective	
		6.3.2 Popularize the Biotechnology and Biosafety Policy	Planning stage or early implementation	Measure taken has been partially effective	

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
		6.3.3 Advocate for the approval of the National Biotechnology and Biosafety Bill to enable regulation of Biotechnology and Biosafety developments in the country.	Actively under implementation	Measure taken has been partially effective	
		6.3.4 Popularize the Biosafety and Biotechnology Policy and Bill/Act	Actively under implementation	Measure taken has been partially effective	
		6.3.5 Develop guidelines on compliance to biosafety	Not yet started		
		6.3.6 Enhance the regulatory performance of the National Biosafety Committee (NBC) and Institutional Biosafety Committees (IBC)	Not yet started		
		6.3.7 Promote public-private partnerships (PPP) in biotechnology development	Not yet started		
National Target 6.4	Domestic the Nagoya-Kuala Lumpur Supplementary Protocol on liability and redress	6.4.1 Organize and conduct gender-responsive national and local stakeholder awareness creation campaigns on biosafety	Not yet started		
		6.4.2 Support tertiary Institutions to run short courses on biosafety	Actively under implementation	Measure taken has been partially effective	Key informant interviews UNCST and NARO staff
		6.4.4 Support the full implementation of the Nagoya Supplementary Protocol on Liability and Redress	Actively under implementation	Measure taken has been partially effective	Key informant interviews with CBD Focal Point, UNCST and NARO staff
National Target 6.5	Support biotechnology applications and use for National development	6.5.1 Promote management oriented research and development in medical, agricultural land industrial biotechnology.	Planning stage or early implementation	Measure taken has been partially effective	Key informant interviews with CBD Focal Point, UNCST, UNCRI and NARO staff
		6.5.2 Undertake ESIA or risk assessments on biotechnology plans, programmes and projects	Not yet started		
		6.5.3 Establish a strong and effective monitoring system for biotechnology use and applications	Not yet started		

4.1.7 Effectiveness of measures and actions to promote innovative and sustainable financing mechanisms to support NBSAP implementation

Put in place measures for sustainable biodiversity financing

NEMA undertook a study to collect information which guided the development of guidelines for financing biodiversity in Uganda. The guidelines were developed as a follow up of the NBSAP II. The report was published and disseminated to stakeholders. The guidelines were used to support NEMA Budget Framework Papers for 2016/17. The guidelines were also used in the mid-term review of the NFA Strategic Plan 2013-2018. Between July 2016 and December 2018, NEMA and other NBSAP stakeholders implemented the BIOFIN project and the outcome of the project was a National Biodiversity Finance Plan (NBFP) (2019) which was published and disseminated in June 2019.

Mobilize financial resources for biodiversity conservation

Additional financing has been mobilized for biodiversity conservation in the country. The land mark financing was the Euro six million funding for biodiversity conservation enterprises in Uganda that is implemented by the East African Development Bank (EADB). The financing targets private sector investments in forestry, tourism and agriculture. Additional financing has been obtained for Natural Capital Accounting that is targeting public institutions under the leadership of the Ministry of Finance

Planning and Economic Development (MFPED) and the Uganda Bureau of Statistics. The funding was received from the World Bank, UNEP WCMC, UNECA, UNSD and the Government of Uganda.

NEMA has developed a partnership with IUCN to support capacity building for writing project proposals that are gender-responsive. There is increased advocacy through national compliance standards for all projects and programmes for inclusion of gender considerations in all projects implemented by public institutions. Failure to comply to gender standards leads to rejection of projects and programmes. The gender compliance certification is the main driver for gender equality endeavour in public programmes and projects.

Between 2014 and 2018, Uganda has continued to implement an increased number of projects funded through the Global Environment Facility (GEF), the Green Climate Fund (GCF), and those funded by the UN Environment, UNDP, and the World Bank under multilateral and bilateral funding targeting biodiversity conservation. Many of the projects have been written and developed in Uganda and/or in partnerships with international institutions. The projects also increasing promote synergies between the different multilateral Environmental Conventions.

The Biodiversity Finance Needs Assessment (FNA) for Uganda (NEMA et al. 2017 b) showed that approximately 1% of Uganda national budget goes for biodiversity conservation actions. A similar assessment was not conducted for NGOs and private sector. However, there has been an increase in public expenditure for biodiversity conservation. The funding increased from UGX 67.43 billion in 2009/10 to UGX 147.8 billion in 2014/15. The development of the FNA and the NBFP was in part aimed at encouraging regular reporting on biodiversity expenditures. A framework has been established that will allow for increased monitoring of biodiversity expenditure, and also to assess the effectiveness of expenditure on biodiversity management. Review of biodiversity expenditure has been proposed for the next strategic plan for NEMA.

Promote innovative financing mechanism

Uganda's National Environment Act (2018) acknowledges the need for enhancing the enabling framework for new biodiversity financing mechanisms. The legislation proposes additional economic instruments including biodiversity offsets, charge systems and payments for environmental services. The Government has no immediate plans for issuing environmental bonds although the current legislation would allow for issuing such bonds. Environmental bonds were considered during the development of Uganda's NBFP; however, they did not attract interest from the financial sector.

The Uganda Green Growth Development Strategy (UGGDS) provided an implementation platform for promote green production and purchase of green goods, promotion of green products and technologies and instituting appropriate pricing mechanisms for biodiversity goods and services. There has been increased efforts particularly by non-governmental organizations (NGOs) such as the World Wide Fund for Nature (WWF), IUCN, CARE, Environmental Alert and Advocates Coalition for Environment and Development (ACODE), among others to support sensitization and capacity development to companies about benefits from ecosystem services. NEMA, UWA, NFA and MWE have also promoted similar public outreach to increase financing drawn from private sector for biodiversity conservation. A marathon titled; "Run for Water and Environment: was organized by the MWE and it took place on the 18th of March 2018.

Table 4.7: Effectiveness of measures and actions for strategic objective 1

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
National Target 7.1	Put in place measures for sustainable biodiversity financing	7.1.1 Undertake a study to collect information which will guide in the development of guidelines for financing biodiversity in Uganda	Completed	Measure taken has been effective	Key informant interview with CBD Focal Point
		7.1.2 Develop and implement guidelines for financing biodiversity in Uganda	Completed	Measure taken has been effective	Key informant interview with CBD Focal Point
		7.1.3 Develop Biodiversity Finance Plan	Actively under implementation	Measure taken has been effective	Key informant interview with CBD Focal Point
National Target 7.2	Mobilize financial resources for biodiversity conservation	7.2.1 Identify and seek funding support from diverse sources including regional and bilateral development partners, foundations and private sector	Completed	Measure taken has been effective	Key informant interview with CBD Focal Point
		7.2.2 Support capacity building for writing project proposals that are gender-responsive	Planning stage or early implementation	Unknown	
		7.2.3 Develop project proposals to target designated donors under the CBD	Actively under implementation	Measure taken has been partially effective	Key informant interview with CBD Focal Point
		7.2.4 Mobilize resources by creating synergies between the different multilateral Environmental Conventions	Actively under implementation	Measure taken has been partially effective	Key informant interview with CBD Focal Point
		7.2.5 Budget for activities of biodiversity and incorporate in annual budget of Line ministries, NGOs, private sector	Planning stage or early implementation	Measure taken has been partially effective	Key informant interview with CBD Focal Point
		7.2.6 Promote accountability, transparency, gender mainstreaming in implementation of biodiversity projects	Planning stage or early implementation	Measure taken has been partially effective	Key informant interview with CBD Focal Point
National Target 7.3	Promote innovative financing mechanism	7.3.1 Put in place an enabling policy or legislative framework for new biodiversity financing mechanisms	Completed	Measure taken has been partially effective	Document Review and Key informant discussions with staff of NEMA, NFA, UWA
		7.3.2 Issue environment bonds	Not yet started	Unknown	
		7.3.3 Provide incentives that promote green production and purchase of green goods	Planning stage or early implementation	Measure taken has been partially effective	Document Review and Key informant discussions with staff of NEMA, NPA, UWA
		7.3.4 Institute appropriate pricing mechanisms for biodiversity goods and services	Planning stage or early implementation	Measure taken has been partially effective	Document Review and Key informant discussions with staff of NEMA, NPA, UWA
		7.3.5 Support green marathon	Actively under implementation	Measure taken has been effective	Key informant interview with NEMA and UWA staff
		7.3.6 Promote green products and technologies	Actively under implementation	Measure taken has been effective	Key informant interview with NEMA
		7.3.8 Support sensitization and capacity development to companies about benefits from ecosystem services	Actively under implementation	Measure taken has been effective	Key informant interview with NEMA
		7.3.9 Enhance payment for ecosystem services and biodiversity offsets	Actively under implementation	Measure taken has been effective	Key informant interview with NEMA

4.1.8 Effectiveness of biodiversity measures and actions for new and emerging issues

Support ecosystem conservation in oil rich regions of Uganda

As Uganda's closer to attaining oil and gas production comprehensive regulatory framework accompanying the legislation (the National Environment Act 2018, The Petroleum (Exploration, Development and Production) Act 2013; and The Petroleum (Refining, Conversion, Transmission and Midstream Storage) Act 2013 and the National oil and gas policy (2008) have been put in place. The regulations include; the Petroleum (Refining, Conversion, Transmission and Midstream Storage) (Health, Safety and Environment) Regulations, 2016, the Petroleum (Exploration, Development and Production) (Health, Safety and Environment) Regulations, 2016 and the Petroleum (Waste Management) Regulations, 2019 alongside five other regulations for production and development. The provisions in the

Petroleum (Waste Management) Regulations, 2019 include compliance with environmental principles, responsibility for petroleum waste management, financial security for petroleum waste handling, petroleum waste management hierarchy, use of good environmental management practices, waste management systems and petroleum management systems. The regulations also deal with; (i) handling, labelling and storage of petroleum wastes, (ii) transportation, treatment and disposal of petroleum waste; (iii) decommissioning of petroleum waste treatment facilities and handling of petroleum waste during decommissioning, (iv) records, reports and notifications, and (v) offences, penalties and administrative measures.

The National Environment (Oil spill prevention, control and management) regulation was developed under the National Environment Act Cap 153 and provisions for National Oil Spill Contingency Preparedness and Response were included in the National Environment Act (2018). The plan proposed in the law comprises section 92 (2) The Plan shall establish a national framework and command structure for planning, preparation and response to oil spills on land and water bodies in Uganda, and for the management of oil spills of a transboundary nature.

The National Environment Act 2018 strengthens environmental compliance for all petroleum exploration and development and extractive industries through Environmental and Social Impact Assessments (ESIAs) and Environmental Voluntary and Compliance Audits. Additionally, the law requires the development of Strategic Environment Assessments for all sectors to inform planning and subsequent decisions on the major risks to include in ESIAs and environmental audits. The requirement for environmental audits and additional compliance requirements took into considerations the limitations of the National Environment Act Cap 153.

Between 2009 and 2010 Uganda published its first sensitivity atlas for the Albertine Graben and 2013 conducted a SEA to establish the risk to biodiversity by ecosystems and species, and other environmental risks for the Albertine Graben Uganda's current oil production zone. The sensitivity atlas and the SEA were the basis for the subsequent input into the regulations on oil spill prevention, control and management, the oil spill response plan in the National Environment Act (2018), and the petroleum environment and safeguards regulations of 2016 and petroleum waste management regulations of 2019, among others. Instruments on payments for ecosystem services and biodiversity offsets have been introduced to enhance protection and restoration measures for contingency and for degraded ecosystems, threatened species and migratory routes in oil exploration and production regions. The Albertine Graben Sensitivity Atlas has not been updated even though there are ongoing efforts to update the General Management Plans of national parks and wildlife reserves, and water resources management plans to prevent, minimize and/or mitigate impacts from oil and gas development.

The Ministry of Energy and Mineral Development (MEMD), the Petroleum Authority of Uganda (PAU) and NEMA have maintained generally maintained a comprehensive awareness programme. The MEMD, PAU and NEMA provide regular press releases and maintain active social media and websites which provide regular information updates. All the major project developments in the Albertine Graben are subjected to public hearings and consensus from public hearings is included in the ESIAs and environmental management and mitigation plans as well as the biodiversity offset plans. Between 2017 and 2019, public hearings were held for the major developments on the oil refinery, the pipeline development, and the oil and gas development activities in Tilenga (northern part of the Albertine Graben) and King Fisher (middle section of the Albertine Graben) along the shore of Lake Albert.

Under the Oil for Development (OfD) project supported by the Norwegian Government, the Government of Uganda through NEMA, MEMD, the Ministry of Local Government (MoLG) and the MFPED, among

others has supported capacity building for District and Municipal local governments to have skills for effectively monitoring oil and gas activities. Through institutional reforms based on the Petroleum (Exploration, Development and Production) Act 2013, the Government established PAU whose roles also principle mission is to regulate and monitor the petroleum sector in order to create lasting value for society and contribute to Uganda being a sound investment destination. The responsibility includes enhancing institutional capacity and equipment for districts and municipalities to support he regulation and monitoring functions. The National Environment Act 2018 has also provided NEMA with mandate to support capacity building for districts and local governments to enhance their regulatory functions for environmental management including biodiversity conservation and management.

Whereas no biodiversity offsets trust fund has been established a comprehensive biodiversity offset strategy was proposed under the National Environment Act 2018. The biodiversity offset strategy was elaborated in the National Biodiversity Finance Plan (NBFP), and some agencies including the Uganda Wildlife Authority (UWA) and the National Forestry Authority (NFA) are in the final stages of developing guideline for biodiversity offsetting for protected areas. The UWA

The National Policy on Conservation and Sustainable Development of Wildlife Resources (2014) proposed that appropriate policies and guidelines for wildlife rescue, shipment, translocation and re-introduction are put in place and followed. Whereas comprehensive policies and guidelines are still in draft form, UWA in 2015 started conducting translocations of Giraffes within the Murchison Falls National Park (MFNP) from the less safe northern bank where oil explorations were ongoing to the safer southern bank. Giraffes have also been translocated from the MFNP to Lake Mburo National Park (20 Giraffe), Kidepo Valley National Park (15 Giraffe) and to the Uganda Wildlife Education Centre (2 Giraffe).

Promote sustainable use of biofuels in Uganda

The promotion of sustainable production and use of biofuels stalled between 2015 and 2018 due to the delayed tabling in parliament and passing of the law on biofuels. Whereas the Cabinet of the Government of Uganda in June 2015 passed the Biofuels Bill (2014), the Bill was not tabled on the floor of Parliament for discussion and passing as law. According to the Bill, Government's interest was to promote investment in the renewable energy generation and increase the life of the country's s fossil fuel (petroleum products) reserves has considerable interest in the development and promotion of biofuels. The Bill was based on the 2007 Renewable Energy policy, which provided for the blending of biofuels and fossil fuels. There were general challenges associated with technical feasibility of producing biofuels and engagement with private sector partners particularly in the oil and gas industry on technical feasibility of using biofuels to blend with petroleum in the country. The Government stalled the process to further explore the feasibility of biofuels (NEMA 2018).

The loss of moment on the biofuels legislation as stalled additional activities on; undertaking awareness at all levels on the positive and negative impacts of biofuels on biodiversity, developing a framework that promotes the positive and minimizes the negative impacts of biofuel production on biodiversity, putting in place measures to protect food and energy security of local communities including women and men when introducing biofuel crops, assessing and identifying areas suitable for biofuel production and areas inappropriate for biofuel production, ensuring that EIAs are conducted for all biofuel projects and programmes, promoting and supporting research programmes on biofuels, and promoting and supporting the use of environmentally-sound technologies which promote the positive and minimize the negative impacts of biofuel production on biodiversity.

Minimise the impact of natural disasters on biodiversity

Identification and implementation of risk management, mitigation and preparedness measures for biodiversity management was achieved and addressed in the National Environment Act (2018) Part VII – "Control of Pollution and Environmental Emergency Preparedness" under sections 77 to 94. NEMA is mandated as the principal agency in Uganda for regulating, monitoring, supervising and coordinating all activities relating to the environment (under section (2) The functions of the Authority subsection (m) to collaborate with lead agencies and support preparedness and response to environmental emergencies or disasters. Emergences may include, but are not limited to; landslides in hilly and mountainous areas and acute pollute in rivers, lakes, wetlands and on land, (c) if there are signs of difficulty by the system to regenerate vegetation cover. The overall responsibility for, Section (94), preparedness for environmental emergencies and disasters lies with the Office of the Prime Minister. Under Section (94) sub-section (1) the Office of the Prime Minister may, in consultation with NEMA, declare an incident, occurrence or event as an environmental emergency or disaster. Subsection (2) the Office of the Prime Minister shall, by regulations establish a coordination mechanism for national responses to environmental emergencies and disasters. Subsection (3) he coordination mechanism under subsection (1) shall include the participation of the following; (a) the Office of the Prime Minister, (b) the Authority, (c) the Uganda Peoples' Defence Forces (UPDF), (d) the Uganda Police Force, (e) the Fire Brigade Service, (f) organisations providing healthcare whether governmental or nongovernmental, and (g) any relevant lead agency or organisation.

Preparedness, Risk Reduction and Management Plan for protecting biodiversity

Uganda's National Policy for Disaster Preparedness and Management was developed by Government in 2010 (OPM 2010). The policy considered the natural hazards in Uganda to include: (i) drought, (ii) famine or food security, (iii) floods, (iv) landslides and mudslides, (v) human epidemics (these include cholera, meningitis, hepatitis E, Marburg, plague, and Ebola, sleeping sickness, diarrhoea dysentery and typhoid, diarrhoea dysentery and typhoid, massive chemical or/and alcoholic poisoning may also create a hazardous condition similar to epidemics. Modern epidemics include avian influenza, Ebola haemorrhagic fever and malaria. In some parts of Uganda, diseases like meningitis, cholera, HIV/AIDS and Ebola, plague and jiggers constitute hazards). (vi) crop and animal Epidemics (animal epidemics include swine fever, foot and mouth, Nangana, bird flu while crop diseases epidemics include coffee wilt, banana bacterial wilt, cassava mosaic, brown steak), (vii) pandemics (A pandemic is a worldwide epidemic of a disease) for example an influenza pandemic, (viii) heavy Storms, (ix) pests infestation and (x) earthquakes.

Among the human induced disasters, environmental degradation is the commonest. Environmental degradation largely results from poor land use patterns and other practices that lead to waste and destruction of ecological patterns. Environmental degradation is exemplified by overgrazing, destructive tilling practices on sloping landscapes, monoculture, unguided and uncontrolled use of fertilizers and pesticides, bush burning, overfishing, deforestation.

The policy actions for environmental degradation include; educate the communities on the nature and causes of environmental degradation, involve communities in environment protection, formulate strict laws against environmental degradation iv. develop programs for proper management of the environment, conduct environmental impact assessment. The responsible Institutions are; NEMA (Lead Institution), the Ministry of Water and Environment (MWE), Ministry of Energy and Mineral Development (MEMD),

the Ministry of Agriculture, Fisheries and Animal Industry and Fisheries (MAAIF), the Ministry of Local Governments (MoLG) and the NFA. Together with the OPM, the responsible actors are required to mainstream disaster preparedness, risk reduction and management plan in their strategic plans and annual work plans and budgets. In the case of NEMA, NFA, UWA and other agencies where conservation and protection of biodiversity is critical disaster preparedness, risk reduction and management plan is mainstreamed in key national, sectoral and districts planning frameworks and subjected to annual review by the OPM as the supervising agency for all Government ministries.

Improve disaster management systems, like early warning systems

The Office of the Prime Minister's Disaster Preparedness established an early warning systems in the five Districts prone to Landslides in Mt Elgon involving the use of Smart Phones, Mega-phones, Motorcycles and Bicycles, SMS and FM Radios. The system is considered effective. In 2018 alone,67 landslides are believed to have occurred in the Mt. Elgon sub-region; in Bududa, Manafwa, Namisindwa. Sironko and Bulambuli. Due to this increased risk awareness, out of the 67 landslides, 66 have not registered any fatalities. The one of 11th October 2018, occurred 10 kms inside the forest, where nobody lives, so the communities were not able to see the signals. The resultant massive flash floods and rocks in a fraction of one minute had dropped 7kms downstream (Parliament of Uganda 2018).

Since 2014, NEMA has pursued a policy of integrating participatory valuation and management of ecosystem services in all project decisions for environmental and social impact assessment. Not all ESIAs are able to undertake valuation and management of ecosystem services due to the limited capacity of environmental practitioners to undertake and/or support such valuation. In 2014 with the support of the United States Agency for International Development (USAID) under the Conservation Trust Fund (CSF) NEMA developed guidelines for economic assessment of environmental impacts and disseminated the guidelines with participatory training sessions for ministries, departments and agencies (MDAs) lead agencies on environmental management. Between 2015 and 2018, USAID through the Environment Management for the Oil Sector (EMOS) project implemented institutional capacity building for MDAs, universities, and environmental protections on among other areas ecosystem service valuation. Three ecosystem valuation studies were conducted for three protected areas; Murchison Falls National Park (MFNP), Semuliki National Park (SNP) and the Budongo Central Forest Reserve (BCFR). In the subsequent period, Uganda National Roads Authority (UNRA) was able to undertake ecosystem service valuation as part of the ESIAs for 10 road infrastructure projects. The same ecosystem service valuation was not sustained in the oil sector development projects. However, the National Environment Act (2018) seeks to ensure that ecosystem service valuation is integrated into ESIAs, and in the environmental management and monitoring plans (EMMP).

The MFPED Budget Monitoring and Accountability Unit (BMAU) conducted an assessment of Effectiveness of Disaster Management and Disaster Risk Reduction in Uganda (MFPED 2019). The assessment indicated that the Government through the Second National Development Plan (NDP II) prioritized reduction on the impact of natural disasters and emergencies through a number of interventions, including; coordinating the development and implementation of disaster mitigation and preparedness plans in all local governments (LGs), coordinating regular disaster vulnerability assessments at community level, hazard forecasting and dissemination of early warning messages, resettling landless communities and victims of disasters, and coordinating timely responses to disasters and emergencies.

The reality of the situation is that the Government had not made progress with a law to govern disaster risk reduction and management, the Contingency Fund that was proposed in the policy has not yet been operationalized, the Government is still spending the bulk of its resources on managing and responding to disaster as opposed to managing and reducing disaster risk, there is a lack of funding at local governments directed towards disaster management, preparedness and prevention. Therefore, for the most part District Contingency Plans have generally not been implemented.

The MFPED recommended that the draft Bill governing disaster risk reduction and management and expedite its tabling before parliament so that a specific Act of Parliament is enacted to operationalize the provision for a National law governing disaster risk reduction and management. Secondly, it was recommended that the OPM expedite the process of establishing a Disaster Preparedness and Management Commission to deal with both natural and manmade disasters as proposed in the National Constitution (Article 249). Thirdly, the MFPED and Parliament should operationalize the Contingency Fund. Provision to finance Uganda's Disaster response. In addition, the MFPED should allocate LGs a specific grant directed towards disaster and the MFPED should incorporating a disaster prevention component in all conditional grants transferred to LGs (MFPED 2019).

Table 4.8: Effectiveness of measures and actions for new and emerging issues

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
National Target 8.1	Support ecosystem conservation in oil rich regions of Uganda	8.1.1 Set up environmental standards to limit the production or discharge of harmful (hazardous) wastes or products in sensitive ecosystems	Actively under implementation	Measure taken has been effective	Key informant interview with NEMA
		8.1.2 Strengthen compliance to EIAs for all petroleum explorations and extractive industries	Actively under implementation	Measure taken has been effective	Key informant interview with NEMA
		8.1.3 Support protection and restoration measures for degraded ecosystems, threatened species and migratory routes in oil exploration and production regions	Actively under implementation	Measure taken has been partially effective	Document Review and Key informant discussions with staff of NEMA, NFA and UWA
		8.1.4 Routinely improve/update the Sensitivity Atlas for the Albertine Graben	Planning stage or early implementation	Measure taken has been effective	Document Review and Key informant discussions with staff of NEMA, PAU
		8.1.5 Support comprehensive awareness programmes and information flow regarding petroleum processes and biodiversity	Actively under implementation	Measure taken has been effective	Document Review and Key informant discussions with staff of NEMA, PAU
		8.1.6 Build the capacity and mobility of district and municipal environment officers (DEO/ MEO) to effectively monitor oil and gas activities	Actively under implementation	Measure taken has been partially effective	Document Review and Key informant discussions with staff of NEMA, PAU
		8.1.7 Set up a biodiversity offset trust fund to ensure no net loss biodiversity due to petroleum activities	Planning stage or early implementation	Measure taken has been partially effective	Document Review and Key informant discussions with staff of NEMA, Petroleum Authority of Uganda (PAU)
		8.1.8 Examine and implement opportunities for translocation of animals from sensitive areas where oil exploration is already taking place to other PAs	Planning stage or early implementation	Measure taken has been partially effective	Document Review and Key informant discussions with staff of NEMA, UWA
National Target 8.2	Promote sustainable use of biofuels in Uganda	8.2.1 Undertake awareness at all levels on the positive and negative impacts of biofuels on biodiversity	Planning stage or early implementation	Measure taken has been partially effective	Document Review and Key informant discussions with staff of NEMA, NFA and UWA
		8.2.2 Develop a framework that promotes the positive and minimizes the negative impacts of biofuel production on biodiversity	Planning stage or early implementation	Measure taken has been partially effective	Document review and key informant discussions with staff of NEMA, NFA and UWA
		8.2.3 Put in place measures to protect food and energy security of local communities including women and men when introducing biofuel crops	Planning stage or early implementation	Unknown	Document review and key informant discussions with staff of NEMA, PAU, MAAIF, District Local Governments
		8.2.4 Assess and identify areas suitable for biofuel production and areas inappropriate for biofuel production	Planning stage or early implementation	Unknown	Document review and key informant discussions with staff of NEMA, PAU, MAAIF, District Local Governments
		8.2.5 Ensure that EIAs are conducted for all biofuel projects and programmes	Planning stage or early implementation	Unknown	Document review and key informant discussions with staff of NEMA, PAU, MAAIF, District Local Governments
		8.2.6 Promote and support research programmes on biofuels	Planning stage or early implementation	Unknown	Document Review and Key informant discussions with staff of NEMA, PAU, MAAIF, District Local Governments
		8.2.7 Promote and support the use of environmentally-sound technologies which promote the positive and minimize	Planning stage or early implementation	Unknown	Document review and key informant discussions with staff of NEMA, PAU, MAAIF, District Local Governments

No of target	Strategy	Description of actions	Progress in implementing	Effectiveness of implementation	Methodology or approach to assessing progress
		the negative impacts of biofuel production on biodiversity			
National Target 8.3	Minimise the impact of natural disasters on biodiversity	8.3.1 Identify and implement risk management, mitigation and preparedness measures for biodiversity	Actively under implementation	Measure taken has been partially effective	Literature review and key informant discussions with NEMA, MWE and Office of the Prime Minister
		8.3.2 Preparedness, Risk Reduction and Management Plan for protecting biodiversity	Planning stage or early implementation	Measure taken has been partially effective	Literature review and key informant discussions with NEMA, MWE and Office of the Prime Minister
		8.3.3 Mainstream Disaster Preparedness, Risk Reduction and Management Plan in key national, sectoral and districts planning frameworks for protection of biodiversity	Planning stage or early implementation	Measure taken has been partially effective	Literature review and key informant discussions with NEMA, MWE and Office of the Prime Minister
		8.3.4 Improve disaster management systems, like early warning systems	Planning stage or early implementation	Measure taken has been partially effective	Literature review and key informant discussions with NEMA, MWE, OPM
		8.3.5 Support participatory valuation and management of ecosystem services	Planning stage or early implementation	Measure taken has been partially effective	Literature review and key informant discussions with NEMA, MWE, UBOS and NPA
		8.3.6 Strengthen the capacity of Disaster Reduction and Management Committees at all levels	Actively under implementation	Measure taken has been partially effective	Literature review and key informant discussions with NEMA, MWE and Office of the Prime Minister

4.2 Lessons learned

1. Decentralization of stakeholder coordination frameworks for biodiversity management has increased engagement of Districts in the implementation of biodiversity actions. This has led to regional strategies to address challenges such as the Shea butter tree strategy in northern Uganda and the District Ordinances restricting deforestation of woodlands for charcoal in northern, eastern and central Uganda, as well as wetland management as part of joint catchment management for districts in eastern, western and northern Uganda. The decentralized system has created pilot interventions that need to be replicated for all biodiversity management challenges and scaled up.

2. Effectiveness of research in strategic areas of research in biodiversity conservation and sustainable use, capacity building for information management and exchange in taxonomy and strengthen the role of indigenous peoples and local communities in biodiversity conservation and management is mixed. There are strong foundations for continued growth of biodiversity research particularly under the National Agricultural Research Systems (NARS), and strategic plans of MDAs. Generally, there are still concerns that the capacity for taxonomy in the country is declining with very few specialists emerging as the crop of old institutional taxonomists in public agencies head towards retirement. Even though ESIAs, crop research and academic programmes with taxonomy are increasing, very few products currently rely on taxonomy knowledge.

3. For indigenous communities, their role in decision in biodiversity management has generally been for both subsistence needs and possibility of financial return from markets. For example, shea belt communities have benefited from growth in the value chain, while Gum Arabica communities suffered as the market structure for the commodity failed. The emergence of high value alternative land uses of mining, oil and gas are threatening indigenous communities in the Karamoja and Albertine Graben regions. At an aggregate level, the effectiveness of measures has reduced even though the success of Shea belt activities offers promise for how other indigenous communities can be sustained. Implementation of biodiversity offsets for indigenous communities can also be worthwhile interventions in the face of exponential economic development pressure on ecosystems inhabited and/or serving indigenous communities. Indigenous communities in the south-western part of Uganda e.g. the Batwa have generally engaged with biodiversity conservation as long as their rights of access to ecosystem services are maintained. Increasingly, it has become the mandate of the conservation agencies particularly UWA, NFA and NEMA

(through ESIAs) to provide additional protection for communities. Programmes such as collaborative resource management, revenue sharing and lately biodiversity offsets are promoted to accommodate the additional considerations of indigenous communities. Nonetheless, there is a risk of oversight that may aggregate the challenges of disparate communities leading to uniform interventions, and/or limited integration especially since very few ESIAs, for instance, undertake comprehensive participatory ecosystem service valuation studies.

4. The strategy on improved management effectiveness of protected areas (PAs) is one of the best performing strategies. All the National Parks have General Management Plans (GMPs). The maintenance of effective wildlife corridor remains an important challenge that has not been addressed despite efforts undertaken by UWA, NFA and NEMA with support of UNDP, WCS and USAID through studies, ESIAs and public and policy engagement. Human wildlife conflict is managed through interventions such as wildlife use rights such as sport hunting, and incentives are used to minimize the impacts.

5. The climate change and biodiversity conservation strategy is implemented. Uganda's REDD+ Strategy was completed in 2018 and alongside the Forest Investment Plan (FIP) and Forest Landscape Restoration (FLR) financial and economic assessments for the Northern Moist and Karamoja landscapes. Uganda seeks to restore 2.5 million ha of forest estate of Uganda as part of the Bonn challenge.

6. The core measures for protection of threatened and vulnerable species are through law enforcement and community engagement largely through providing incentives to communities to support conservation through revenue sharing arrangements. Community-based interventions help to combat wildlife crime while also creating potential benefits, such as poverty alleviation, community engagement to protect wildlife. In situ community seed banks present the major form of genetic diversity protection of cultivated and animals.

7. With exception of National Parks and Wildlife Reserves measures to reduce further loss of natural habitats comprising tropical forest reserves, woodlands, grasslands and wetlands have generally been ineffective. Early results from the 2017 National Biomass Survey draft reports suggest that there might be a reversal in the performance of forest cover largely attributed to increased forest plantations.

8. There has been an improvement in monitoring of effluent standards with the improved capacity at the Directorate of Water Resources Management. The capacity has been improved decentralization of water resources management functions to Water Management Zones (WMZs) as well as the development of catchment management plans. Robust risk assessment of pesticides or chemical contaminants is need to improve understanding of the resilience of Ugandan ecosystem, and species including honeybee genotypes to a contaminated environment.

9. In 2012, Uganda launches its National Invasive Species Strategy, Action Plan (NISSAP). However, a consolidated invasive species programme has not developed.

10. The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) intensified enforcement of fisheries practice in the country. In May 2015, the Government established a Fisheries Protection Force (FPF). As a result of the increased enforcement on the water bodies, the country has started realizing an increase in the fish exports from 18,052 MT valued at USD 117.6 million in 2015 to 19,546 MT valued at USD 121.5 million in 2016 (MAAIF 2018). The National Fisheries and Aquaculture policy (2018) was finalized. The Ministry will also table the Fisheries Bill (2018) which will streamline the roles of different fisheries enforcement agencies, standards and fishing requirements. The National Fisheries and Aquaculture Policy (2018), and the Fisheries Bill (2018) address the challenges highlighted in the NBSAP II including; putting in place and implement control measures for the alien invasive species including invasive weeds, and promote sustainable aquaculture for local communities.

11. The Government is implementing a series of environmental economic instrument reforms. The National Environment Act (2018) introduced biodiversity offsets and payments for environmental services as part of environmental management and monitoring plans. The National Biodiversity Finance Plan (NBFP) provided initial feasibility assessment guidance on eight finance solutions.

12. The National Environment Act 2018 (Section 2, subsection 1 (b)) provides for equitable, gender responsive and sustainable use of the environment and natural resources, including cultural and natural heritage, for the benefit of both present and future generations. Examples of best practice such as the Trees for Global Benefits (TGB) under ECOTRUST combine improved livelihoods for households with women's leadership of agro-forestry smallholder agricultural landscapes and voluntary carbon payments for planting indigenous tree species.

13. The major environmental fiscal reforms undertaken between 2014 and 2018 were for the environmental levy introduced under the Public Finance Management Act (2015). The levy was reformed to strengthen, under the Traffic and Road Safety (Amendment) Act 2018, to penalize older more polluting vehicles imported in the country penalize importation. The Uganda Green Growth Development Strategy (UGGDS) provided for pursuit of green procurement but no specific green procurement policy exists in Uganda. However, the Income Tax (Amendment) Act (2018) exempts interest earned by a financial institution on a loan granted to any person for the purpose of forestry with specific exemptions on withholding tax while the Value Added Tax (VAT) exemption for the supply of accommodation in tourist lodges and hotels outside Kampala City.

14. The National Environment Act (2018) was passed by the Parliament of Uganda and assented to by the President. The new law is a revision of the National Environment Act Cap 153. The new law has an increased focus on the mitigation hierarchy, management of residual impacts, compensation and decommissioning will strengthen the role of EIA and ESIA in managing potential negative impacts and enhancing positive impacts on biodiversity.

15. Uganda is implementing several Natural Capital Accounting projects. The accounts under development include land, forest, wetlands, tourism, soils and water accounts. A National Plan for Advancing Environmental Economic Accounting in Uganda was developed by the Government, under the auspices of the UBOS with support from UNSD and it is expected to be launched in November 2019 alongside a road map for NCA in the country.

16. The focus of biodiversity conservation based value chain development as part of NBSAP II implementation in Uganda, for the period between 2014 and 2018, was the shea nut tree. Shea occurs in a belt of northern Uganda that covers, the Acholi, Lango, West Nile and Karamoja sub-regions. Government is supporting research to strengthen propagation of the shea nut tree, enforcement activities to conserve the shea, and national export market development.

17. Uganda recognizes and protects the rights of local communities to benefit from their traditional knowledge and to receive compensation for any use of such knowledge. Holders of traditional knowledge have the right to ask for benefits from the knowledge and information have provided with respect to a genetic resource that a person would like to access. They have the right to extend or refuse their approval for such access.

18. The National Science, Technology and Innovation Plan (NSTP) 2012/2013 - 2017/2018 aims to provide a comprehensive framework for actualizing Uganda's Science, Technology and Innovation (STI) development aspirations that are enshrined in the National Science, Technology and Innovation Policy (2009). UNCST has been supporting dissemination of indigenous knowledge by organizing events in

recognition and support of the indigenous knowledge efforts in different parts of the country. In western Uganda, UNCST partnered with in partnership with Igongo Cultural Centre to showcase achievements from value addition to indigenous products such as, millet, milk, bananas.

19. Currently, one of the successes of implementation of ABS in Uganda are the community seed banks. Community seed banks in Uganda are still few, although the number of community seed banks and related initiatives has increased from only one in 2008 to four in 2017, with a fifth one to be established in early 2018.

20. The promotion of awareness of NBSAP II was conducted at several levels. The NBSAPII was integrated into the National Development Plan II, the Ministry of Water and Environment (MWE) through the Water and Environment Week, NEMA through the World Biodiversity and World Environment day and UNCST through National Biosafety Forums, Information, Education and Communication (IEC) materials have produced.

21. Since 2014, Uganda has implemented several projects including the Biodiversity Finance Initiative (BIOFIN), the Connect project, the Rio Multilateral Environmental Agreements project, the Karamoja Critical Landscape (KCL), and Building Climate Resilience through wetland restoration project. There are four on-going projects implementing Natural Capital Accounting (NCA) in relation to biodiversity conservation. The projects have generally been implemented with financial support from GEF, the Government, UN Environment, UNDP, the World Bank, the European Union and the German Government, among others. There are many other proposals that are different stages of development. For example, the BIOFIN project proposed eight finance solutions which are in early stages of project development all aligned with the NBSAP II.

22. Since 2016, UNCST has organised four annual Biosafety Forum every February, as a platform for interaction among the various actors in biosafety and biotechnology. Public invited participants convene to discuss scientific advances and biosafety regulation and their implications on Gene technology research developments in Uganda. In the last two years the participants to the forum average 160 people and they included members of Institutional Biosafety Committees, National Biosafety Committee members, principal investigators from academic and research institutions in Uganda, representatives of regulatory bodies, media practitioners and experts in Biotechnology and Biosafety. UNCST conducts annual public engagement on biotechnology and biosafety at the National Agricultural Show in Jinja City eastern Uganda, in July of every year.

23. Uganda has fairly good base of capacity which to build and enhance biotechnology and Biosafety in the country. There are 24 PhD-level scientists, 50 MSc-level scientists, and more than 70 personnel with bachelor degrees or diploma certificate level training. Several physical structures exist and/or have been improved for genomics (4 labs), tissue culture (7 facilities) and plant transformation (2 labs), microbiology and immunology (>10 labs), biochemical assay, and contained and confined testing facilities that follow established testing guidelines (3 sites). Nine universities that offer biotechnology related courses within a wide scope of other biology-based disciplines.

24. The Genetic Engineering Regulatory Bill 2018 was passed by Parliament in November 2018 and the law was assented to by the president. The phase of undertaking widespread awareness on the benefits and risks associated with biotechnology under the new legislation and the biotechnology and biosafety policy is being developed for new programming in the FY 2019/20 period.

25. Whereas Uganda is a Party to the Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety to which it acceded in June 2014, there has been limited implementation of the protocol outside of the development of the Genetic Engineering Act (2018). The

June 2017 Parliamentary Committee review of the then National Biotechnology and Biosafety Bill (2012) highlighted considerable effort in highlighting biosafety considerations. The Committee adopted the message that the protocol takes into account risks to human health by providing international rules and procedures in the field of liability and redress relating to Living Modified Organisms (LMOs). Gender-responsive national and local stakeholder awareness creation campaigns on biosafety have not yet been held.

26. By 2015, Uganda was one in only six other countries in Africa that had begun confined and/or multi-location field trials. Animal health and livestock experts are using biotechnology discoveries to improve animal health and production. The bulk of biotechnology work in Uganda is conducted and led by institutions under the NARO. The Regional Eastern and Central Africa Agricultural Transformation (ECAAT) Project developed an Environmental and Social Management Framework (ESMF) that also includes consideration for biotechnology and biosafety.

27. Uganda's Genetic Engineering Act (2018) establishes a monitoring system for biotechnology use and applications based on the establishment of a National Biosafety Committee (NBC) and Institutional Biosafety Committees (IBCs). Uganda's NBC was first established in 1996 Under Section 5 (e) of the Uganda National Council for Science and Technology Act (Cap 209). However, the mandate at the time had a narrow scope on biotechnology and biosafety.

28. NEMA undertook a study to collect information which guided the development of guidelines for financing biodiversity in Uganda, and later developed a National Biodiversity Finance Plan (NBFP) which was published and disseminated in June 2019.

29. Additional financing has been mobilized came from bilateral and multilateral development partners such as KfW of the Germany government. Between 2014 and 2018, Uganda continued to implement an increased projects funded through the Global Environment Facility (GEF), the Green Climate Fund (GCF), funded by the UN Environment, UNDP, and the World Bank. The Biodiversity Finance Needs Assessment (FNA) for Uganda (NEMA et al. 2017 b) showed that approximately 1% of Uganda national budget goes for biodiversity conservation actions. Innovative financing solutions were documented throughout the BIOFIN project and were also included in the UGGDS.

30. As Uganda's closer to attaining oil and gas production comprehensive regulatory framework accompanying the legislation has been put in place. For example, the provisions in the Petroleum (Waste Management) Regulations, 2019 include compliance with environmental principles, responsibility for petroleum waste management, financial security for petroleum waste handling, petroleum waste management hierarchy, use of good environmental management practices, waste management systems and petroleum management systems. The National Environment (Oil spill prevention, control and management) regulation was developed under the National Environment Act Cap 153 and adapted into National Environment Act (2018).
31. Between 2009 and 2010 Uganda published its first sensitivity atlas for the Albertine Graben and 2013 conducted a SEA to establish the risk to biodiversity by ecosystems and species, and other environmental risks for the Albertine Graben Uganda's current oil production zone. The Albertine Graben Sensitivity Atlas has not been updated even though there are ongoing efforts to update the General Management Plans of national parks and wildlife reserves, and water resources management plans to prevent, minimize and/or mitigate impacts from oil and gas development.

32. Whereas no biodiversity offsets trust fund a biodiversity offset strategy was elaborated in the NBFP, and some agencies including the Uganda Wildlife Authority (UWA) and the National Forestry Authority (NFA) are in the final stages of developing guideline for biodiversity offsetting for protected areas. The UWA

33. The promotion of sustainable production and use of biofuels stalled between 2015 and 2018 due to the delayed tabling in parliament and passing of the law on biofuels. Whereas the Cabinet of the Government of Uganda in June 2015 passed the Biofuels Bill (2014), the Bill was not tabled on the floor of Parliament for discussion and passing as law. The government postponed tabling of the bill.

34. The MFPED Budget Monitoring and Accountability Unit (BMAU) conducted an assessment of Effectiveness of Disaster Management and Disaster Risk Reduction in Uganda (MFPED 2019). The assessment indicated that the Government has not made progress with a law to govern disaster risk reduction and management, the Contingency Fund that was proposed in the policy has not yet been operationalized, the Government is still spending the bulk of its resources on managing and responding to disaster as opposed to managing and reducing disaster risk, there is a lack of funding at local governments directed towards disaster management, preparedness and prevention. Therefore, for the most part District Contingency Plans have generally not been implemented.

4.3 Obstacles and capacity needs, including Technical, scientific and capacity needs for implementation support

The obstacles and capacity needs including technical, scientific and other capacity needs are included in the Table 4.9. The synthesis was developed in a concise descriptive and comprehensive manner to guide implementation of the NBSAP II.

Table 4.9: Synthesis of obstacles, needs including technical and scientific capacity needs.

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
1.1	1.1.1 Strengthen the capacity of the biodiversity coordination mechanism	A Monitoring and Evaluation Framework has not been developed. The reporting on biodiversity targets have to be integrated in annual and medium term strategic plans. Where changes are made, the feedback is not clear cut	A clear M&E strategy and a means of verification and reporting under a unified structure.	There are multiple sectors coordinated different and sometimes the working synergies of the focal persons are not reflected at the sectoral reporting mandates and/or priorities.
	1.1.2 Develop an integrated biodiversity management policy framework	Biodiversity related policies are disjointed	Coordination of implementation effort and indicators	
	1.1.3 Map relevant stakeholders (women and men) at different levels, and establish/reinforce networks and task forces, including especially on gender and women's empowerment	Limited stakeholders have been identified and engaged.	Low functionality and/or absence of local institutions charged with biodiversity management	Interventions of NGOs/CSOs; Assessments (baselines and progress/monitoring reports) on gender and biodiversity management in Uganda
	1.1.4 Develop a gender responsive guidelines for implementing NBSAPII	No guidelines	Guidelines on mainstreaming Gender in biodiversity management; Training extension staff and TOTs to support integration of gender issues in all biodiversity projects and related extension services.	Best practices available locally and internationally, and lessons that can be adopted.
	1.1.5 Develop and implement a gender responsive NBSAPII Monitoring and Evaluation strategy with SMART indicators	Limited consultations undertaken, strategy draft not published or disseminated; implementation arrangements not costed and/or included in work plans and financing strategies	Stakeholder consultations at a wide scale; development of a financing plan for strategy.	Existing biodiversity related M&E strategies of NBSAPII stakeholders
	1.1.6 Undertake Monitoring and Evaluation of the implementation of NBSAPII	There is no M&E Strategy.	Need to refine and adopt/domestic indicators across all implementing partners.	Current work plans and medium to long-term strategies of NBSAPII implementing agencies. Technical and Allocative efficiency analyses

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
				on indicators to assess implementation of NBSAP II
1.2	1.2.1 Develop sector research priorities in biodiversity	Biodiversity conservation and management is not a core priority research agenda for many sectors e.g. water and environment, agriculture, energy and mineral development.	Guidelines on integrating biodiversity into research undertakings for different sectors	Baselines of current research related to biodiversity management. Establish knowledge, information and technology gap for which research is needed.
	1.2.2 Ensure that Uganda benefits from international cooperation and opportunities for information exchange and support in the field of biodiversity at the local, national, regional and international levels	Level of international cooperation in biodiversity information exchange and support is low	Strengthen performance of the CHM; strengthening and coordination of databases with biodiversity related information and data. Strengthen analysis and dissemination of information on biodiversity	Baseline of databases with biodiversity related information and data. Current information, analysis and reporting systems based on databases biodiversity databases.
	1.2.3 Conduct awareness raising on the role of taxonomy in biodiversity conservation in public and private institutions	There is limited focus on taxonomy in academic curricula, and human resource development for public and non-public institutions	Document and archive available taxonomic information for future learning. Dissemination of information on the capacity gap on taxonomy among partners. Supporting academic and research institutions to maintain taxonomists.	Gaps of human resource in taxonomy. Gaps in available funds for maintain taxonomists. Technical/allocative efficiency of maintaining taxonomists.
	1.2.4 Create awareness on the application of taxonomic information in many production sectors of the country such as agriculture, trade, health, development and regulatory agencies as well as local communities	Limited use of taxonomic information by production sectors	Description of importance of taxonomy to production sectors; Building up adequate human resource of taxonomists to support production sectors	Gaps of human resource in taxonomy. Gaps in available funds for maintain taxonomists. Technical/allocative efficiency of maintaining taxonomists.
1.3	1.3.1 Support institutions with taxonomic data and information (through funding, increased personnel or better infrastructure) to make this information easily available to end -users	Presently there is limited sharing of taxonomic data and information among institutions	Document and archive available taxonomic information for future learning. Dissemination of information on the capacity gap on taxonomy among partners. Incentives to maintain human resources and databases for taxonomic information	Business for maintaining archives, databases and human resources for taxonomy
	1.3.2 Support and train women, including women's indigenous groups and women's organizations, on taxonomy, taxonomic data, information	Limited number of women taxonomists, and contribution of indigenous groups and women's organisations to collation of taxonomic information	Guidance on collation of taxonomic information at local levels. Enhance of capacity of indigenous groups and women's organisations to collation of taxonomic information	Baseline and status of involvement of indigenous groups and women's organisations in the collation of taxonomic information
2.1	2.1.1 Develop taxonomic knowledge bases of biodiversity in formats that are accessible to women and men and other end users	Simple taxonomic knowledge bases are not widely available	Simplified version (including local translation) of guides for dissemination of taxonomy information and collation of data	Local/traditional information/ databased on taxonomy
	2.1.2 Improve taxonomic infrastructure and tools to provide adequate taxonomic information	Outdated and inadequate taxonomic infrastructure and tools in relevant institutions	Introduce state of art practice, databases, archiving systems, and data sharing platforms	Best practices available locally and internationally, and lessons that can be adopted.
	2.1.3 Establish Centre(s) of Taxonomic excellence	No designated centres of taxonomic excellence	National policies/guidelines on Taxonomy, databases and archiving systems.	Establish current status of taxonomy, archives and databases. Baseline on coordination and data sharing.

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
	2.1.4 Undertake human resource capacity development in taxonomy at all levels and retain taxonomists with job descriptions in their institutions	There few institutions retaining and/or developing qualified and experienced human resource in taxonomy. There are concerns that current human resource capacity may be lost and/or knowledge not passed on	Develop human resource at academic level, and mentoring programmes in research and biodiversity management institutions	Current human resources and gap to be filled. Business case for development in taxonomy among institutions
	2.1.5 Provide incentives/employment opportunities to women and men graduates with taxonomic backgrounds to retain them e.g. prioritizing taxonomy in Environmental Impact Assessments (EIA)	There are very few job opportunities for taxonomist in the country	Feasibility/viability of increasing human resource of taxonomists to biodiversity related sectors	Opportunities and the benefit of employing more taxonomists
	2.1.6 Develop access and benefit sharing arrangements with indigenous peoples and local communities, with respect to intellectual property rights	Licensing institutions have not adequately considered the rights of access and benefit sharing of indigenous peoples and local communities	Awareness creation among licensing institutions; policies and regulations to protect rights of IPLCs; and monitoring, evaluation and reinforcement of rights to access and benefit sharing for IPLCs	Current status of access and benefit sharing arrangements for IPLCs. Scale of opportunities for access and benefit sharing.
	2.1.7 Establish/maintain viable wildlife/biodiversity corridors with respect to community safeguards	The land tenure systems in areas that serve as protected area corridors belong to people; There are many development activities taking place in these areas; the opportunity costs for maintaining protected area corridors is high due to current land use, population density	Strategic planning that caters for opportunity cost of current land owners; design incentives where communities can benefit from having protected area corridors; management plans for ecosystems that serve as protected area corridors	Feasibility and spatial assessment to define the optimal protected area corridors
2.2	2.2.1 Enhance carbon stocks and storage by mainstreaming climate change into the REDD+ strategy as well as in sector policies, plans and projects	There is limited mainstreaming of REDD+ in sector plans and policies with respect to biodiversity and ecosystem protection	Implementation of REDD+ strategy across other sectors	The scale of opportunity/incentive of implementing REDD+; the specific cost/resource requirements
	2.2.2 Establish buffer zones for protection of critical conservation areas with high biodiversity within Pas	There are already existing land uses in buffer zones; there is a need to demonstrate to stakeholders the trade-off versus other land use	The lack of an incentive of engagement plan for the losers from creation of a buffer zone; there is a need to develop management plan for the buffer zones	information on current land uses of proposed buffer zones and trade-offs that need to be undertaken to be able to establish the buffer zones
	2.2.3 Monitor and control bush burning in fire prone areas	Uncontrolled fires are common in many biodiversity rich areas	Fire management within management plans of Pas (on ground management of the ecosystem, human resource deployments, early warning systems, equipment)	exposure and sensitivity to fire risk in Pas; need for information on fire and emergency management plans coping strategy
	2.2.4 Engage local communities including women, men and youth in curbing destructive use of threatened plant species	Inadequate conservation and sustainable use plans for threatened plant species	Absence of a developed supply value chains for sustainable use; absence of management plans	business case and feasibility assessment for threatened species; existing best practices local and international
	2.2.5 Put in place species recovery plans for the degraded/ threatened habitats	Attracting/mobilising adequate resources to such activities; developing a feasible/viable plan	resource mobilisation and management planning; technical capacity to undertake habitat restoration programmes	scale of species recovery plans for degraded/threatened habitats; resource requirements and feasible/viable options for implementing species recovery plans
	2.2.6 Promote agro-forestry practices among local communities with particular focus on women and men farmers (supporting REDD+)	Agro-forestry practices still confined to certain regions of Uganda; Agro-forestry practices are on a small scale	Establishing/describing incentives to a largescale of land use/beneficiaries	clarity on the size and scale of incentives

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
	2.2.7 Promote women's enterprises to enhance their participation and leadership in biodiversity conservation	Demonstrating the comparative advantage of biodiversity conservation versus conventional practices within the value chains	Benefits/incentives demonstrated within biodiversity value chains	performance information on sustainable biodiversity value chain
	2.2.8 Improve forest timber harvesting and utilization technologies (supporting REDD+)	Technology available for timber harvest and utilisation is old, inefficient and limited in value addition contribution	state of the art technology that offers efficiency and value addition	Cost of integrating such technology
	2.2.9 Monitor the impact of agrochemicals on selected pollinators	Not much data is available in the country regarding the impact of agrochemicals on pollinators which are important for agricultural production	Develop baselines for pollinators; human resource capacity and need to mobilise resources	spatial baselines for pollinators. Contribution of pollinators within the ecosystems. Specific impact assessment of agrochemicals. Types of agrochemicals used
2.3	2.3.1 Introduce pro-poor environmental taxes and levies and market-based instruments	Environmental taxes and market based instruments are still inadequately being used to manage biodiversity in Uganda	designing optimal instruments and implementation capacity; recovery of funds generated for investment into biodiversity conservation	Specific contribution of the instruments to biodiversity conservation and poverty reduction
	2.3.2 Promote and support Green Procurement through purchasing of environmentally preferable products or services, taking into consideration the necessity, not only for quality and price, but also for biodiversity conservation-conscious business	Poorly developed market structure that favours poor quality conventionally produced products over sustainably produced products. High administrative costs of changing the incentives in the current market to allow for competitiveness based on environmental sustainability	Establish standards for biodiversity friendly procurement; to have sufficient supply of goods and services of appropriate quality for the market	Feasibility and timelines under which green procurement can be implemented
	2.3.3 Disseminate traditional knowledge information/ documents to enhance sustainable use of biodiversity (planning for food security and health care, i.e. medicinal plants)	Most of the traditional knowledge has not been compiled and documented in formats that can be disseminated	compile and document traditional knowledge in formats that can be used	existing archives and databases on traditional knowledge that can be added
	2.3.4 Build capacity to enforce the Nagoya protocol on ABS	No implantation plan/strategy in place yet	develop plan/strategy for ABS	Consolidate information on ongoing ABS activities in the country
3.1	3.1.1 Support the Establishment of a functional Intellectual Property (IP) regime on ABS	collation of data on IP is at an early stage and appropriate infrastructures have not been put in place	Development of an IP information infrastructure (Archiving, data base, information sharing) in the country	innovations on IP related to ABS within the country; Information on best practices within and outside the country
	3.1.2 Undertake intensive awareness raising on the content of NBSAPII at all levels	Funds have not been availed in the budget. Particularly for local governments, and relevant committees are generally non-functional. They need to be reconstituted and have capacity rebuilt.	Strengthening functionality of Environment Committees; Develop a simplified version of NBSAP for dissemination	Baseline level of awareness; resource requirements for implementation of strategy
	3.1.3 Develop and disseminate user-friendly and gender-responsive Information Education and Communication materials (IECs) for popular campaigns targeting women as agents of change for conservation	relevant awareness material were not developed; partnerships for awareness creation have not been developed; limited resources available	Strengthen partnerships for gender sensitive biodiversity awareness creation	ongoing biodiversity related gender sensitive awareness creation
	3.1.4 Sensitize local communities including IPLCs on biodiversity conservation	Resource mobilisation to undertake activity.	Develop a simplified version of NBSAP for dissemination	Baseline level of awareness; Salient features on biodiversity specific to IPLCs to integrate in sensitisation activity
	3.1.5 Develop and disseminate gender-responsive biodiversity public awareness materials	Relevant awareness material were not developed; partnerships for awareness creation have not been developed; limited resources available	Strengthen partnerships for gender sensitive biodiversity awareness creation	ongoing biodiversity related gender sensitive awareness creation
	3.1.5 Develop and disseminate	The educational curriculum does not	Strengthen partnerships for gender	ongoing biodiversity related

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
	gender responsive educational materials on biodiversity	segregate based on gender biases. There are limited education opportunities focused on gender and biodiversity	sensitive biodiversity education programming and curricula	gender sensitive education programming and curricula
	3.1.6 Seek support to enable women and men personnel to attend regional and international fora relevant to biodiversity	Financial resource mobilisation.	Developing research and implementation projects, and papers for dissemination internationally and/or resource mobilisation	Opportunities for funding for research and implementation projects, and dissemination of information
3.2	3.2.1 Establish and operationalize Biosafety Clearing House (BCH)	Enabling regulatory framework is still pending. The National Biotechnology and Biosafety Bill (2017) was sent back to parliament for review.	Mobilising resources and archiving existing information for the BCH. Establishment of information sharing agreements	Best practices available locally and internationally, and lessons that can be adopted.
	3.2.2 Conduct specialized trainings in Biosafety for regulators and inspectors	Enabling regulatory framework is still pending.	University and Training Institutions integrate specialized trainings in biosafety; and design and implementation of specialised on job trainings programmes in biosafety for regulators and inspectors with limited time for academic experiences	Scale of biosafety capacity needs for different groups of regulators and inspectors
	3.2.3 Conduct specialized biotechnology communication for media specialists	Enabling regulatory framework is still pending.	Develop and implement a strategy and Guidelines for media communication on biotechnology and biosafety.	Biotechnology and biosafety information packaged for media outreach
	3.2.4 Conduct trainings in biotechnology and biosafety for women and men	Low level of awareness on Biotechnology and Biosafety in the general Public	Simplified version (including local translation) of information materials integrated into extension and media information	Aggregated baseline level of biotechnology innovations already in common use
	3.2.5 Assess national capacities in biotechnology and Biosafety	Non-uniform capacity between regulators, inspectors and developers of biotechnology. Capacity of regulators and inspectors lower	User manuals and guides to integrate into routine regulatory, inspection and extension materials for biotechnology users	Limited quality information on safeguards to be undertaken and/or available from the use of biotechnology
	3.2.6 Promote infrastructural Development and Research on biotechnology and Biosafety.	Inadequate infrastructure	Resource mobilisation capacity for biotechnology and market structure development	Current market structure for biotechnology in common use
	3.2.7 Develop and apply biotechnology tools for identification, characterization and conservation of biodiversity	Enabling regulatory framework is still pending.	Resource mobilisation and human resource capacity for identification, characterization and conservation of biodiversity	Priorities for biotechnology for identification, characterization and conservation of biodiversity
	3.2.8 Undertake widespread awareness on the benefits and risks associated with biotechnology	Limited awareness, knowledge and misinformation on biotechnology	Simplified version (including local translation) of information materials	Best practice both local and international on biotechnology use and biosafety
	3.2.9 Popularize the Biotechnology and Biosafety Policy	Limited awareness and knowledge on the Biotechnology and Biosafety policy, 2008	Simplified version (including local translation) of information materials	Best practice both local and international on biotechnology use and biosafety
3.3	3.3.1 Develop guidelines on compliance to biosafety	Enabling regulatory framework is still pending.	A national strategy for biotechnology and biosafety with wide stakeholder consultation	Best practice both local and international on biotechnology use and biosafety
	3.3.2 Enhance the regulatory performance of the National Biosafety Committee (NBC) and the Institutional Biosafety Committees (IBC)	Enabling regulatory framework is still pending.	Develop biosafety programmes, develop regulations and standards. Technology upgrade and capacity of inspectors and regulatory agencies	Best practice on biosafety
	3.3.3 Promote public-private partnerships (PPP) in biotechnology development	Enabling regulatory framework is still pending.	Develop national strategy for biotechnology development and clearly highlight priorities and opportunities.	Information on implementation of PPPs and adequacy for development of biotechnology

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
	3.3.4 Organize and conduct gender-responsive national and local stakeholder awareness creation campaigns on biosafety	Limited awareness, knowledge and misinformation on biotechnology. Limited knowledge on the differentiation of biotechnology by gender	Simplified version (including local translation) of information materials	Best practice both local and international on biotechnology use and biosafety
	3.3.5 Promote management oriented research and development in medical, agricultural land industrial biotechnology.	Enabling regulatory framework is still pending.	Resource mobilization and human resource capacity for medical and agricultural biotechnology	Priorities for biotechnology for medical and agricultural biotechnology
	3.3.6 Undertake ESIA or risk assessments on biotechnology plans, programmes and projects	Enabling regulatory framework is still pending.	Scope of risks to consider, impacts and considerations for expert teams and competences and experience to consider. Regulator competence to review ESIA	Best practice ESIAs practice and regulatory practice for biotechnology and biosafety in other countries
3.4	3.4.1 Establish a strong and effective monitoring system for biotechnology use and applications	Enabling regulatory framework is still pending.	Human, physical and financial capacity to effectively and efficiently monitor biotechnology use and applications.	Experiences and lessons learned from establishing a regulatory framework for biotechnology and biosafety from other countries
	3.4.2 Develop and implement mechanisms for sharing costs and benefits of biotechnology	Enabling regulatory framework is still pending.	High value of knowledge on the costs and benefits of biotechnology	Information and knowledge within the country and outside the country on value, costs and benefits of biotechnology
	3.4.3 Promote integration of biotechnology values into macroeconomic frameworks	Enabling regulatory framework is still pending.	Generation of high quality technical information and knowledge on biotechnology and biosafety	Experiences and lessons learned from other countries
	3.4.3 Support capacity building for writing project proposals that are gender-responsive	Enabling regulatory framework is still pending.	Ability to generate high quality data and information explaining problems that need to be addressed. Ability to identify the most feasible and viable entry points and articulate the actions, timelines, results framework and inputs.	Description on the priorities for biodiversity and biodiversity-related investments
	3.4.4 Budget for activities of biodiversity and incorporate in annual budget of Line ministries, NGOs, private sector	Appropriations based on national annual priorities and Government budget ceilings.	Capacity to effectively leverage existing funds to cater for biodiversity management. Mobilisation additional funds from economic instruments and creation of economic opportunities	Opportunity to generate new economic opportunities through biodiversity financing.
	3.4.5 Promote accountability, transparency, gender mainstreaming in implementation of biodiversity projects	Biodiversity coordination has limited control over Governance aspects of institutions. Absence of a gender mainstreaming strategy for biodiversity management.	Enhance capacity for mainstreaming gender considerations in resource mobilisation and implementation of biodiversity projects. Strengthen governance as part of the coordination of biodiversity management.	Best practice of governance, transparency and gender mainstreaming that can be adopted or scaled up in the country.
3.5	3.5.1 Issue environment bonds	Regulations and/or Instrument and guidelines on environmental bonds not developed	Generation of high quality technical information on potential on environmental bonds	International best practice. Feasibility of environmental bonds.
	3.5.2 Provide incentives that promote green production and purchase of green goods	Green production and purchase of green goods limited to organic agriculture and in some sustainability value chains. But level of practice limited by niche focus of organic agriculture and poorly developed market structure for green products.	Generation of high quality technical information on potential on environmental bonds. Appropriate actions to upgrade the green goods/production value chain.	International best practice on green production and purchase of green goods
	3.5.3 Institute appropriate pricing mechanisms for biodiversity goods and services	The market structure generally does not differentiate biodiversity as value added and/or offer a price for biodiversity.	Generate information and data to support regulatory reforms in the market. Support upgrading of value chain to acknowledge the value of biodiversity.	Obtain information on best practice on integration of biodiversity into the value chain and integration of value into price for goods and services.

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
	3.5.4 Routinely improve/update the Sensitivity Atlas for the Albertine Graben	The 2013 version has not yet been updated as it is still actively in use.	Capacity to integrate additional strategic data on physical plans, ecosystems and species.	Need to generate new spatial data and strategic planning data on physical planning, infrastructure plans and impacts on ecosystems.
	3.5.5 Set up a biodiversity offset trust fund to ensure no net loss biodiversity due to petroleum activities	No biodiversity offset trust fund is presently in place	Enhancement of capacity of institutions to design and implement biodiversity offsets.	Spatially detailed biodiversity data. High value ecosystem, species and ecosystem services data.
	3.5.6 Examine and implement opportunities for translocation of animals from sensitive areas where oil exploration is already taking place to other PAs	High cost of activities; Need to conduct appropriate feasibility assessments; high risk to wildlife to be moved and the receiving PAs.	Technical capacity of UWA and PAs management. Support of independent researchers to monitor progress of translocation. Resource mobilisation to finance translocations	Baselines and long-term stability of the host ecosystems and the receiving ecosystems
	3.5.7 Undertake awareness at all levels on the positive and negative impacts of biofuels on biodiversity	The regulations and guidelines on use of biofuels have not been developed. There are risks of impacts on food security if staple foods are used making the biofuels and/or land for food crops is replaced by biofuels.	Establish the capacity and willingness of farmers to produce enough raw material for biofuels.	Knowledge and information on crops to produce and technical and allocative efficiency required to maintain biofuels.
	3.5.8 Develop a framework that promotes the positive and minimizes the negative impacts of biofuel production on biodiversity	Enabling regulatory framework absent. The use of biofuels is pegged on the subsequent PPP agreements signed between oil and the Government	Ability to generate high quality data on potential for sustainable biofuels production	Technology options for integration of biofuels and the business case for different stakeholders
	3.5.9 Put in place measures to protect food and energy security of local communities including women and men when introducing biofuel crops	Production largely occurs at subsistence level. The production for many smallholders includes small average 1 ha where both food and fuel from biomass are expected.	Capacity to increase production of cereals and other crops for biofuels without compromising food security	Technical efficiency and allocative efficiency of current production and potential technical efficiency required to sustainably and efficiently produce biofuels
3.6	3.6.1 Assess and identify areas suitable for biofuel production and areas inappropriate for biofuel production	The regulations and guidelines on use of biofuels have not been developed.	Detailed spatial analysis. GIS mapping and analysis of remote sensing data.	Updated regional and district level reports on crop and livestock production - censuses and district agricultural reports
	3.6.2 Ensure that EIAs are conducted for all biofuel projects and programmes	Enabling regulatory framework is still pending.	Scope of risks to consider, impacts and considerations for expert teams and competences and experience to consider.	Best practice regulatory planning for biofuels
	3.6.3 Promote and support research programmes on biofuels	Research on crops that also serve as biofuel crops has generally been towards their present use as staple foods, vegetable oil, sugar and energy co-generation. Crops as biofuels research was limited. Additional resources needed to be mobilised.	Human resource capacity and financial resources need to be mobilised. Investment into equipment, databases and laboratories for testing and platforms for peer review and publishing will have to be established and/or strengthened.	Technical efficiency of biofuels and their use in the oil and gas industry, and on their own as part of the energy strategy in the country. The trade-offs of commercial biofuel production and food security, current electricity co-generation and vegetable oil revenues, among others.
	3.6.4 Promote and support the use of environmentally-sound technologies which promote the positive and minimize the negative impacts of biofuel production on biodiversity	Enabling regulatory framework is still pending.	Human resource capacity and financial resources needs. Equipment, databases and laboratories for testing to be established and/or strengthened.	Best practices within the country and from other countries
	3.6.5 Preparedness, Risk Reduction and Management Plan for protecting biodiversity	Risk management and preparedness generally limited to the ESIA process and the management plans of PAs. Hazards from droughts, floods, landslides have limited consideration, as there is little documentation on biodiversity impact.	Research on the impacts of disasters and disaster risks to biodiversity and impacts beyond the current scope of ESIAs and PA management plans	Lessons learned from other countries. How to integrate disaster risk beyond impacts caused by project developers or accidents such as fires.

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
	3.6.6 Mainstream Disaster Preparedness, Risk Reduction and Management Plan in key National, sectoral and Districts planning frameworks for protection of biodiversity	Lack of enabling regulations.	Support to developing enabling regulatory framework. Integrating disaster risk and preparedness to regulatory and implementation safeguards for biodiversity management.	Best practices and experiences of other countries.
	3.6.7 Improve disaster management systems, like early warning systems	Enabling regulations, access to knowledge, information and technologies and financial implications.	Generation and/or collation of high quality data for decision making. Expertise to support regulators, inspectors and project implementers in biodiversity management	Best practices and experiences of other countries.
	3.6.8 Support participatory valuation and management of ecosystem services	Quality of information and exposure of participants to knowledge and information to support valuation as well as financial implications.	Generation and/or collation of high quality data for decision making. Expertise to support regulators, inspectors and project implementers in biodiversity management	Best practices and experiences of other countries.
3.7	3.7.1 Monitor and enforce compliance to effluent standards requirements	The proliferation of cottage industries particularly in urban areas that are unregistered and are generally off the radar of compliance officials. Inadequate monitoring of discharges from larger, registered companies	The need to work with urban authorities to increase vigilance. This is likely to be a medium to long-term engagement. More stringent and punitive charge systems, and incentive systems for compliance are needed. The need to create effluent treatment trading systems.	For Kampala City there is greater vigilance by the City Authority. However for the urban areas especially the other eight cities such capacity does not exist.
	3.7.2 Monitor the impact of agrochemicals on selected pollinators	Setting up data collection protocols and monitoring requires significant commitment and resources. Some studies have been conducted but they are usually short-term.	There is need to have increased support for research at universities to maintain monitoring. There is need to increase policy makers appreciation of the importance of the pollinators	Pollinator need to be raised on the scale of indicators to monitor as an indicator of biodiversity trends.
	3.7.3 Manage all forms of waste in an effective and efficient manner to reduce its negative impact on the environment, including through local-level waste management and recycling initiatives	The responsibility of waste management is generally for urban authorities. The proliferation of Town Councils and Districts has imposed a large burden on local governments to fund waste management given that they rely on government funds. The market for innovative financing for municipal waste composting proved unsustainable. Excessive reliance on compliance such as bans and possible threat of arrest when the enforcement system is poor	Need to rely on awareness creation and education in schools to strengthen the culture of waste management. The need to raise the profile of the household and individual responsibility. Need to design effective economic instruments to curb poor disposal and rewards proper disposal and recycling or reuse	There is evidence that increased awareness creation and education in schools yields results, based on NEMA and civil society studies.
3.8	3.8.1 Develop and implement management plans to prevent the establishment and introduction of alien invasive species 3.8.2 eradication or control existing alien invasive species	The Government has not implemented a comprehensive progamme for IAS since the efforts undertaken for the water hyacinth. New challenges such as the Kariba weed and other invasive have not adequately addressed. Agencies such as NARO, UWA mobilise revenues through research funding programmes and internal revenues to undertake action but it is not comprehensive. There is only a limited budget available under on-budget funding for IAS. The Kariba weeds, congress weeds and	The need to mobilise additional resources. There is need to develop cost-effective programmes due to the limited funding available. The need to increase research on management of IAS	International and/or regional partnerships projects and programmes seem to be the most cost-effective way to engage with international finance. Arrangements under the East African Community (EAC), the African Union and similar arrangements can offer viable alternatives for countries afflicted with similar IAS challenges.

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
3.9	3.9.1 Put in place effective control measures to manage fishing and alien fish species such as the Nile Perch *Salvinia molesta* including promoting awareness of existing regulations 3.9.2 Put in place and implement control measures for the Water Hyacinth, and the congress weed	There is need to mobilise additional financing for programmes where funding gaps currently exist	Support to develop cost-effective programmes. Developing a clear business case for management of IAS	Innovative financing options are limited. Even though, they may offer long-term solutions.
	3.9.3 Promote sustainable aquaculture for local communities including women and men for socio-economic development	Many small holder fish farmers can only achieve subsistence level quality. There is need to upgrade low cost technologies to make them more economically viable. Reforms in the market structure particularly for regional market opportunities in neighbouring countries can	The market structure for fish make fish as competitive as animal proteins. Therefore, the scale of consumption is relatively limited. The market structure for fish reduces the size of the urban market for fish. The Nile Perch and Tilapia fish are at a high cost and the more affordable silver fish are generally for lower income end of the market.	The regional markets particularly in the Democratic Republic of Congo (DRC) were blamed for the high scale of illegal fishing practices even though the fish reach the prices in the region markets would be competitive for sustainable fish exports including from aquaculture.
	3.9.4 Undertake SEA/EIA on policies, programmes or projects that are likely to have significantly negative impacts on aquatic biodiversity	There are increasingly more EIAs conducted. There are far too few SEAs conducted and they are largely development partner led. The ESIAs are generally paper based. There is no spread sheet system with specific indicators that stand out to monitor. Review, monitoring and compliance and voluntary audit are difficult to verify independently. Even though, the EIA certificate provides a summary of key actions. A lot of important salient issues may be missed.	NEMA is reluctant to take lead on SEA. There is need to enhance capacity within the country to cost-effectively undertake SEA. There is need to establish a spread sheet based database for ESIAs. To allow for proper compliance monitoring, reporting and verification.	When lead agencies were created, the role of NEMA is generally to ensure compliance to environmental management and coordination of actions in the laws and the NBSAPII.
	3.9.5 Develop and or implement appropriate mitigation measures against habitat degradation of open water resources including by identifying and promoting alternative livelihood sources for women and men	There is very little implementation of Ecosystem Service Valuation (ESV) in the current EIA and audit system. The incomprehensive data base also limits the capacity to effectively monitor mitigation measures	Need to continue building capacity for ESV among practitioners. There is need for the regulator to also undertake ESV studies to provide guidance on thresholds that can be used in ESIAs	
	3.9.6 Promote private sector investment and participation in aquatic biodiversity conservation	The business case for private sector investment and participation in aquatic biodiversity has not been demonstrated beyond fisheries, boating for tourism and water transport.	There is need to undertake feasibility studies and demonstrate the business case for private sector. Enabling regulations, rules or guidelines of behaviour will also be need to protect private sector investment.	
	3.9.7 Support transboundary management of fisheries resources	There is need to scale up the structures of LVFO to other capture fisheries with transboundary nature. Institutional arrangements with the DRC and South Sudan have proposed but their functionality is generally limited and intensities when crises occur.	Establish stable institutional arrangements on transboundary resources, and provide funding for regular engagement.	There is already a lot of work under the Lake Victoria Fisheries Organisation (LVFO).

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
3.10	3.10.1 Strengthen community and resource use groups participation in fisheries management, including by identifying gender-differentiated roles across the sector	There is need to review rules and guidelines and strengthen enforcement capacity of community and resource user groups.	Re-training of user groups on the need for sustainable capture fisheries. The need to design optimal fishing effort for the different communities and monitor it. In addition to support on compliance consider reliable economic instruments such as charge systems to keep the fishing effort sustainable.	Community and resource use groups under the Beach Management Units (BMUs) were not successful at managing the fishing effort and the poor fishing gear that was employed.
	3.10.2 Regulate and control importation and usage of fishing gears 3.10.3 Strengthen monitoring, control and surveillance fishing activities	The current surveillance and compliance systems still lets in poor fishing gear that are used in capture fisheries. The national market is generally more keen on the mature fish. The illegal small size fish are largely illegally exported or processed into smoked fish and other products for the local and regional markets.	Strengthen monitoring, surveillance, and enforcement of standards including among the groups. Skill and empower customs to impound any such gears and also community groups.	
	3.10.4 Develop and implement gender-responsive community fisheries management plans	There is need to review rules and guidelines and strengthen enforcement capacity of community and resource user groups. The gender components under the BMUs were strong and will be lost out in the enforcement based management system.	Re-training of user groups on the need for sustainable capture fisheries.	Community and resource use groups under the Beach Management Units (BMUs) were not successful at managing the fishing effort and the poor fishing gear that was employed.
	3.10.5 Provide adequate support to Beach Management Units (BMU)	There is need to review rules and guidelines and strengthen enforcement capacity of community and resource user groups.	Re-training of user groups on the need for sustainable capture fisheries.	
4.1	4.1.1 Develop economic instruments to encourage activities that enhance biodiversity conservation and discourages activities that impact negatively on biodiversity	The regulatory structure and capacity of officials is generally tilted towards enforcement and compliance instruments. There are always concerns about whether the governance systems at national and local government level are strong enough to maintain due diligence with the funds generated. Increasingly the Ministry of Finance is enforcing centralized management of all public revenues including the non-tax revenues (NTR) from economic instruments. If the funds are not returned for conservation, this will not only drain conservation resources, but likely create perverse incentives if the regulators don't have money to regulate public funded projects that benefit from the NTR.	There is a need for attitude change to accommodate use of economic instruments. Need to design viable economic instruments. There is need to increased advocacy from all actors including development partners to ensure that economic instruments and environmental fiscal revenues are returned for conservation. There must be a mechanism, at macroeconomic level (including modelling) that ensures public revenues are not encouraging perverse incentives	The need for fiscal discipline especially where the NTR collections by government department and agencies can be quite large is important. Indeed, the centralized revenues also improve monetary policy management. Nonetheless, the lack of clarity and sustainability of public conservation finance disrupts implementation of long-term conservation action such as the NBSAP.
	4.1.2 Identify and support women groups to adopt more sustainable alternatives for household and income-generating activities to enhance livelihoods and biodiversity conservation	The current interventions are quite few and generally run by non-governmental organisations. Pro-poor taxes such as loyalties on minerals and conservation charges for minerals and/or extraction of large volume	There is need to scale up programmes that create synergies between sustainable livelihoods and vulnerable groups including women. Public sector resources should also be committed.	UWA, NFA, NEMA and NGOs have small scale efforts spread through the country. But these actions cannot be consolidated into a programme. The NBFP proposes a finance

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
	4.1.3 Introduce pro-poor environmental taxes and levies and market-based instruments	of ecosystem services are generally not transmitted to communities and/or communities. The willingness to allocate scarce priority resources to conservation actions is generally limited for both MDAs and local governments.	There is need to continue with awareness creation. Clear guidance on thresholds for conservation investment are required. Incentives can be introduced in central government grants to MDAs and local governments.	solution to address this challenge.
	4.1.4 Promote and support Green Procurement through purchasing of environmentally preferable products or services, taking into consideration the necessity, not only for quality and price, but also for biodiversity conservation-conscious business	There is no green procurement policy, legislation and/or regulation. There are concerns that if the market was opened up for green procurements that the domestic production may not meet public procurement standards.	NEMA needs to encourage the public procurement agency (PPDA) to develop policies, regulations on green procurement. There is need to support development of local market structure for green products that can met market requirements.	The Government has taken leadership through the UGGDS. The agriculture sector is most advanced. The timber and non-timber products industry have also been making significant strides. At least two local companies are able to meet international export standards for wood. While many companies export high quality honey for the international market.
	4.1.5 Undertake Environmental Impact Assessments (EIA) of all policies, programmes or projects which have the potential for negative—or positive—impacts on biodiversity	Whereas all policies and public ad non-programmes or projects are required to undertake environment compliance, less than one-third do. The environmental inspection capacity for public agencies is rated at only 30%.	There is need to establish and/or strengthen environmental compliance guidelines for all public agencies. For non-public agencies, additional awareness creation is needed. The regulators for the private sector and non-governmental organisations should also have capacity to verify whether or not projects have undertaken compliance actions	NEMA has worked to create environmental inspection capacity for MDAs. However, there are several sectors where the capacity is not adequate.
	4.1.6 Integrate biodiversity accounting into national accounting and reporting processes	A comprehensive programme on biodiversity and natural capital accounting requires committed funding for a sustained period. The Government needs to be willing to open up new areas to also be integrated in natural capital accounts including mineral and oil and gas sectors	The national capacity to undertake natural capital accounting needs to be built. Research and/or data collection on ecosystems and ecosystem services that are not included in national surveys and inventories. Capacity for macroeconomic modelling and analysis (as well as microeconomic analysis) and communicate the message for policy makers and project/ programme implementers and natural resource managers.	Through appropriate engagement comprehensive natural capital accounting can be achieved. But willingness to under a national programme and not limited scale interventions will convince the Ministry of Finance and the Central Bank of the viability of pursuing a green economy.
4.2	4.2.1 Promote PPP to collect, harvest and process plant based products for commercialization	Community based systems for seed collection, and seed propagation have been initiated. But the scale is quite small. The market does not have strong appreciation of new modern technologies.	Significant investment in knowledge and awareness is needed. Including trials and demonstrations.	

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	4.2.2 Support value addition on plant based products for commercialization by local community groups	The economy is still very subsistence based, many farmers produce their own food. Therefore value addition is still largely targeted for non-farmers, and farmers who seek food substitution or have gaps on food security to fill.	There is need to develop value chains that have a regional scope beyond just Uganda, for food products.	There are a lot of food imports that are expensive and unnecessary drain local resources, for example, wheat, vegetable oil, among other when the local comparative advantage for production is even higher.
4.3	4.3.1 Develop and implement mechanisms for sharing the benefits from access to PGR in the country.	The interventions undertaken as part of community seed banks are still at small scale, and not competitive against seed dealers. The capacity in term of laboratories and facilities at the Plant Genetic Research Centre is still quite low. Even though the technical capacity is quite strong.	There is need to scale up the community seed banks and structuring the market to ensure that the producers benefit from their conservation and seed production efforts. Strengthen the institutional capacity of the PGRC. The housing structures, storage laboratories, and outreach facilities beyond the headquarters including partnership with other NARO institutes	NARO has a strong set up. However, the low capacity at PGRC is glaring the low capacity was also acknowledge in parliamentary reporting.
	4.3.2 Document traditional knowledge, innovations and practices in PGR	There is limited documentation of traditional knowledge, innovations and practice. Available information is largely in research publications.	There is need for quarterly, annual reporting in new letters, reports. There is need to disseminate the information to increase awareness and also grow the market.	A trade-off is needed to strengthen research but also provide as much public information as possible.
	4.3.3 Disseminate traditional knowledge information/documents to enhance sustainable use of biodiversity (planning for food security and health care, i.e. medicinal plants)			
	4.3.4 Initiate and support community based PGR management initiatives in various parts of the country	The interventions undertaken as part of community interventions are quite small scale, and not competitive in the conventional market.	There is need to scale up the community interventions and support structuring the market to ensure cost-effectiveness and competitiveness.	
4.4	4.4.1 Accede to the Nagoya Protocol on ABS	Already undertaken		
	4.4.2 Review the ABS Regulations and incorporate relevant elements of the Nagoya Protocol	Progress for project development ongoing		
	4.4.3 Build capacity to enforce the Nagoya protocol on ABS	Progress on institutional capacity building project on-going		
	4.4.4 Promote and regulate bioprospecting and bio-trade activities	The market is quite small and niche and controlled by the different agencies e.g. UWA, NFA, UEPB and MTIC. There are risks that isolated decisions may be made with inaccurate data and could risk the conservation status of important species e.g. leopards, among others.	There is need for increased coordination and monitoring of biodiversity compliance standards. The coordination arrangements need to be strengthened. The need to triangulate information and build accurate information further justifies the need for wildlife accounts, and other similar accounts.	Decisions mad based on outdate information that is not regularly updated should not be part of NBSAP II implementation.
	4.4.5 Support the Establishment of a functional Intellectual Property (IP) regime on ABS	The IP regime is established, the Uganda Registration Services Bureau (URSB) to coordinate and it supported by the UNCST, URA Customs, and all the MDAs which are the lead agencies implementing, monitoring and verifying the IPs.		Uganda domestic laws for IPs; Industrial Property Act 2014 for the registration and protection of patents, industrial designs, utility models and techovations; Trademarks Act 2010 for the registration and protection of

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
				trademarks; Copyrights and Neighbouring Rights Act 2006 for the protection of literary, scientific and artistic intellectual works and their neighbouring rights; Trade Secrets Protection Act 2009 for protection of nondisclosure of confidential information in commercial transactions whose disclosure would harm the honest commercial practice the person; Geographical Indications Act 2013 for the registration of geographical indications and protection of identification of products made and associated to a specific geographical location with peculiar qualities; and the Plant Variety Protection Act 2014 for protection of exclusive rights granted to plant breeders and remedies in case of infringement.
5.1	5.1.1 Undertake intensive awareness raising on the content of NBSAPII at all levels 5.1.2 Develop and disseminate user-friendly and gender-responsive Information Education and Communication materials (IECs) for popular campaigns targeting women as agents of change for conservation 5.1.3 Sensitize local communities including IPLCs on biodiversity conservation 5.1.4 Develop and disseminate gender-responsive biodiversity public awareness materials	There is no specific programme on wide outreach for awareness raising on the content of NBSAPII at all levels. However, individual institutions include components into their work plans which they implement.	Additional resource need to be allocated to specific awareness raising on the content of NBSAPII at all levels.	The Government designs these programmes such as the NBSAP to be integral to government programmes, which is aimed at achieving cost-effectiveness. Individual institutions develop IEC materials and target different groups that are key to implementation of the NBSAP. NEMA has always provided the lead on outreach to local governments and IPLCs. NGOs with specific interest provide additional support including IUCN, WWF, ECOTRUST, Tree Talk, Environmental Alert and ACODE, among others
5.2	5.2.1 Develop and implement educational programs on biodiversity issues relevant to Uganda 5.2.2 Strengthen and/or establish environmental clubs or societies 5.2.3 Develop and disseminate gender-responsive educational materials on biodiversity	Maintaining technical and academic capacity on new and emerging areas. This requires additional training of academic staff at university and even additional recruitments. The resource constraints often mean changes at tertiary institutions have a longer lag compared to contemporary knowledge in practice. The growth of clubs is often blamed on low resources. But many times they advocacy and engagement message is not suited for education institutions. Many times development partners create secretariats in non-governmental organisations for forums and funds, which	There is need to increase feedback engagement between academic institutions and the resource managers and experts in the field. These platforms were proposed under a National Biodiversity Forum, which has generally remained inactive. Where a secretariat is established in the non-government organisation similar capacity is need for the public sector regulator to ensure that the government can participate effectively.	A joint Green Economy, Biodiversity Forum was agreed by national and international stakeholders. However, the working arrangements were not completed.

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
		limits public sector participation.	Engagement with education institutions needs to integrate changes in the education system, including technology and curriculum changes.	
5.3	5.3.1 Seek support to enable women and men personnel to attend regional and international fora relevant to biodiversity	On-going efforts at the biodiversity focal points level to include more women within the coordination roles.		
	5.3.2 Develop proposals for supporting biodiversity conservation programs at national level	Some agencies have indicated that their research departments are quite weak and they do not generate adequate information to use in developing proposals. The NPA has indicated that the multitasking placed on senior officers in MDAs limits the capacity for proposal writing.	There is a need to include a grants management position at the NBSAP coordination level to enhance proposal writing and/or resource mobilisation for biodiversity management.	In the early 2003, USAID championed establishment of grants management into government institutions as part of environmental reforms, using a lead agency coordination framework. However, the strategic reforms changed and the mandates were generally changed.
6.1	6.1.1 Conduct a baseline study on level of public awareness and education on the benefits and risks of biotechnology and Biosafety	There institutions are still mobilizing resources for conducting the baseline study on level of public awareness and education on the benefits and risks of biotechnology and Biosafety. The baseline study was not included in the priorities for the FY 2019/20 budget.	An external source of financing may be needed.	
	6.1.2 Establish and operationalize Biosafety Clearing House (BCH)	The process for institutional capacity for BCH has been initiated and is delayed by agreements between partners.	An external source of financing may be needed. As well external technical support.	
	6.1.3 Conduct specialized trainings in Biosafety for regulators and inspectors	Trainings have been set up and are ongoing and expected to continue in the FY 2019		
	6.1.4 Conduct specialized biotechnology communication for media specialists	Communications through regulation government communication strategies are ongoing.		
	6.1.5 Conduct trainings in biotechnology and biosafety for women and men	Public trainings are limited to national exhibitions and shows and/or forums. Outreach at local government is constrained by limited resources.	External financial support may be need to achieve comprehensive public outreach. Even though, the government indicated a willingness to support outreach during the review and passing of the Genetic Engineering Act 2018	
6.2	6.2.1Assess national capacities in biotechnology and Biosafety	A preliminary assessment was conducted by NARO. However, it was largely based on 2013 information and needs to be updated.	There is need to update the national capacity. UNCST and NEMA may need to mobilise resources to support the undertaking	
	6.2.2 Support the development of skilled human resources for biotechnology and Biosafety	There is ongoing capacity development at NARO, Ministry of Health (MoH) and at the Universities in the country.	The larger challenge may be creating national demand for biotechnology experts and deploying them.	
	6.2.3 Promote infrastructural Development and Research on biotechnology and Biosafety.	A preliminary assessment was conducted by NARO. However, it was largely based on 2013 information and needs to be updated.	There is need to update the national capacity. UNCST and NEMA may need to mobilise resources to support the undertaking	
	6.2.4 Develop and apply biotechnology tools for identification, characterization and conservation of biodiversity	Ongoing activities. The law was recently passed. There is considerable and urgent need for putting in place regulations, guidelines, protocols of practice.	Institutional capacity enhancement to meet the regulatory and industrial practice prescriptions of the law of an urgent requirement.	If the national standards required in the law are not met, the industry will struggle to effective get a foothold.
6.3	6.3.1 Undertake widespread awareness on the benefits and	There institutions are still mobilizing resources	An external source of financing may be needed.	

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
	risks associated with biotechnology			
	6.3.2 Popularize the Biotechnology and Biosafety Policy	UNCST has conducted considerable popularizing of the policy. Nonetheless, additional effort is required with the law.	An external source of financing may be needed.	
	6.3.3 Advocate for the approval of the National Biotechnology and Biosafety Bill to enable regulation of Biotechnology and Biosafety developments in the country.	Laws was passed		
	6.3.4 Popularize the Biosafety and Biotechnology Policy and Bill/Act	There institutions are still mobilizing resources	An external source of financing may be needed.	
	6.3.5 Develop guidelines on compliance to biosafety	Regulatory reforms have been included in the FY 2019/20 work plans of UNCST. Although the effort required means additional financial support.	Additional engagement will be needed with the Ministry of Finance in the subsequent financial years to ensure appropriate financing is provided.	
	6.3.6 Enhance the regulatory performance of the National Biosafety Committee (NBC)and the Institutional Biosafety Committees (IBC)	UNCST is in the process of strengthening the NBC and engagement on strengthening of IBCs as part of the institutional capacity building. Resource constraints may mean reforms take longer.	Institutions will have to consider using both appropriations from the Ministry of finance and their own internal revenue to achieve institutional capacity require to effectively ensure biosafety in the country.	
	6.3.7 Promote public-private partnerships (PPP) in biotechnology development	Additional private sector engagement is on-going. However, strategic plans passed by the sectors will give more confidence to private sector	External support may be needed to achieve comprehensive strategic planning for biotechnology development	
6.4	6.4.1 Organize and conduct gender-responsive national and local stakeholder awareness creation campaigns on biosafety	Public trainings are limited to national exhibitions and shows and/or forums. Outreach at local government is constrained by limited resources.	External financial support may be need to achieve comprehensive public outreach. Even though, the government indicated a willingness to support outreach during the review and passing of the Genetic Engineering Act 2018	
	6.4.2 Support tertiary Institutions to run short courses on biosafety	Short-term programmes are run by NARO and Makerere University Agricultural Research Institute Kabanyolo. These course are generally without certification, and have few participants. The current arrangements are also constrained financially.	These programmes need to be consolidated into short certificate programmes and included in the curriculums of the institutions. The trainees can co-fund the programmes for well-structured programmes with clear benefits, and outreach with private sector and external partners can be pursued.	
	6.4.4 Support the full implementation of the Nagoya Supplementary Protocol on Liability and Redress	On-going preparations for institutional capacity building to implement the protocol.		
6.5	6.5.1 Promote management oriented research and development in medical, agricultural land industrial biotechnology.	A clear strategic plan is not available. A resource mobilisation plan is not available	A strategic plan needs to be urgently developed, and to include a resource mobilisation plan.	
	6.5.2 Undertake ESIA or risk assessments on biotechnology plans, programmes and projects	The law was recently passed. The lead agencies and NEMA have not yet adjusted their work plans to enhance ESIAs. However, even with existing regulations ESIAs and risk assessments can be conducted.	Review work plans to scale up ESIAs or risk assessments on biotechnology plans, programmes and projects	

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
	6.5.3 Establish a strong and effective monitoring system for biotechnology use and applications	A fairly strongly monitoring system exists. But it has not been reviewed in line with some of the recommendations of the new law	Revise existing monitoring modalities in line with new law. Ensure cost-effectiveness of any new actions proposed.	
	6.5.4 Develop and implement mechanisms for sharing costs and benefits of biotechnology	A clear strategic plan is not available.	A strategic plan needs to be urgently developed.	
	6.5.6 Promote integration of biotechnology values into macroeconomic frameworks	A clear strategic plan is not available. Some baseline studies will be required, and the studies and financial resources for these have not been mobilized.	A strategic plan needs to be urgently developed and to include integration of biotechnology values into macroeconomic frameworks	There is need to regularly show the value of biotechnology to the national economy as part of advocacy to attract additional resources.
7.1	7.1.1 Undertake a study to collect information which will guide in the development of guidelines for financing biodiversity in Uganda	Already completed		
	7.1.2 Develop and implement guidelines for financing biodiversity in Uganda	Already completed		
	7.1.3 Develop Biodiversity Finance Plan	Already completed		
7.2	7.2.1 Identify and seek funding support from diverse sources including regional and bilateral development partners, foundations and private sector	Ongoing. However, the resources are generally not adequate to address the biodiversity conservation challenges.	Additional resource mobilisation and establishment of a grants management system for proposal development and resource mobilisation at the NBSAP coordination desk may be required. Regular training for the junior staff on the components of biodiversity projects to include in proposals including gender considerations, MEAs, and alignment with public fiscal management regimes. There is need to also continually provide training on proper financial management and general project management to enhance compliance in implementation guidelines provided for by the different funding sources.	There is capacity for writing proposals but it largely limited to senior officers who also have to multitask. Therefore additional support is needed to harness the knowledge of the senior officers and also produce results.
	7.2.2 Support capacity building for writing project proposals that are gender-responsive			
	7.2.3 Develop project proposals to target designated donors under the CBD			
	7.2.5 Mobilize resources by creating synergies between the different multilateral Environmental Conventions			
	7.2.6 Budget for activities of biodiversity and incorporate in annual budget of Line ministries, NGOs, private sector			
	7.2.7 Promote accountability, transparency, gender mainstreaming in implementation of biodiversity projects			
7.3	7.3.1 Put in place an enabling policy or legislative framework for new biodiversity financing mechanisms	A new environment act accommodates a wide range of financing mechanisms.		
	7.3.2 Issue environment bonds	There is limited support among financial institutions for environmental bonds.	There is need for increased engagement between the regulators such as NEMA and the biodiversity finance team with financial institutions and agreement on the modalities in which the environmental bonds would work. Before the instrument can be proposed to the	The draft NBFP proposed an environmental bond that can be revisited as it was not included in the final report.

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
			Ministry of Finance.	
	7.3.3 Provide incentives that promote green production and purchase of green goods	The procurement regulations do not adequately cater for green procurements.	The need to review public procurements and provide incentives. Technical engagement and financial support for reforms may be needed	
	7.3.4 Institute appropriate pricing mechanisms for biodiversity goods and services	Market creation for biodiversity goods and services, and appropriate pricing is supported by the new environmental law. The regulations and guidelines for operationalizing the mechanisms have not been put in place yet.	There is need to expedite regulations and guidelines for operationalizing the mechanisms	
	7.3.5 Support green marathon	On going		
	7.3.6 Promote green products and technologies	The procurement regulations do not adequately cater for green procurements.	The need to review public procurements and provide incentives. Technical engagement and financial support for reforms may be needed	
	7.3.8 Support sensitization and capacity development to companies about benefits from ecosystem services	A natural capital forum including private sector was mooted but it has not gained traction. There is need to revive the institutional arrangements proposed under the NBFP.	There is need to expedite regulations and guidelines for operationalizing the mechanisms	
	7.3.9 Enhance payment for ecosystem services and biodiversity offsets	Market creation for biodiversity goods and services, and appropriate pricing is supported by the new environmental law. The regulations and guidelines for operationalizing the mechanisms have not been put in place yet.	There is need to expedite regulations and guidelines for operationalizing the mechanisms	
8.1	8.1.1Set up environmental standards to limit the production or discharge of harmful (hazardous) wastes or products in sensitive ecosystems	The standards are generally already in place. They need to be reviewed and revised to meet current expectations.	There is need to expedite reviews and revision of regulations and guidelines.	
	8.1.2 Strengthen compliance to EIAs for all petroleum explorations and extractive industries	The regulatory reforms have generally been put in place. Even though new unforeseen challenges could emerge, and contingencies have also been indicated. Nonetheless, the current practice of environment management and monitoring plans (EMMPs) have not fully integrated the values of ecosystems and ecosystem services. The base indicators for environmental compliance may not have existed in some places limiting the scale of proposed actions.	There is need for the regulator to conducted separate studies to fill the gaps in the current compliance submissions made as part of the ESIAs. These compliance requirements may be appended to the EMMPs and audit reports.	There is some support from the Oil for Development project supported by the Norwegian Government; however, there is need to include more partners to protect the biodiversity in the AG.
	8.1.3 Support protection and restoration measures for degraded ecosystems, threatened species and migratory routes in oil exploration and production regions			
	8.1.4 Routinely improve/update the Sensitivity Atlas for the Albertine Graben	The implementation of the next Sensitivity Atlas has not been included in the FY 2019/20 work plan for the regulator. There should be efforts to include it soon as the last study was conducted over 10 years ago	There will be need to mobilise adequate technical and financial resources to undertake the studies and compile the atlas.	
	8.1.5 Support comprehensive awareness programmes and information flow regarding petroleum processes and biodiversity	There is already a strong information outflow. Nonetheless, the scale of the risk to biodiversity required more awareness creation and information flow. The information flow is generally limited to public hearings, reports, and newsletters.	There is need to enhance capacity of the local governments to communicate the biodiversity message related to oil and gas development as they have more engagement with the public through radio and extension activities.	

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
	8.1.6 Build the capacity and mobility of district and municipal environment officers (DEO/MEO) to effectively monitor oil and gas activities	Within the chain of environmental compliance, local governments have the least resources available to be able to undertake comprehensive monitoring of oil and gas activities	Mobilise additional resources and integrate them in district budgets and/or work with civil society organizations to strengthen the monitoring efforts of local governments.	
	8.1.7 Set up a biodiversity offset trust fund to ensure no net loss biodiversity due to petroleum activities	A biodiversity offset fund was proposed in the NBFP. However, the current mechanisms are based on one-offsets that are not centralized. There is need to design coordination and perhaps adopt a bio-banking model.	Participatory assessments and stakeholder agreement required, as well as working modalities. Additional technical and financial support would be required.	As part of the Environment Act (2018) and the Public Finance Management Act (2015) fiscal reforms can be undertaken to establish a fund managed by the Ministry of finance.
	8.1.8 Examine and implement opportunities for translocation of animals from sensitive areas where oil exploration is already taking place to other PAs	Work on translocations is ongoing. However, generally policies, guidelines and rules have not been developed. The translocations are quite expensive as the potential host sites also require additional resources for preparation.	Policy and regulatory reforms to support translocations are needed. There is need to mobilise technical and financial resources to minimize any potential negative impacts.	
8.2	8.2.1 Undertake awareness at all levels on the positive and negative impacts of biofuels on biodiversity	The biodiversity legislation was postponed by government. There are very few feasibility studies to demonstrate that biofuels can be viable undertaking and that the impacts on food security and industrial demand would be managed.	There is need to develop an advocacy message and build capacity of decision makers. A clear strategy needs to be designed and subjected to stakeholder engagement. The socioeconomic, and socio-political considerations need to be fully considered.	
	8.2.2 Develop a framework that promotes the positive and minimizes the negative impacts of biofuel production on biodiversity			
	8.2.3 Put in place measures to protect food and energy security of local communities including women and men when introducing biofuel crops			
	8.2.4 Assess and identify areas suitable for biofuel production and areas inappropriate for biofuel production	The biodiversity legislation was postponed by government. Action needs to be postponed until there is commitment from Government.		
	8.2.5 Ensure that EIAs are conducted for all biofuel projects and programmes			
	8.2.6 Promote and support research programmes on biofuels			
	8.2.7 Promote and support the use of environmentally-sound technologies which promote the positive and minimize the negative impacts of biofuel production on biodiversity			
8.3	8.3.1 Identify and implement risk management, mitigation and preparedness measures for biodiversity	There is need to develop a biodiversity based strategy. The OPM makes NEMA the lead agency for developing the strategy that would be comprehensive for all environmental considerations.	NEMA needs to mobilise financial and technical resources to undertake studies and then develop a comprehensive and cost efficient strategy.	The work undertaken as part of the biodiversity finance plan can be a starting point.
	8.3.2 Develop a Disaster Preparedness, Risk Reduction and Management Plan for protecting biodiversity			
	8.3.3 Mainstream Disaster Preparedness, Risk Reduction and Management Plan in key National, sectoral and Districts planning frameworks for protection of biodiversity	Whereas disaster preparedness is meant be mainstreamed into national, sectoral and district plans the legislation has never been tabled. The lack of a legislation has constrained actions outside those managed by the regulator.	There is need to provide technical and financial support to expedite the legislation. Technical and financial support needed for sector studies to	The Ministry of Finance has urged the OPM to prioritise the Disaster Preparedness, Risk Reduction and Management Legislation and strategic plan and the Ministry of finance to

National target	Description of actions/activities	Obstacles and barriers	Capacity needs	Additional information
	8.3.4 Improve disaster management systems, like early warning systems 8.3.5 Support participatory valuation and management of ecosystem services 8.3.6 Strengthen the capacity of Disaster Reduction and Management Committees at all levels	The National Environment Act (2018) provides for a limited scope of disaster preparedness. However, a national legislation at OPM is needed to trigger the actions of the other MDAs and local governments. The funding from the Ministry of Finance is limited to adequately undertake actions by local governments and MDAs.	undertake comprehensive institutional capacity for disaster management systems, like early warning systems, participatory valuation and management of ecosystem services and to Strengthen the capacity of Disaster Reduction and Management Committees. A national strategic plan for Disaster Preparedness, Risk Reduction and Management needs to be developed as part of the legislative reforms.	expedite financing for these efforts.

PART III. NATIONAL CONTRIBUTION TOWARDS AICHI BIODIVERSITY TARGETS AND GLOBAL STRATEGY FOR PLANT CONSERVATION

5. NATIONAL CONTRIBUTION TOWARDS AICHI BIODIVERSITY TARGETS AND GLOBAL STRATEGY FOR PLANT CONSERVATION

5.1 Contribution towards Aichi Targets

The contribution of the NBSAP II was first introduced in the section on the targets being pursued at the national level. Table 5.1 delineates the specific contributions of the national targets and strategies to the Aichi Biodiversity Targets.

Table 5.1: Contributions towards Aichi Biodiversity Targets

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
National Target 1.1	1.1.1 Strengthen the capacity of the biodiversity coordination mechanism	Aichi targets II.	1b: Society is aware of steps they can take to conserve and use biodiversity sustainably	On track to achieve target	Based on comprehensive evidence				
1.2	1.1.2 Develop an integrated biodiversity management policy framework	2: Integration of biodiversity values	2b: Biodiversity values are integrated into local and national planning processes	On track to achieve target	Based on partial evidence				
1.3	1.1.3 Map relevant stakeholders (women and men) at different levels, and establish/reinforce networks and task forces, including especially on gender and women's empowerment	1: Awareness of biodiversity values	2a: Biodiversity values are integrated into development and poverty reduction strategies	Progress towards target but at insufficien t rate	Based on partial evidence				
1.4	1.1.4 Conduct capacity building sessions on the NBSAP, gender and biodiversity, and implementing conservation plans and initiatives with a gender perspective across the environmental sector	18: Traditional knowledge integrated	14b: Ecosystems that are important for women, indigenous and local communities and poor and vulnerable are safeguarded	Progress towards target but at insufficien t rate	Based on partial evidence				
1.5	1.1.5 Lobby Government and other relevant stakeholders to put in place a coordination mechanism for implementation of Multilateral Environmental Conventions	20: Resource mobilization increased	17b: The NBSAP is adopted as a policy instrument	On track to achieve target	Based on comprehensive evidence				
1.6	1.1.6 Develop and utilize biodiversity and ecosystem services valuation tools to quantify and monitor the environmental, economic	15: Resilience enhanced, ecosystems restored	14a: Ecosystems that provide essential services are restored and safeguarded	On track to achieve target	Based on comprehensive evidence	4: Sustainable production and consumptio			

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
	and social value of biodiversity					n			
1.7	1.1.7 Develop guidelines for mainstreaming biodiversity into national, sectoral and district plans	2: Integration of biodiversity values	2c: Biodiversity values are incorporated into national accounting processes and procedures	On track to exceed target	Based on comprehensive evidence				
1.8	1.1.8 Undertake and utilize biodiversity and ecosystem services valuations to mainstream biodiversity into decision making and to develop a business case for biodiversity	4: Sustainable production and consumption	19a: The knowledge and science base on biodiversity is improved	On track to achieve target	Based on comprehensive evidence				
1.9	1.1.9 Undertake mapping of the status and trends of ecosystems (especially forests, wetlands and rangelands)	15: Resilience enhanced, ecosystems restored	4b: Actors have kept the impacts of use of natural resources well within safe ecological limits	On track to achieve target	Based on comprehensive evidence				
National Target 1.2	1.2.1 Develop a gender responsive guidelines for implementing NBSAPII	Corresponding Aichi 17	17c: The NBSAP is under implementation	Unknown	Based on limited evidence				
2.2	1.2.2 Produce and disseminate NBSAPII to stakeholders		17a: The NBSAP is developed and submitted	On track to exceed target	Based on comprehensive evidence				
2.3	1.2.3 Facilitate the mainstreaming of NBSAPII actions in national, sectoral and district plans and programmes	2: Integration of biodiversity values	2b: Biodiversity values are integrated into local and national planning processes	On track to achieve target	Based on comprehensive evidence				
2.4	1.2.4 Undertake regular cross-sectoral consultations on NBSAPII implementation	17: NBSAP adopted, commenced	17c: The NBSAP is under implementation	Unknown	Based on limited evidence				
National Target 1.3	1.3.1Develop and implement a gender responsive NBSAPII Monitoring and Evaluation strategy with SMART indicators	Aichi target 17:	18b: The full and effective participation of indigenous and local communities is secured	Unknown	Based on limited evidence				
3.2	1.3.2 Undertake Monitoring and Evaluation of the implementation of NBSAPII		17c: The NBSAP is under implementation	Unknown	Based on limited evidence				
National Target 2.1	2.1.1 Support innovative research, science and technology in the management of biodiversity with particular focus on value addition, product development and innovation with due considerations of women, men and youth	Corresponding Aichi targets 19	19a: The knowledge and science base on biodiversity is improved	On track to achieve target	Based on comprehensive evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
	2.1.2 Support Product testing and quality assurance and standards development		19b: The knowledge and science base on biodiversity is widely shared	On track to achieve target	Based on comprehensive evidence				
		13: Genetic diversity maintained							
	2.1.3Undertake taxonomic research to improve knowledge of little known taxa (especially those which may have commercial value)	19: Knowledge improved, shared, transferred	19a: The knowledge and science base on biodiversity is improved	On track to achieve target	Based on comprehensive evidence				
	2.1.4 Develop sector research priorities in biodiversity	19: Knowledge improved, shared, transferred	2d: Biodiversity values are integrated into national reporting systems	Progress towards target but at insufficien t rate	Based on partial evidence				
	2.1.5 Promote research and bioprospecting on PGR, including medicinal plants	19: Knowledge improved, shared, transferred	19a: The knowledge and science base on biodiversity is improved	On track to achieve target	Based on partial evidence				
	2.1.6 Enhance national capacity in information management and research which supports biodiversity conservation	18: Traditional knowledge integrated	2c: Biodiversity values are incorporated into national accounting processes and procedures	On track to exceed target	Based on partial evidence				
National Target 2.2	2.1.7 Ensure that Uganda benefits from international cooperation and opportunities for information exchange and support in the field of biodiversity at the local, national, regional and international levels	1: Awareness of biodiversity values	2c: Biodiversity values are incorporated into national accounting processes and procedures	Progress towards target but at insufficien t rate	Based on partial evidence				
National Target 2.2	2.2.1 Conduct awareness raising on the role of taxonomy in biodiversity conservation in public and private institutions	Corresponding Aichi target 19	1a: Society is aware of the values of biodiversity	Progress towards target but at insufficien t rate	Based on partial evidence				
	2.2.2 Create awareness on the application of taxonomic information in many production sectors of the country such as agriculture, trade, health, development and regulatory agencies as well as local communities		1b: Society is aware of steps they can take to conserve and use biodiversity sustainably	Progress towards target but at insufficien t rate	Based on partial evidence				
	2.2.3 Support institutions with taxonomic data and information (through funding, increased personnel or better infrastructure) to make this information easily available to end -users	18: Traditional knowledge integrated	20a: Mobilization of financial resources is increased substantially	Progress towards target but at insufficien t rate	Based on partial evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
	2.2.4 Support and train women, including women's indigenous groups and women's organizations, on taxonomy, taxonomic data, information	19: Knowledge improved, shared, transferred	14b: Ecosystems that are important for women, indigenous and local communities and poor and vulnerable are safeguarded	Unknown	Based on limited evidence				
	2.2.5 Develop taxonomic knowledge bases of biodiversity in formats that are accessible to women and men and other end users	19: Knowledge improved, shared, transferred	18b: The full and effective participation of indigenous and local communities is secured	Progress towards target but at insufficien t rate	Based on partial evidence				
	2.2.6 Improve taxonomic infrastructure and tools to provide adequate taxonomic information	19: Knowledge improved, shared, transferred	20a: Mobilization of financial resources is increased substantially	Progress towards target but at insufficien t rate	Based on partial evidence				
	2.2.7 Establish Center(s) of Taxonomic excellence	13: Genetic diversity maintained	2b: Biodiversity values are integrated into local and national planning processes	Unknown	Based on limited evidence				
	2.2.8 Undertake human resource capacity development in taxonomy at all levels and retain taxonomists with job descriptions in their institutions	3: Negative and positive incentives	9c: Priority species are controlled or eradicated	Unknown	Based on limited evidence				
National Target 2.3	2.2.9 Provide incentives/employment opportunities to women and men graduates with taxonomic backgrounds to retain them e.g. prioritizing taxonomy in Environmental Impact Assessments (EIA)	18: Traditional knowledge integrated	3a: Subsidies harmful to biodiversity are eliminated, phased out or reformed	Progress towards target but at insufficien t rate	Based on partial evidence				
National Target 2.3	2.3.1 Promote the role of traditional knowledge, innovations and practices in the management and use of biodiversity	Aichi target 18	14b: Ecosystems that are important for women, indigenous and local communities and poor and vulnerable are safeguarded	On track to achieve target	Based on partial evidence				
	2.3.2 Document traditional knowledge and practices of women and men that promote conservation and sustainable use of biodiversity e.g. in herbal medicine		14b: Ecosystems that are important for women, indigenous and local communities and poor and vulnerable are safeguarded	On track to achieve target	Based on partial evidence				
		10: Pressures on vulnerable ecosystems minimized							
	2.3.3 Develop Community Action Plans for biodiversity conservation in strategic areas	12: Extinctions prevented, status improved	14a: Ecosystems that provide essential services are restored and safeguarded	On track to achieve target	Based on comprehensive evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
National Target 3.1	2.3.4 Develop access and benefit sharing arrangements with indigenous peoples and local communities, with respect to intellectual property rights	12: Extinctions prevented, status improved	4a: Actors have taken steps or implemented plans for sustainable consumption and production	Unknown	Based on limited evidence				
National Target 3.1	3.1.1Develop and implement participatory PA management plans	Corresponding Aichi target 11	3b: Positive incentives are developed and applied	Unknown	Based on limited evidence				
	3.1.2 Promote protected areas as core drivers for nature-based tourism development in the local economy	12: Extinctions prevented, status improved	11e: Protected areas are managed effectively and equitably	On track to achieve target	Based on comprehensive evidence				
	3.1.3 Establish/maintain viable wildlife/biodiversity corridors with respect to community safeguards	7: Sustainable agriculture	14a: Ecosystems that provide essential services are restored and safeguarded	Progress towards target but at insufficien t rate	Based on limited evidence				
	3.1.4 Support gender-responsive alternative livelihood options for communities adjacent to PAs	10: Pressures on vulnerable ecosystems minimized	14b: Ecosystems that are important for women, indigenous and local communities and poor and vulnerable are safeguarded	On track to achieve target	Based on comprehensive evidence				
	3.1.5 Identify and implement PA networks to conserve ecologically sensitive vegetation types, habitats, species and genetic diversity	8: Pollution is not detrimental	11e: Protected areas are managed effectively and equitably	On track to achieve target	Based on partial evidence				
	3.1.6 Mitigate human wildlife conflicts	1: Awareness of biodiversity values	12a: The extinction of known threatened species has been prevented	On track to achieve target	Based on comprehensive evidence				
National Target 3.2	3.1.7 Strengthen partnerships with adjacent communities to PAs for mutual benefits (Supporting REDD+)	11: Protected areas (17%, 10%) effectively	11f: Protected areas are part of a well-connected network and integrated into the wider landscapes and seascapes	On track to achieve target	Based on comprehensive evidence				
National Target 3.2	3.2.1 Reduce deforestation and increase timber stocks countrywide to reduce pressure on current stocks, especially in natural forests	Corresponding Aichi target 15	15a: Ecosystem resilience and carbon stocks are conserved	On track to achieve target	Based on partial evidence				
	3.2.2 Develop guidelines and capacities for ensuring gender-responsive, equitable and transparent implementation of REDD+ in partnership with CSOs, including women's organizations	15: Resilience enhanced, ecosystems restored	17c: The NBSAP is under implementation	On track to achieve target	Based on partial evidence				
	3.2.3 Enhance carbon stocks and storage by mainstreaming climate change into the REDD+ strategy as well as in sector	7: Sustainable agriculture	15a: Ecosystem resilience and carbon stocks are conserved	Progress towards target but at insufficien	Based on partial evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
	policies, plans and projects			t rate					
	3.2.4 Support afforestation, tree planting and re-forestation activities at all levels	11: Protected areas (17%, 10%) effectively	15b: 15% restoration of degraded ecosystems enhances ecosystem resilience	Progress towards target but at insufficien t rate	Based on partial evidence				
	3.2.5 Promote and support restoration of degraded wetlands	15: Resilience enhanced, ecosystems restored	14a: Ecosystems that provide essential services are restored and safeguarded	Progress towards target but at insufficien t rate	Based on limited evidence				
	3.2.6 Enhance biodiversity and ecosystems' resilience to climate change especially in biodiversity hotspots	5: Rate of loss at least halved	11a: At least 17% of terrestrial and inland water are conserved	On track to achieve target	Based on partial evidence				
	3.2.7 Establish buffer zones for protection of critical conservation areas with high biodiversity within Pas	8: Pollution is not detrimental	11f: Protected areas are part of a well-connected network and integrated into the wider landscapes and seascapes	Progress towards target but at insufficien t rate	Based on limited evidence				
	3.2.8 Monitor and control bush burning in fire prone areas	13: Genetic diversity maintained	5a: The rate of loss of all natural habitats, including forests, is at least halved	Progress towards target but at insufficien t rate	Based on comprehensive evidence				
National Target 3.3	3.2.9 Collect and store diverse gene pools, including through community and women-led seed banks as a basis of genetic adaptation to climate change and for enhancing food and nutritional security	10: Pressures on vulnerable ecosystems minimized	13e: Strategies have been developed and implemented for minimizing genetic erosion	On track to achieve target	Based on partial evidence				
National Target 3.3	3.3.1 Protect threatened, endemic and vulnerable species inside and outside protected areas	Corresponding Aichi target 12	12a: The extinction of known threatened species has been prevented	On track to achieve target	Based on partial evidence				
	3.3.2 Support ex-situ conservation of plant and animal resources	18: Traditional knowledge integrated	13c: The genetic diversity of wild crop and animal relatives is maintained	On track to achieve target	Based on partial evidence				
	3.3.3 Engage local communities including women, men and youth in curbing destructive use of threatened plant species	12: Extinctions prevented, status improved	18b: The full and effective participation of indigenous and local communities is secured	Unknown	Based on limited evidence				
	3.3.4 Effectively combat poaching and illegal wildlife trade and trafficking through strengthening law enforcement	2: Integration of biodiversity values	12a: The extinction of known threatened species has been prevented	On track to achieve target	Based on comprehensive evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
	3.3.5Strengthen the capacity of CITES Management Authority and CITES Competent Authorities	12: Extinctions prevented, status improved	20a: Mobilization of financial resources is increased substantially	On track to achieve target	Based on comprehensive evidence				
National Target 3.4	3.3.6 Strengthen PA institutional capacity and coordination for effective monitoring of wildlife	13: Genetic diversity maintained	3b: Positive incentives are developed and applied	On track to achieve target	Based on comprehensive evidence				
National Target 3.4	3.4.1 Collect through local and gender-responsive approach information on availability of plant and animal germplasm	Corresponding Aichi target 13	18a: The traditional knowledge of indigenous and local communities is respected and fully integrated into implementation of the Convention	On track to achieve target	Based on comprehensive evidence				
	3.4.2 Support national and local repositories for plant and animal genetic resources	9: Invasive controlled	13e: Strategies have been developed and implemented for minimizing genetic erosion	On track to achieve target	Based on comprehensive evidence				
	3.4.3 Identify, collect and conserve indigenous species and varieties	13: Genetic diversity maintained	9b: Invasive alien species pathways are identified and prioritized	On track to achieve target	Based on comprehensive evidence				
	3.4.4 Reintroduce germplasm of species extinct in the country	13: Genetic diversity maintained	12a: The extinction of known threatened species has been prevented	On track to achieve target	Based on comprehensive evidence				
	3.4.5 Strengthen human and infrastructural capacity for genetic resources conservation and management	1: Awareness of biodiversity values	13e: Strategies have been developed and implemented for minimizing genetic erosion	On track to achieve target	Based on comprehensive evidence				
National Target 3.5	3.4.6 Educate local farmers including women, men and youth on the importance of preserving genetic diversity	5: Rate of loss at least halved	18b: The full and effective participation of indigenous and local communities is secured	On track to achieve target	Based on comprehensive evidence	14: Essential ecosystem services restored			
National Target 3.5	3.5.1 Identify, map and prioritize degraded habitats including forests and wetlands	Corresponding Aichi targets 5	5a: The rate of loss of all natural habitats, including forests, is at least halved	On track to achieve target	Based on partial evidence	Corresponding Aichi target 14	14a: Ecosystems that provide essential services are restored and safeguarded	On track to achieve target	Based on partial evidence
	3.5.2 Assess the rate of conversion of the degraded/threatened habitats by human activities	5: Rate of loss at least halved	5b: The rate of loss of all habitats is brought close to zero	On track to achieve target	Based on partial evidence				
	3.5.3 Estimate the productivity of the degraded/threatened habitats	8: Pollution is not detrimental	4a: Actors have taken steps or implemented plans for sustainable consumption and production	On track to achieve target	Based on partial evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
	3.5.4 Estimate the proportion of land affected by desertification	1: Awareness of biodiversity values	4b: Actors have kept the impacts of use of natural resources well within safe ecological limits	On track to achieve target	Based on partial evidence				
	3.5.5 Promote awareness on regulations that protect fragile ecosystems	5: Rate of loss at least halved	3b: Positive incentives are developed and applied	On track to achieve target	Based on partial evidence				
	3.5.6 Sensitize policy makers on drivers of habitat loss, and for support to reverse the rate of habitat loss	11: Protected areas (17%, 10%) effectively	4a: Actors have taken steps or implemented plans for sustainable consumption and production	On track to achieve target	Based on partial evidence				
	3.5.7 Put in place species recovery plans for the degraded/threatened habitats	14: Essential ecosystem services restored	4a: Actors have taken steps or implemented plans for sustainable consumption and production	Progress towards target but at insufficien t rate	Based on partial evidence				
	3.5.8 Restore and safeguard ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being	20: Resource mobilization increased	14a: Ecosystems that provide essential services are restored and safeguarded	On track to achieve target	Based on partial evidence				
National Target 3.6	3.5.9 Develop mechanisms for fair and equitable sharing of costs and benefits of using wetlands	7: Sustainable agriculture	7b: Areas under aquaculture are managed sustainably	On track to achieve target	Based on partial evidence				
National Target 3.6	3.6.1Promote agricultural practices which minimize the negative impacts of agricultural production on biodiversity and ecosystem functioning	Corresponding Aichi target 7: By 2020, areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity	7a: Areas under agriculture are managed sustainably	On track to achieve target	Based on limited evidence				
	3.6.2 Promote agro-forestry practices among local communities with particular focus on women and men farmers (supporting REDD+)		14b: Ecosystems that are important for women, indigenous and local communities and poor and vulnerable are safeguarded	Progress towards target but at insufficien t rate	Based on partial evidence				
	3.6.3 Strengthen tenure rights, including of women farmers to support sustainable land management (SLM) practices that conserve agro-biodiversity		18a: The traditional knowledge of indigenous and local communities is respected and fully integrated into implementation of the Convention	On track to achieve target	Based on partial evidence				
	3.6.4Promote sustainable management practices to support the conservation and sustainable use of biodiversity in forests	10: Pressures on vulnerable ecosystems minimized	7c: Areas under forestry are managed sustainably	Progress towards target but at insufficien	Based on partial evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
				t rate					
	3.6.5 Support local communities including IPLCs, women and men to diversify their livelihoods through biodiversity friendly enterprises which ease pressure on the resource base	1: Awareness of biodiversity values	18a: The traditional knowledge of indigenous and local communities is respected and fully integrated into implementation of the Convention	On track to achieve target	Based on partial evidence				
	3.6.6 Promote women's enterprises to enhance their participation and leadership in biodiversity conservation	14: Essential ecosystem services restored	18a: The traditional knowledge of indigenous and local communities is respected and fully integrated into implementation of the Convention	Progress towards target but at insufficien t rate	Based on partial evidence				
	3.6.7 Implement forest management planning that zones and protects timber production to meet demand whilst restocking for future needs (supporting REDD+)	19: Knowledge improved, shared, transferred	5c: Degradation and fragmentation is significantly reduced	On track to achieve target	Based on partial evidence				
National Target 3.7	3.6.8 Improve forest timber harvesting and utilization technologies (supporting REDD+)	8: Pollution is not detrimental	12a: The extinction of known threatened species has been prevented	Progress towards target but at insufficien t rate	Based on partial evidence				
National Target 3.7	3.7.1 Monitor and enforce compliance to effluent standards requirements	Corresponding Aichi target 8	8a: Pollution has been brought to levels not detrimental to ecosystem function and biodiversity	On track to achieve target	Based on partial evidence				
	3.7.2 Monitor the impact of agrochemicals on selected pollinators		8b: Excess nutrients have been brought to levels not detrimental to ecosystem function and biodiversity	Progress towards target but at insufficien t rate	Based on partial evidence				
National Target 3.8	3.7.3 Manage all forms of waste in an effective and efficient manner to reduce its negative impact on the environment, including through local-level waste management and recycling initiatives		8a: Pollution has been brought to levels not detrimental to ecosystem function and biodiversity	On track to achieve target	Based on partial evidence				
National Target 3.8	3.8.1 Develop and implement management plans to prevent the establishment and introduction of alien invasive species	Corresponding Aichi target 9	9d: Measures are in place to manage pathways to prevent their introduction and establishment	On track to achieve target	Based on partial evidence				
National Target 3.9	3.8.2 eradication or control existing alien invasive species	6: Fisheries are sustainably managed	9c: Priority species are controlled or eradicated	On track to achieve target	Based on partial evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
National Target 3.9	3.9.1 Put in place effective control measures to manage fishing and alien fish species such as the Nile Perch Salvinia molesta including promoting awareness of existing regulations	Corresponding Aichi target 6s	3a: Subsidies harmful to biodiversity are eliminated, phased out or reformed	On track to achieve target	Based on comprehensive evidence				
	3.9.2 Put in place and implement control measures for the Water Hyacinth, and the congress weed	6: Fisheries are sustainably managed	20a: Mobilization of financial resources is increased substantially	On track to achieve target	Based on partial evidence				
	3.9.3 Promote sustainable aquaculture for local communities including women and men for socio-economic development	12: Extinctions prevented, status improved	7b: Areas under aquaculture are managed sustainably	On track to achieve target	Based on comprehensive evidence				
	3.9.4 Undertake SEA/EIA on policies, programmes or projects that are likely to have significantly negative impacts on aquatic biodiversity	5: Rate of loss at least halved	3a: Subsidies harmful to biodiversity are eliminated, phased out or reformed	On track to achieve target	Based on partial evidence				
	3.9.5 Develop and or implement appropriate mitigation measures against habitat degradation of open water resources including by identifying and promoting alternative livelihood sources for women and men	14: Essential ecosystem services restored	5b: The rate of loss of all habitats is brought close to zero	On track to achieve target	Based on partial evidence				
	3.9.6 Promote private sector investment and participation in aquatic biodiversity conservation	6: Fisheries are sustainably managed	11e: Protected areas are managed effectively and equitably	On track to achieve target	Based on partial evidence				
National Target 3.10	3.9.7 Support transboundary management of fisheries resources	4: Sustainable production and consumption	11a: At least 17% of terrestrial and inland water are conserved	On track to achieve target	Based on comprehensive evidence				
National Target 3.10	3.10.1 Strengthen community and resource use groups participation in fisheries management, including by identifying gender-differentiated roles across the sector	Corresponding Aichi target 6	6b: Fish recovery plans are developed and measures in place for all depleted species	On track to achieve target	Based on partial evidence				
	3.10.2 Regulate and control importation and usage of fishing gears		6a: Fish and invertebrate stocks and aquatic plants are managed sustainably	On track to achieve target	Based on comprehensive evidence				
	3.10.3 Strengthen monitoring, control and surveillance fishing activities		6d: The impacts of fishers on stocks, species and ecosystems are within safe ecological limits	On track to achieve target	Based on comprehensive evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
	3.10.4 Develop and implement gender-responsive community fisheries management plans	20: Resource mobilization increased	14b: Ecosystems that are important for women, indigenous and local communities and poor and vulnerable are safeguarded	On track to achieve target	Based on comprehensive evidence				
National Target 4.1	3.10.5 Provide adequate support to Beach Management Units (BMU)	3: Negative and positive incentives	20a: Mobilization of financial resources is increased substantially	On track to achieve target	Based on partial evidence				
National Target 4.1	4.1.1 Develop economic instruments to encourage activities that enhance biodiversity conservation and discourages activities that impact negatively on biodiversity	Aichi target 3	3b: Positive incentives are developed and applied	On track to achieve target	Based on partial evidence				
	4.1.2 Identify and support women groups to adopt more sustainable alternatives for household and income-generating activities to enhance livelihoods and biodiversity conservation	3: Negative and positive incentives	18a: The traditional knowledge of indigenous and local communities is respected and fully integrated into implementation of the Convention	On track to achieve target	Based on partial evidence				
	4.1.3 Introduce pro-poor environmental taxes and levies and market-based instruments	4: Sustainable production and consumption	3b: Positive incentives are developed and applied	On track to achieve target	Based on limited evidence				
	4.1.4 Promote and support Green Procurement through purchasing of environmentally preferable products or services, taking into consideration the necessity, not only for quality and price, but also for biodiversity conservation-conscious business	3: Negative and positive incentives	3a: Subsidies harmful to biodiversity are eliminated, phased out or reformed	Progress towards target but at insufficien t rate	Based on limited evidence				
	4.1.5 Undertake Environmental Impact Assessments (EIA) of all policies, programmes or projects which have the potential for negative—or positive—impacts on biodiversity	2: Integration of biodiversity values	4b: Actors have kept the impacts of use of natural resources well within safe ecological limits	On track to achieve target	Based on partial evidence				
National Target 4.2	4.1.6 Integrate biodiversity accounting into national accounting and reporting processes	2: Integration of biodiversity values	2c: Biodiversity values are incorporated into national accounting processes and procedures	On track to achieve target	Based on partial evidence				
National Target 4.2	4.2.1 Promote PPP to collect, harvest and process plant based products for commercialization	Aichi target 13	13d: Plants of socio-cultural importance are maintained	On track to achieve target	Based on comprehensive evidence				
National Target 4.3	4.2.2 Support value addition on plant based products for commercialization by local community groups	20: Resource mobilization increased	13d: Plants of socio-cultural importance are maintained	On track to achieve target	Based on comprehensive evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
National Target 4.3	4.3.1 Develop and implement mechanisms for sharing the benefits from access to PGR in the country	Aichi target 13	12b: The conservation status of threatened species has been improved and sustained	On track to achieve target	Based on comprehensive evidence				
	4.3.2 Document traditional knowledge, innovations and practices in PGR	19: Knowledge improved, shared, transferred	18a: The traditional knowledge of indigenous and local communities is respected and fully integrated into implementation of the Convention	On track to achieve target	Based on comprehensive evidence				
	4.3.3 Disseminate traditional knowledge information/documents to enhance sustainable use of biodiversity (planning for food security and health care, i.e. medicinal plants)	20: Resource mobilization increased	18a: The traditional knowledge of indigenous and local communities is respected and fully integrated into implementation of the Convention	Progress towards target but at insufficien t rate	Based on partial evidence				
National Target 4.4	4.3.4 Initiate and support community based PGR management initiatives in various parts of the country	16: Nagoya Protocol operational	18b: The full and effective participation of indigenous and local communities is secured	On track to achieve target	Based on partial evidence				
National Target 4.4	4.4.1 Accede to the Nagoya Protocol on ABS	Aichi target 16	16a: The Nagoya Protocol is in force	On track to exceed target	Based on comprehensive evidence				
	4.4.2 Review the ABS Regulations and incorporate relevant elements of the Nagoya Protocol	16: Nagoya Protocol operational	16b: The Nagoya Protocol is operational	On track to achieve target	Based on comprehensive evidence				
	4.4.3 Build capacity to enforce the Nagoya protocol on ABS	16: Nagoya Protocol operational	16b: The Nagoya Protocol is operational	Progress towards target but at insufficien t rate	Based on limited evidence				
	4.4.4 Promote and regulate bioprospecting and biotrade activities	16: Nagoya Protocol operational	16a: The Nagoya Protocol is in force	On track to achieve target	Based on partial evidence				
National Target 5.1	4.4.5 Support the Establishment of a functional Intellectual Property (IP) regime on ABS	17: NBSAP adopted, commenced	16b: The Nagoya Protocol is operational	Progress towards target but at insufficien t rate	Based on limited evidence				
National Target 5.1	5.1.1 Undertake intensive awareness raising on the content of NBSAPII at all levels	Aichi targets 1	17a: The NBSAP is developed and submitted	Progress towards target but at insufficien t rate	Based on limited evidence				
	5.1.2 Develop and disseminate user-friendly and gender-responsive Information Education and Communication materials (IECs) for popular campaigns targeting women as agents of change		18a: The traditional knowledge of indigenous and local communities is respected and fully integrated into implementation of the Convention	Progress towards target but at insufficien t rate	Based on limited evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
	for conservation								
	5.1.3 Sensitize local communities including IPLCs on biodiversity conservation	1: Awareness of biodiversity values	1b: Society is aware of steps they can take to conserve and use biodiversity sustainably	Progress towards target but at insufficient rate	Based on limited evidence				
National 5.2	5.1.4 Develop and disseminate gender-responsive biodiversity public awareness materials	1: Awareness of biodiversity values	17c: The NBSAP is under implementation	Progress towards target but at insufficient rate	Based on partial evidence				
National Target 5.2	5.2.1Develop and implement educational programs on biodiversity issues relevant to Uganda	Aichi targets 1	2b: Biodiversity values are integrated into local and national planning processes	On track to achieve target	Based on partial evidence				
	5.2.2 Strengthen and/or establish environmental clubs or societies		1a: Society is aware of the values of biodiversity	On track to achieve target	Based on comprehensive evidence				
National Target 5.3	5.2.3 Develop and disseminate gender-responsive educational materials on biodiversity	20: Resource mobilization increased	17c: The NBSAP is under implementation	Progress towards target but at insufficient rate	Based on partial evidence				
National Target 5.3	5.3.1 Seek support to enable women and men personnel to attend regional and international fora relevant to biodiversity	Corresponding Aichi target 1	1b: Society is aware of steps they can take to conserve and use biodiversity sustainably	Progress towards target but at insufficient rate	Based on comprehensive evidence				
National Target 6.1	5.3.2 Develop proposals for supporting biodiversity conservation programs at national level		2b: Biodiversity values are integrated into local and national planning processes	On track to achieve target	Based on comprehensive evidence				
National Target 6.1	6.1.1Conduct a baseline study on level of public awareness and education on the benefits and risks of biotechnology and Biosafety	Corresponding Aichi target 19	19b: The knowledge and science base on biodiversity is widely shared	On track to achieve target	Based on partial evidence				
	6.1.2 Establish and operationalize Biosafety Clearing House (BCH)		19a: The knowledge and science base on biodiversity is improved	Progress towards target but at insufficient rate	Based on partial evidence				
	6.1.3 Conduct specialized trainings in Biosafety for regulators and inspectors		19a: The knowledge and science base on biodiversity is improved	Progress towards target but at insufficient rate	Based on partial evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
	6.1.4 Conduct specialized biotechnology communication for media specialists	18: Traditional knowledge integrated	19b: The knowledge and science base on biodiversity is widely shared	Progress towards target but at insufficient rate	Based on partial evidence				
National Target 6.2	6.1.5 Conduct trainings in biotechnology and biosafety for women and men	2: Integration of biodiversity values	18b: The full and effective participation of indigenous and local communities is secured	Progress towards target but at insufficient rate	Based on partial evidence				
National Target 6.2	6.2.1Assess national capacities in biotechnology and Biosafety	Corresponding Aichi target 19	17b: The NBSAP is adopted as a policy instrument	Progress towards target but at insufficient rate	Based on partial evidence				
	6.2.2 Support the development of skilled human resources for biotechnology and Biosafety		19a: The knowledge and science base on biodiversity is improved	On track to achieve target	Based on partial evidence				
	6.2.3 Promote infrastructural Development and Research on biotechnology and Biosafety.		19a: The knowledge and science base on biodiversity is improved	Progress towards target but at insufficient rate	Based on partial evidence				
National Target 6.3	6.2.4 Develop and apply biotechnology tools for identification, characterization and conservation of biodiversity	1: Awareness of biodiversity values	19b: The knowledge and science base on biodiversity is widely shared	Progress towards target but at insufficient rate	Based on partial evidence				
National Target 6.3	6.3.1 Undertake widespread awareness on the benefits and risks associated with biotechnology	Corresponding Aichi target 19	2a: Biodiversity values are integrated into development and poverty reduction strategies	On track to achieve target	Based on partial evidence				
	6.3.2 Popularize the Biotechnology and Biosafety Policy	17: NBSAP adopted, commenced	17b: The NBSAP is adopted as a policy instrument	Progress towards target but at insufficient rate	Based on partial evidence				
	6.3.3 Advocate for the approval of the National Biotechnology and Biosafety Bill to enable regulation of Biotechnology and Biosafety developments in the country.	17: NBSAP adopted, commenced	2b: Biodiversity values are integrated into local and national planning processes	On track to achieve target	Based on partial evidence				
	6.3.4 Popularize the Biosafety and Biotechnology Policy and Bill/Act	17: NBSAP adopted, commenced	18a: The traditional knowledge of indigenous and local communities is respected and fully integrated into implementation of the Convention	On track to exceed target	Based on partial evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
	6.3.5 develop guidelines on compliance to biosafety	12: Extinctions prevented, status improved	2d: Biodiversity values are integrated into national reporting systems	Unknown	Based on limited evidence				
	6.3.6 Enhance the regulatory performance of the National Biosafety Committee (NBC)and the Institutional Biosafety Committees (IBC)	10: Pressures on vulnerable ecosystems minimized	2b: Biodiversity values are integrated into local and national planning processes	Unknown	Based on limited evidence				
National Target 6.4	6.3.7 Promote public-private partnerships (PPP) in biotechnology development	1: Awareness of biodiversity values	1a: Society is aware of the values of biodiversity	Unknown	Based on limited evidence				
National Target 6.4	6.4.1 Organize and conduct gender-responsive national and local stakeholder awareness creation campaigns on biosafety	Corresponding Aichi target 19	14b: Ecosystems that are important for women, indigenous and local communities and poor and vulnerable are safeguarded	Unknown	Based on limited evidence				
	6.4.2 Support tertiary Institutions to run short courses on biosafety	17: NBSAP adopted, commenced	1a: Society is aware of the values of biodiversity	On track to achieve target	Based on partial evidence				
		17: NBSAP adopted, commenced							
	6.4.4 Support the full implementation of the Nagoya Supplementary Protocol on Liability and Redress	20: Resource mobilization increased	16b: The Nagoya Protocol is operational	On track to achieve target	Based on partial evidence				
National Target 6.5	6.5.1 Promote management oriented research and development in medical, agricultural land industrial biotechnology.	Corresponding Aichi target 19	19a: The knowledge and science base on biodiversity is improved	Progress towards target but at insufficien t rate	Based on partial evidence				
National Target 7.1	6.5.2 Undertake ESIA or risk assessments on biotechnology plans, programmes and projects	19: Knowledge improved, shared, transferred	3a: Subsidies harmful to biodiversity are eliminated, phased out or reformed	Unknown	Based on limited evidence				
	6.5.3 Establish a strong and effective monitoring system for biotechnology use and applications	20: Resource mobilization increased	3b: Positive incentives are developed and applied	Unknown	Based on limited evidence				
	6.5.4 Develop and implement mechanisms for sharing costs and benefits of biotechnology	17: NBSAP adopted, commenced	20a: Mobilization of financial resources is increased substantially	Unknown	Based on limited evidence				
National Target 7.2	6.5.6 Promote integration of biotechnology values into macroeconomic frameworks	20: Resource mobilization increased	2d: Biodiversity values are integrated into national reporting systems	Unknown	Based on limited evidence				
National Target 7.1	7.1.1 Undertake a study to collect information which will guide in the development of guidelines for financing biodiversity in Uganda	Aichi target 20	18b: The full and effective participation of indigenous and local communities is secured	On track to exceed target	Based on comprehensive evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
	7.1.2 Develop and implement guidelines for financing biodiversity in Uganda	20: Resource mobilization increased	20a: Mobilization of financial resources is increased substantially	On track to exceed target	Based on comprehensive evidence				
	7.1.3 Develop Biodiversity Finance Plan	20: Resource mobilization increased	2a: Biodiversity values are integrated into development and poverty reduction strategies	Progress towards target but at insufficien t rate	Based on comprehensive evidence				
National Target 7.2	7.2.1 Identify and seek funding support from diverse sources including regional and bilateral development partners, foundations and private sector	Target 20.	20a: Mobilization of financial resources is increased substantially	On track to exceed target	Based on comprehensive evidence				
	7.2.2 Support capacity building for writing project proposals that are gender-responsive	20: Resource mobilization increased	11c: Areas of particular importance for biodiversity and ecosystem services are conserved	Progress towards target but at insufficien t rate	Based on limited evidence				
National Target 7.3	7.2.3 Develop project proposals to target designated donors under the CBD	20: Resource mobilization increased	20a: Mobilization of financial resources is increased substantially	On track to achieve target	Based on partial evidence				
	7.2.5 Mobilize resources by creating synergies between the different multilateral Environmental Conventions	3: Negative and positive incentives	2c: Biodiversity values are incorporated into national accounting processes and procedures	On track to achieve target	Based on partial evidence				
	7.2.6 Budget for activities of biodiversity and incorporate in annual budget of Line ministries, NGOs, private sector	3: Negative and positive incentives	2b: Biodiversity values are integrated into local and national planning processes	Progress towards target but at insufficien t rate	Based on partial evidence				
	7.2.7 Promote accountability, transparency, gender mainstreaming in implementation of biodiversity projects	3: Negative and positive incentives	2a: Biodiversity values are integrated into development and poverty reduction strategies	Progress towards target but at insufficien t rate	Based on partial evidence				
National Target 7.3	7.3.1 Put in place an enabling policy or legislative framework for new biodiversity financing mechanisms	Target 20	4a: Actors have taken steps or implemented plans for sustainable consumption and production	On track to exceed target	Based on partial evidence				
	7.3.2 Issue environment bonds	4: Sustainable production and consumption	3b: Positive incentives are developed and applied	Unknown	Based on limited evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
	7.3.3 Provide incentives that promote green production and purchase of green goods	12: Extinctions prevented, status improved	4a: Actors have taken steps or implemented plans for sustainable consumption and production	Progress towards target but at insufficien t rate	Based on partial evidence				
	7.3.4 Institute appropriate pricing mechanisms for biodiversity goods and services	12: Extinctions prevented, status improved	20a: Mobilization of financial resources is increased substantially	Progress towards target but at insufficien t rate	Based on partial evidence				
National Target 8.1	7.3.5 Support green marathon	8: Pollution is not detrimental	2c: Biodiversity values are incorporated into national accounting processes and procedures	On track to achieve target	Based on comprehensive evidence				
	7.3.6 Promote green products and technologies	1: Awareness of biodiversity values	19a: The knowledge and science base on biodiversity is improved	On track to achieve target	Based on comprehensive evidence				
	7.3.8 Support sensitization and capacity development to companies about benefits from ecosystem services	14: Essential ecosystem services restored	14a: Ecosystems that provide essential services are restored and safeguarded	On track to achieve target	Based on comprehensive evidence				
	7.3.9 Enhance payment for ecosystem services and biodiversity offsets	5: Rate of loss at least halved	4a: Actors have taken steps or implemented plans for sustainable consumption and production	On track to achieve target	Based on comprehensive evidence				
National Target 8.1	8.1.1Set up environmental standards to limit the production or discharge of harmful (hazardous) wastes or products in sensitive ecosystems	Related Aichi target 8	8a: Pollution has been brought to levels not detrimental to ecosystem function and biodiversity	On track to achieve target	Based on comprehensive evidence				
	8.1.2 Strengthen compliance to t EIAs for all petroleum explorations and extractive industries		8a: Pollution has been brought to levels not detrimental to ecosystem function and biodiversity	On track to achieve target	Based on comprehensive evidence				
	8.1.3 Support protection and restoration measures for degraded ecosystems, threatened species and migratory routes in oil exploration and production regions	5: Rate of loss at least halved	14a: Ecosystems that provide essential services are restored and safeguarded	On track to achieve target	Based on partial evidence				
	8.1.4 Routinely improve/update the Sensitivity Atlas for the Albertine Graben	12: Extinctions prevented, status improved	8a: Pollution has been brought to levels not detrimental to ecosystem function and biodiversity	Progress towards target but at insufficien t rate	Based on comprehensive evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
National Target 8.2	8.1.5 Support comprehensive awareness programmes and information flow regarding petroleum processes and biodiversity	3: Negative and positive incentives	4a: Actors have taken steps or implemented plans for sustainable consumption and production	Progress towards target but at insufficien t rate	Based on comprehensive evidence				
	8.1.6 Build the capacity and mobility of district and municipal environment officers (DEO/MEO) to effectively monitor oil and gas activities	3: Negative and positive incentives	2b: Biodiversity values are integrated into local and national planning processes	On track to achieve target	Based on partial evidence				
	8.1.7 Set up a biodiversity offset trust fund to ensure no net loss biodiversity due to petroleum activities	3: Negative and positive incentives	19b: The knowledge and science base on biodiversity is widely shared	Progress towards target but at insufficien t rate	Based on partial evidence				
	8.1.8 Examine and implement opportunities for translocation of animals from sensitive areas where oil exploration is already taking place to other PAs	4: Sustainable production and consumption	11c: Areas of particular importance for biodiversity and ecosystem services are conserved	Progress towards target but at insufficien t rate	Based on partial evidence				
National Target 8.2	8.2.1Undertake awareness at all levels on the positive and negative impacts of biofuels on biodiversity	Related to Aichi target 7	4b: Actors have kept the impacts of use of natural resources well within safe ecological limits	Progress towards target but at insufficien t rate	Based on partial evidence				
	8.2.2 Develop a framework that promotes the positive and minimizes the negative impacts of biofuel production on biodiversity		4a: Actors have taken steps or implemented plans for sustainable consumption and production	Progress towards target but at insufficien t rate	Based on partial evidence				
	8.2.3 Put in place measures to protect food and energy security of local communities including women and men when introducing biofuel crops	4: Sustainable production and consumption	18a: The traditional knowledge of indigenous and local communities is respected and fully integrated into implementation of the Convention	Progress towards target but at insufficien t rate	Based on limited evidence				
National Target 8.3	8.2.4 Assess and identify areas suitable for biofuel production and areas inappropriate for biofuel production	2: Integration of biodiversity values	11c: Areas of particular importance for biodiversity and ecosystem services are conserved	Progress towards target but at insufficien t rate	Based on limited evidence	15: Resilience enhanced, ecosystems restored	15a: Ecosystem resilience and carbon stocks are conserved	Progress towards target but at insufficient rate	Based on limited evidence
	8.2.5 Ensure that EIAs are conducted for all biofuel projects and programmes	2: Integration of biodiversity values	8a: Pollution has been brought to levels not detrimental to ecosystem function and biodiversity	Progress towards target but at insufficien t rate	Based on limited evidence				
	8.2.6 Promote and support research programmes on biofuels	2: Integration of biodiversity values	18b: The full and effective participation of indigenous and local communities is secured	Progress towards target but at insufficien t rate	Based on limited evidence				

National Target	Description of actions	Primary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence	Secondary Aichi Biodiversity Targets	Sub-elements of each Aichi Biodiversity Target	Progress in achieving sub-element of the Aichi	Level of confidence
	8.2.7 Promote and support the use of environmentally-sound technologies which promote the positive and minimize the negative impacts of biofuel production on biodiversity	3: Negative and positive incentives	19a: The knowledge and science base on biodiversity is improved	Progress towards target but at insufficien t rate	Based on limited evidence				
National Target 8.3	8.3.1 Identify and implement risk management, mitigation and preparedness measures for biodiversity	Related to Aichi target 14	1b: Society is aware of steps they can take to conserve and use biodiversity sustainably	On track to achieve target	Based on partial evidence	Related to Aichi target 15	15a: Ecosystem resilience and carbon stocks are conserved	On track to achieve target	Based on partial evidence
	8.3.2 Develop a Disaster Preparedness, Risk Reduction and Management Plan for protecting biodiversity	20: Resource mobilization increased	1b: Society is aware of steps they can take to conserve and use biodiversity sustainably	Progress towards target but at insufficien t rate	Based on partial evidence	15: Resilience enhanced, ecosystems restored			
	8.3.3 Mainstream Disaster Preparedness, Risk Reduction and Management Plan in key National, sectoral and Districts planning frameworks for protection of biodiversity		2b: Biodiversity values are integrated into local and national planning processes	Progress towards target but at insufficien t rate	Based on partial evidence				
	8.3.4 Improve disaster management systems, like early warning systems		2b: Biodiversity values are integrated into local and national planning processes	Progress towards target but at insufficien t rate	Based on partial evidence				
	8.3.5 Support participatory valuation and management of ecosystem services		14a: Ecosystems that provide essential services are restored and safeguarded	Progress towards target but at insufficien t rate	Based on partial evidence				
	8.3.6 Strengthen the capacity of Disaster Reduction and Management Committees at all levels		2b: Biodiversity values are integrated into local and national planning processes	On track to achieve target	Based on partial evidence				

5.2 Contribution to Sustainable Development Goals

The contributions of NBSAP II to the sustainable development goals are delineated in Table 5.2 below.

Table 5.2: Contributions towards Sustainable Development Goals

	Description of actions	Primary SDG	Primary SDG Target
National Target 1.1	1.1.1 Strengthen the capacity of the biodiversity coordination mechanism	Implementation	17.9 Enhance targeted capacity building to support national plans
	1.1.2 Develop an integrated biodiversity management policy framework	Implementation	17.2 Official development assistance commitments
	1.1.3 Map relevant stakeholders (women and men) at different levels, and establish/reinforce networks and task forces, including especially on gender and women's empowerment	Gender	5.5 Ensure women's participation
	1.1.4 Conduct capacity building sessions on the NBSAP, gender and biodiversity, and implementing conservation plans and initiatives with a gender perspective across the environmental sector	Inequality	10.2 Promote inclusion of all
	1.1.5 Lobby Government and other relevant stakeholders to put in place a	Implementation	17.9 Enhance targeted capacity building to support

	Description of actions	Primary SDG	Primary SDG Target
	coordination mechanism for implementation of Multilateral Environmental Conventions		national plans
	1.1.6 Develop and utilize biodiversity and ecosystem services valuation tools to quantify and monitor the environmental, economic and social value of biodiversity	Growth	8.4 Decouple growth from environmental degradation
	1.1.7 Develop guidelines for mainstreaming biodiversity into national, sectoral and district plans	Terrestrial ecosystems	15.9 Integrate biodiversity values into national planning, poverty reduction
	1.1.8 Undertake and utilize biodiversity and ecosystem services valuations to mainstream biodiversity into decision making and to develop a business case for biodiversity	Peace	16.7 Ensure inclusive, participatory decision making
	1.1.9 Undertake mapping of the status and trends of ecosystems (especially forests, wetlands and rangelands)	Terrestrial ecosystems	15.1 Ensure conservation, restoration, sustainable use of ecosystems and services
National Target 1.2	1.2.1 Develop a gender responsive guidelines for implementing NBSAPII	Gender	5.1 End gender discrimination
	1.2.2 Produce and disseminate NBSAPII to stakeholders	Education	4.6 Literacy and numeracy
	1.2.3 Facilitate the mainstreaming of NBSAPII actions in national, sectoral and district plans and programmes	Implementation	17.9 Enhance targeted capacity building to support national plans
	1.2.4 Undertake regular cross-sectoral consultations on NBSAPII implementation	Implementation	17.13 Policy coordination and policy coherence for macroeconomic
National Target 1.3	1.3.1Develop and implement a gender responsive NBSAPII Monitoring and Evaluation strategy with SMART indicators	Gender	5.1 End gender discrimination
	1.3.2 Undertake Monitoring and Evaluation of the implementation of NBSAPII	Implementation	17.2 Official development assistance commitments
National Target 2.1	2.1.1 Support innovative research, science and technology in the management of biodiversity with particular focus on value addition, product development and innovation with due considerations of women, men and youth	Growth	8.2 Diversify economies, value added
	2.1.2 Support Product testing and quality assurance and standards development	Consumption	12.4 Sound management of chemicals
	2.1.3Undertake taxonomic research to improve knowledge of little known taxa (especially those which may have commercial value)	Resilient infrastructure	9.5 Increase research and development
	2.1.4 Develop sector research priorities in biodiversity	Resilient infrastructure	9.1 Resilient infrastructure for development
	2.1.5 Promote research and bioprospecting on PGR, including medicinal plants	Resilient infrastructure	9.5 Increase research and development
	2.1.6 Enhance national capacity in information management and research which supports biodiversity conservation	Resilient infrastructure	9.4 Retrofit industries for efficiencies, technology
	2.1.7 Ensure that Uganda benefits from international cooperation and opportunities for information exchange and support in the field of biodiversity at the local, national, regional and international levels	Peace	16.8 strengthen participation of developing countries in global governance
National Target 2.2	2.2.1 Conduct awareness raising on the role of taxonomy in biodiversity conservation in public and private institutions	Education	4.5 Equal access to education for all
	2.2.2 Create awareness on the application of taxonomic information in many production sectors of the country such as agriculture, trade, health, development and regulatory agencies as well as local communities	Peace	16.7 Ensure inclusive, participatory decision making
	2.2.3 Support institutions with taxonomic data and information (through funding, increased personnel or better infrastructure) to make this information easily available to end -users	Resilient infrastructure	9.1 Resilient infrastructure for development
	2.2.4 Support and train women, including women's indigenous groups and women's organizations, on taxonomy, taxonomic data, information	Gender	5.5 Ensure women's participation
	2.2.5 Develop taxonomic knowledge bases of biodiversity in formats that are accessible to women and men and other end users	Implementation	17.2 Official development assistance commitments
	2.2.6 Improve taxonomic infrastructure and tools to provide adequate taxonomic information	Resilient infrastructure	9.1 Resilient infrastructure for development
	2.2.7 Establish Center(s) of Taxonomic excellence	Implementation	17.18 Capacity support to LDCs and SIDs for data
	2.2.8 Undertake human resource capacity development in taxonomy at all levels and retain taxonomists with job descriptions in their institutions	Implementation	17.19 Develop measurements of progress on sustainable development
	2.2.9 Provide incentives/employment opportunities to women and men graduates with taxonomic backgrounds to retain them e.g. prioritizing taxonomy in Environmental Impact Assessments (EIA)	Growth	8.3 Job creation, innovation, entrepreneurs
National Target 2.3 !	2.3.1 Promote the role of traditional knowledge, innovations and practices in the management and use of biodiversity	Resilient infrastructure	9.5 Increase research and development
	2.3.2 Document traditional knowledge and practices of women and men that promote conservation and sustainable use of biodiversity e.g. in herbal medicine	Health	3.8 Achieve universal health coverage
	2.3.3 Develop Community Action Plans for biodiversity conservation in strategic areas	Cities	11.6 Reduce impacts of cities
	2.3.4 Develop access and benefit sharing arrangements with indigenous	Terrestrial ecosystems	15.6 Promote fair and equitable sharing of resources

	Description of actions	Primary SDG	Primary SDG Target
	peoples and local communities, with respect to intellectual property rights		
National Target 3.1	3.1.1Develop and implement participatory PA management plans	Peace	16.7 Ensure inclusive, participatory decision making
	3.1.2 Promote protected areas as core drivers for nature-based tourism development in the local economy	Growth	8.9 Promote sustainable tourism
	3.1.3 Establish/maintain viable wildlife/biodiversity corridors with respect to community safeguards	Terrestrial ecosystems	15.1 Ensure conservation, restoration, sustainable use of ecosystems and services
	3.1.4 Support gender-responsive alternative livelihood options for communities adjacent to PAs	Consumption	12.6 Corporate responsibility, sustainability
	3.1.5 Identify and implement PA networks to conserve ecologically sensitive vegetation types, habitats, species and genetic diversity	Terrestrial ecosystems	15.5 Reduce degradation of habitats, halt biodiversity loss, prevent extinctions
	3.1.6 Mitigate human wildlife conflicts	Terrestrial ecosystems	15.9 Integrate biodiversity values into national planning, poverty reduction
	3.1.7 Strengthen partnerships with adjacent communities to PAs for mutual benefits (Supporting REDD+)	Implementation	17.17 Effective partnerships
National Target 3.2	3.2.1 Reduce deforestation and increase timber stocks countrywide to reduce pressure on current stocks, especially in natural forests	Terrestrial ecosystems	15.3 Combat desertification, restore degraded land
	3.2.2 Develop guidelines and capacities for ensuring gender-responsive, equitable and transparent implementation of REDD+ in partnership with CSOs, including women's organizations	Implementation	17.9 Enhance targeted capacity building to support national plans
	3.2.3 Enhance carbon stocks and storage by mainstreaming climate change into the REDD+ strategy as well as in sector policies, plans and projects	Climate	13.2 Incorporate climate change into national policies
	3.2.4 Support afforestation, tree planting and re-forestation activities at all levels	Terrestrial ecosystems	15.2 Sustainable manage forests, restore forests
	3.2.5 Promote and support restoration of degraded wetlands	Terrestrial ecosystems	15.1 Ensure conservation, restoration, sustainable use of ecosystems and services
	3.2.6 Enhance biodiversity and ecosystems' resilience to climate change especially in biodiversity hotspots	Climate	13.3 Awareness and capacity on climate mitigation, adaptation
	3.2.7 Establish buffer zones for protection of critical conservation areas with high biodiversity within Pas	Terrestrial ecosystems	15.5 Reduce degradation of habitats, halt biodiversity loss, prevent extinctions
	3.2.8 Monitor and control bush burning in fire prone areas	Terrestrial ecosystems	15.2 Sustainable manage forests, restore forests
	3.2.9 Collect and store diverse gene pools, including through community and women-led seed banks as a basis of genetic adaptation to climate change and for enhancing food and nutritional security	Gender	5.5 Ensure women's participation
National Target 3.3	3.3.1 Protect threatened, endemic and vulnerable species inside and outside protected areas	Oceans	14.2 Manage, protect and restore marine and coastal ecosystems
	3.3.2 Support ex-situ conservation of plant and animal resources	Terrestrial ecosystems	15.8 Prevent and reduce invasive alien species
	3.3.3 Engage local communities including women, men and youth in curbing destructive use of threatened plant species	Growth	8.6 Reduce unemployment of youth
	3.3.4 Effectively combat poaching and illegal wildlife trade and trafficking through strengthening law enforcement	Terrestrial ecosystems	15.7 End poaching and trafficking of protected species
	3.3.5Strengthen the capacity of CITES Management Authority and CITES Competent Authorities	Terrestrial ecosystems	15.4 Conserve mountain ecosystems
	3.3.6 Strengthen PA institutional capacity and coordination for effective monitoring of wildlife	Growth	8.9 Promote sustainable tourism
National Target 3.4	3.4.1 Collect through local and gender-responsive approach information on availability of plant and animal germplasm	Implementation	17.17 Effective partnerships
	3.4.2 Support national and local repositories for plant and animal genetic resources	Resilient infrastructure	9.4 Retrofit industries for efficiencies, technology
	3.4.3 Identify, collect and conserve indigenous species and varieties	Terrestrial ecosystems	15.8 Prevent and reduce invasive alien species
	3.4.4 Reintroduce germplasm of species extinct in the country	Terrestrial ecosystems	15.7 End poaching and trafficking of protected species
	3.4.5 Strengthen human and infrastructural capacity for genetic resources conservation and management	Resilient infrastructure	9.2 Sustainable industrialization
	3.4.6 Educate local farmers including women, men and youth on the importance of preserving genetic diversity	Inequality	10.2 Promote inclusion of all
National Target 3.5	3.5.1 Identify, map and prioritize degraded habitats including forests and wetlands	Terrestrial ecosystems	15.5 Reduce degradation of habitats, halt biodiversity loss, prevent extinctions
	3.5.2 Assess the rate of conversion of the degraded/threatened habitats by human activities	Growth	8.1 Sustain economic growth
	3.5.3 Estimate the productivity of the degraded/threatened habitats	Consumption	12.8 Awareness of sustainable development
	3.5.4 Estimate the proportion of land affected by desertification	Terrestrial ecosystems	15.3 Combat desertification, restore degraded land
	3.5.5 Promote awareness on regulations that protect fragile ecosystems	Cities	11.6 Reduce impacts of cities
	3.5.6 Sensitize policy makers on drivers of habitat loss, and for support to reverse the rate of habitat loss	Terrestrial ecosystems	15.5 Reduce degradation of habitats, halt biodiversity loss, prevent extinctions
	3.5.7 Put in place species recovery plans for the degraded/threatened	Inequality	10.4 Adopt social protection policies

	Description of actions	Primary SDG	Primary SDG Target
	habitats		
	3.5.8 Restore and safeguard ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being	Terrestrial ecosystems	15.1 Ensure conservation, restoration, sustainable use of ecosystems and services
	3.5.9 Develop mechanisms for fair and equitable sharing of costs and benefits of using wetlands	Terrestrial ecosystems	15.6 Promote fair and equitable sharing of resources
National Target 3.6	3.6.1Promote agricultural practices which minimize the negative impacts of agricultural production on biodiversity and ecosystem functioning	Hunger	2.4 Ensure sustainable food production; maintain key ecosystems
	3.6.2 Promote agro-forestry practices among local communities with particular focus on women and men farmers (supporting REDD+)	Hunger	2.5 Maintain genetic diversity for agriculture, traditional knowledge
	3.6.3 Strengthen tenure rights, including of women farmers to support sustainable land management (SLM) practices that conserve agro-biodiversity	Gender	5.5 Ensure women's participation
	3.6.4Promote sustainable management practices to support the conservation and sustainable use of biodiversity in forests	Cities	11.7 Universal access to green spaces
	3.6.5 Support local communities including IPLCs, women and men to diversify their livelihoods through biodiversity friendly enterprises which ease pressure on the resource base	Growth	8.2 Diversify economies, value added
	3.6.6 Promote women's enterprises to enhance their participation and leadership in biodiversity conservation	Gender	5.5 Ensure women's participation
	3.6.7 Implement forest management planning that zones and protects timber production to meet demand whilst restocking for future needs (supporting REDD+)	Terrestrial ecosystems	15.4 Conserve mountain ecosystems
	3.6.8 Improve forest timber harvesting and utilization technologies (supporting REDD+)	Implementation	17.7 Diffusion of environmentally sound technologies
National Target 3.7	3.7.1 Monitor and enforce compliance to effluent standards requirements	Water sanitation	6.2 Sanitation for all
	3.7.2 Monitor the impact of agrochemicals on selected pollinators	Consumption	12.4 Sound management of chemicals
	3.7.3 Manage all forms of waste in an effective and efficient manner to reduce its negative impact on the environment, including through local-level waste management and recycling initiatives	Consumption	12.5 Reduce waste generation
National Target 3.8	3.8.1 Develop and implement management plans to prevent the establishment and introduction of alien invasive species	Terrestrial ecosystems	15.8 Prevent and reduce invasive alien species
	3.8.2 eradication or control existing alien invasive species	Terrestrial ecosystems	15.8 Prevent and reduce invasive alien species
National Target 3.9	3.9.1 Put in place effective control measures to manage fishing and alien fish species such as the Nile Perch Salvinia molesta including promoting awareness of existing regulations	Oceans	14.1 Prevent and reduce marine pollution
	3.9.2 Put in place and implement control measures for the Water Hyacinth, and the congress weed	Oceans	14.1 Prevent and reduce marine pollution
	3.9.3 Promote sustainable aquaculture for local communities including women and men for socio-economic development	Poverty	1.3 Social protections for vulnerable
	3.9.4 Undertake SEA/EIA on policies, programmes or projects that are likely to have significantly negative impacts on aquatic biodiversity	Growth	8.4 Decouple growth from environmental degradation
	3.9.5 Develop and or implement appropriate mitigation measures against habitat degradation of open water resources including by identifying and promoting alternative livelihood sources for women and men	Terrestrial ecosystems	15.5 Reduce degradation of habitats, halt biodiversity loss, prevent extinctions
	3.9.6 Promote private sector investment and participation in aquatic biodiversity conservation	Peace	16.7 Ensure inclusive, participatory decision making
	3.9.7 Support transboundary management of fisheries resources	Peace	16.8 strengthen participation of developing countries in global governance
National Target 3.10	3.10.1 Strengthen community and resource use groups participation in fisheries management, including by identifying gender-differentiated roles across the sector	Gender	5.1 End gender discrimination
	3.10.2 Regulate and control importation and usage of fishing gears	Oceans	14.6 End perverse fisheries subsidies
	3.10.3 Strengthen monitoring, control and surveillance fishing activities	Oceans	14.4 End overfishing and illegal, destructive fishing
	3.10.4 Develop and implement gender-responsive community fisheries management plans	Inequality	10.2 Promote inclusion of all
	3.10.5 Provide adequate support to Beach Management Units (BMU)	Implementation	17.1 Domestic resource mobilization
National Target 4.1	4.1.1 Develop economic instruments to encourage activities that enhance biodiversity conservation and discourages activities that impact negatively on biodiversity	Terrestrial ecosystems	15.1 Ensure conservation, restoration, sustainable use of ecosystems and services
	4.1.2 Identify and support women groups to adopt more sustainable alternatives for household and income-generating activities to enhance livelihoods and biodiversity conservation	Gender	5.5 Ensure women's participation
	4.1.3 Introduce pro-poor environmental taxes and levies and market-based instruments	Implementation	17.12 Duty-free and quota free access for LDCs
	4.1.4 Promote and support Green Procurement through purchasing of	Consumption	12.7 Sustainable procurement policies

	Description of actions	Primary SDG	Primary SDG Target
	environmentally preferable products or services, taking into consideration the necessity, not only for quality and price, but also for biodiversity conservation-conscious business		
	4.1.5 Undertake Environmental Impact Assessments (EIA) of all policies, programmes or projects which have the potential for negative—or positive—impacts on biodiversity	Inequality	10.7 Facilitate orderly migration
	4.1.6 Integrate biodiversity accounting into national accounting and reporting processes	Peace	16.6 Develop accountable, transparent institutions
National Target 4.2	4.2.1 Promote PPP to collect, harvest and process plant based products for commercialization	Peace	16.9 Legal identify for all
	4.2.2 Support value addition on plant based products for commercialization by local community groups	Growth	8.2 Diversify economies, value added
National Target 4.3	4.3.1 Develop and implement mechanisms for sharing the benefits from access to PGR in the country	Terrestrial ecosystems	15.6 Promote fair and equitable sharing of resources
	4.3.2 Document traditional knowledge, innovations and practices in PGR	Implementation	17.7 Diffusion of environmentally sound technologies
	4.3.3 Disseminate traditional knowledge information/documents to enhance sustainable use of biodiversity (planning for food security and health care, i.e. medicinal plants)	Implementation	17.7 Diffusion of environmentally sound technologies
	4.3.4 Initiate and support community based PGR management initiatives in various parts of the country	Cities	11.3 Sustainable human settlement
National Target 4.4	4.4.1 Accede to the Nagoya Protocol on ABS	Terrestrial ecosystems	15.6 Promote fair and equitable sharing of resources
	4.4.2 Review the ABS Regulations and incorporate relevant elements of the Nagoya Protocol	Peace	16.7 Ensure inclusive, participatory decision making
	4.4.3 Build capacity to enforce the Nagoya protocol on ABS	Peace	16.8 strengthen participation of developing countries in global governance
	4.4.4 Promote and regulate bioprospecting and biotrade activities	Terrestrial ecosystems	15.7 End poaching and trafficking of protected species
	4.4.5 Support the Establishment of a functional Intellectual Property (IP) regime on ABS	Peace	16.9 Legal identify for all
National Target 5.1	5.1.1 Undertake intensive awareness raising on the content of NBSAPII at all levels	Education	4.7 Education for sustainable development
	5.1.2 Develop and disseminate user-friendly and gender-responsive Information Education and Communication materials (IECs) for popular campaigns targeting women as agents of change for conservation	Peace	16.10 Public access to information
	5.1.3 Sensitize local communities including IPLCs on biodiversity conservation	Implementation	17.19 Develop measurements of progress on sustainable development
	5.1.4 Develop and disseminate gender-responsive biodiversity public awareness materials	Peace	16.10 Public access to information
National Target 5.2	5.2.1Develop and implement educational programs on biodiversity issues relevant to Uganda	Peace	16.8 strengthen participation of developing countries in global governance
	5.2.2 Strengthen and/or establish environmental clubs or societies	Implementation	17.9 Enhance targeted capacity building to support national plans
	5.2.3 Develop and disseminate gender-responsive educational materials on biodiversity	Peace	16.10 Public access to information
National Target 5.3	5.3.1 Seek support to enable women and men personnel to attend regional and international fora relevant to biodiversity	Peace	16.3 Promote rule of law, ensure equal justice
	5.3.2 Develop proposals for supporting biodiversity conservation programs at national level	Implementation	17.9 Enhance targeted capacity building to support national plans
National Target 6.1	6.1.1Conduct a baseline study on level of public awareness and education on the benefits and risks of biotechnology and Biosafety	Terrestrial ecosystems	15.6 Promote fair and equitable sharing of resources
	6.1.2 Establish and operationalize Biosafety Clearing House (BCH)	Reliable energy	7.3 Double rate of energy efficiency
	6.1.3 Conduct specialized trainings in Biosafety for regulators and inspectors	Health	3.8 Achieve universal health coverage
	6.1.4 Conduct specialized biotechnology communication for media specialists	Peace	16.10 Public access to information
	6.1.5 Conduct trainings in biotechnology and biosafety for women and men	Implementation	17.18 Capacity support to LDCs and SIDs for data
National Target 6.2	6.2.1Assess national capacities in biotechnology and Biosafety	Peace	16.8 strengthen participation of developing countries in global governance
	6.2.2 Support the development of skilled human resources for biotechnology and Biosafety	Implementation	17.19 Develop measurements of progress on sustainable development
	6.2.3 Promote infrastructural Development and Research on biotechnology and Biosafety.	Resilient infrastructure	9.4 Retrofit industries for efficiencies, technology
	6.2.4 Develop and apply biotechnology tools for identification, characterization and conservation of biodiversity	Resilient infrastructure	9.5 Increase research and development
National	6.3.1 Undertake widespread awareness on the benefits and risks	Education	4.5 Equal access to education for all

	Description of actions	Primary SDG	Primary SDG Target
Target 6.3	associated with biotechnology		
	6.3.2 Popularize the Biotechnology and Biosafety Policy	Peace	16.10 Public access to information
	6.3.3 Advocate for the approval of the National Biotechnology and Biosafety Bill to enable regulation of Biotechnology and Biosafety developments in the country.	Implementation	17.13 Policy coordination and policy coherence for macroeconomic
	6.3.4 Popularize the Biosafety and Biotechnology Policy and Bill/Act	Implementation	17.1 Domestic resource mobilization
	6.3.5 develop guidelines on compliance to biosafety	Peace	16.5 Reduce corruption and bribery
	6.3.6 Enhance the regulatory performance of the National Biosafety Committee (NBC)and the Institutional Biosafety Committees (IBC)	Implementation	17.7 Diffusion of environmentally sound technologies
	6.3.7 Promote public-private partnerships (PPP) in biotechnology development	Implementation	17.7 Diffusion of environmentally sound technologies
National Target 6.4	6.4.1 Organize and conduct gender-responsive national and local stakeholder awareness creation campaigns on biosafety	Gender	5.1 End gender discrimination
	6.4.2 Support tertiary Institutions to run short courses on biosafety	Education	4.3 Equal access to tertiary education
	6.4.3 Support the full implementation of the Nagoya Supplementary Protocol on Liability and Redress	Peace	16.9 Legal identify for all
National Target 6.5	6.5.1 Promote management oriented research and development in medical, agricultural land industrial biotechnology.	Peace	16.7 Ensure inclusive, participatory decision making
	6.5.2 Undertake ESIA or risk assessments on biotechnology plans, programmes and projects	Terrestrial ecosystems	15.9 Integrate biodiversity values into national planning, poverty reduction
	6.5.3 Establish a strong and effective monitoring system for biotechnology use and applications	Education	4.7 Education for sustainable development
	6.5.4 Develop and implement mechanisms for sharing costs and benefits of biotechnology	Terrestrial ecosystems	15.6 Promote fair and equitable sharing of resources
	6.5.6 Promote integration of biotechnology values into macroeconomic frameworks	Implementation	17.13 Policy coordination and policy coherence for macroeconomic
National Target 7.1	7.1.1 Undertake a study to collect information which will guide in the development of guidelines for financing biodiversity in Uganda	Implementation	17.18 Capacity support to LDCs and SIDs for data
	7.1.2 Develop and implement guidelines for financing biodiversity in Uganda	Implementation	17.1 Domestic resource mobilization
	7.1.3 Develop Biodiversity Finance Plan	Implementation	17.3 Mobilize resources for developing countries
National Target 7.2	7.2.1 Identify and seek funding support from diverse sources including regional and bilateral development partners, foundations and private sector	Implementation	17.5 implement investment promotion for LDCs
	7.2.2 Support capacity building for writing project proposals that are gender-responsive	Implementation	17.8 Capacity-building mechanism for LDCs, especially communications
	7.2.3 Develop project proposals to target designated donors under the CBD	Implementation	17.16 Global partnership for sustainable development
	7.2.5 Mobilize resources by creating synergies between the different multilateral Environmental Conventions	Implementation	17.6 Enhance North-South and South-South cooperation
	7.2.6 Budget for activities of biodiversity and incorporate in annual budget of Line ministries, NGOs, private sector	Peace	16.7 Ensure inclusive, participatory decision making
	7.2.7 Promote accountability, transparency, gender mainstreaming in implementation of biodiversity projects	Peace	16.6 Develop accountable, transparent institutions
National Target 7.3	7.3.1 Put in place an enabling policy or legislative framework for new biodiversity financing mechanisms	Implementation	17.5 implement investment promotion for LDCs
	7.3.2 Issue environment bonds	Consumption	12.8 Awareness of sustainable development
	7.3.3 Provide incentives that promote green production and purchase of green goods	Consumption	12.6 Corporate responsibility, sustainability
	7.3.4 Institute appropriate pricing mechanisms for biodiversity goods and services	Implementation	17.5 implement investment promotion for LDCs
	7.3.5 Support green marathon	Growth	8.3 Job creation, innovation, entrepreneurs
	7.3.6 Promote green products and technologies	Consumption	12.7 Sustainable procurement policies
	7.3.8 Support sensitization and capacity development to companies about benefits from ecosystem services	Resilient infrastructure	9.3 Access to financial services, credit
	7.3.9 Enhance payment for ecosystem services and biodiversity offsets	Growth	8.1 Sustain economic growth
National Target 8.1	8.1.1Set up environmental standards to limit the production or discharge of harmful (hazardous) wastes or products in sensitive ecosystems	Implementation	17.2 Official development assistance commitments
	8.1.2 Strengthen compliance to t EIAs for all petroleum explorations and extractive industries	Cities	11.7 Universal access to green spaces
	8.1.3 Support protection and restoration measures for degraded ecosystems, threatened species and migratory routes in oil exploration and production regions	Terrestrial ecosystems	15.5 Reduce degradation of habitats, halt biodiversity loss, prevent extinctions
	8.1.4 Routinely improve/update the Sensitivity Atlas for the Albertine Graben	Implementation	17.7 Diffusion of environmentally sound technologies
	8.1.5 Support comprehensive awareness programmes and information flow regarding petroleum processes and biodiversity	Peace	16.10 Public access to information

	Description of actions	Primary SDG	Primary SDG Target
	8.1.6 Build the capacity and mobility of district and municipal environment officers (DEO/MEO) to effectively monitor oil and gas activities	Implementation	17.8 Capacity-building mechanism for LDCs, especially communications
	8.1.7 Set up a biodiversity offset trust fund to ensure no net loss biodiversity due to petroleum activities	Health	3.8 Achieve universal health coverage
	8.1.8 Examine and implement opportunities for translocation of animals from sensitive areas where oil exploration is already taking place to other PAs	Cities	11.2 Access to transportation
National Target 8.2	8.2.1Undertake awareness at all levels on the positive and negative impacts of biofuels on biodiversity	Education	4.7 Education for sustainable development
	8.2.2 Develop a framework that promotes the positive and minimizes the negative impacts of biofuel production on biodiversity	Consumption	12.1 Implement 10-yr framework on sustainable production and consumption
	8.2.3 Put in place measures to protect food and energy security of local communities including women and men when introducing biofuel crops	Consumption	12.3 Halve food waste
	8.2.4 Assess and identify areas suitable for biofuel production and areas inappropriate for biofuel production	Inequality	10.4 Adopt social protection policies
	8.2.5 Ensure that EIAs are conducted for all biofuel projects and programmes	Consumption	12.5 Reduce waste generation
	8.2.6 Promote and support research programmes on biofuels	Consumption	12.4 Sound management of chemicals
	8.2.7 Promote and support the use of environmentally-sound technologies which promote the positive and minimize the negative impacts of biofuel production on biodiversity	Resilient infrastructure	9.4 Retrofit industries for efficiencies, technology
National Target 8.3	8.3.1 Identify and implement risk management, mitigation and preparedness measures for biodiversity	Climate	13.1 Strengthen resilience and adaptation to disasters
	8.3.2 Develop a Disaster Preparedness, Risk Reduction and Management Plan for protecting biodiversity	Climate	13.3 Awareness and capacity on climate mitigation, adaptation
	8.3.3 Mainstream Disaster Preparedness, Risk Reduction and Management Plan in key National, sectoral and Districts planning frameworks for protection of biodiversity	Terrestrial ecosystems	15.9 Integrate biodiversity values into national planning, poverty reduction
	8.3.4 Improve disaster management systems, like early warning systems	Cities	11.5 Reduce deaths from disasters, especially vulnerable
	8.3.5 Support participatory valuation and management of ecosystem services	Peace	16.8 strengthen participation of developing countries in global governance
	8.3.6 Strengthen the capacity of Disaster Reduction and Management Committees at all levels	Peace	16.6 Develop accountable, transparent institutions

5.3 Contribution towards global strategy for plant conservation

The contributions of the NBSAP II towards global strategy for plant conservation is delineated in Table 5.3 below.

Table 5.3: Contribution towards global strategy for plant conservation

Description of actions	Relevant GSPC Target	Progress	Effectiveness	Links to websites, key documentation	Methodology or approach to assessing progress
2.2.7 Establish Centre(s) of Taxonomic excellence	1. An online flora of all known plants	No significant change at national level	Unknown	NEMA UNCST NARO	A centre of excellence for taxonomy established
2.1.5 Promote research and bioprospecting on PGR, including medicinal plants	2. An assessment of the conservation status of all known plant species, as far as possible, to guide conservation actions		Measure taken has been partially effective	UNCST NARO	Number of Discoveries of valuable natural products
1.1.1 Strengthen the capacity of the biodiversity coordination mechanism	3. Information, research and associated outputs, and methods necessary to implement the Strategy developed and shared		Measure taken has been effective	NEMA NPA Local governments	Collaboration and information flow among stakeholders improved

Description of actions	Relevant GSPC Target	Progress	Effectiveness	Links to websites, key documentation	Methodology or approach to assessing progress
3.5.8 Restore and safeguard ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being	4. At least 15 percent of each ecological region or vegetation type secured through effective management and/or restoration		Measure taken has been effective	NEMA NFA UWA WMD Local governments	Vulnerable areas restored and protected
2.3.3 Develop Community Action Plans for biodiversity conservation in strategic areas	5. At least 75 percent of the most important areas for plant diversity of each ecological region protected with effective management in place for conserving plants and their genetic diversity		Measure taken has been partially effective	NEMA Local governments	Number of sector-based Community Action Plans for biodiversity conservation
3.6.1Promote agricultural practices which minimize the negative impacts of agricultural production on biodiversity and ecosystem functioning	6. At least 75 percent of production lands in each sector managed sustainably, consistent with the conservation of plant diversity		Measure taken has been partially effective	NARO MAAIF Local governments	Measures put in place to ensure a win-win situation for agricultural production and biodiversity conservation
3.3.1 Protect threatened, endemic and vulnerable species inside and outside protected areas	7. At least 75 percent of known threatened plant species conserved in situ		Measure taken has been effective	UWA NEMA NFA Local governments	Reduction in the number nationally extinct, threatened and vulnerable species Number of Species Management Plans under implementation Number of previously extinct species re-introduced
3.3.2 Support ex-situ conservation of plant and animal resources	8. At least 75% of threatened plant species in ex situ collections, preferably in the country of origin, and at least 20% available for recovery and restoration programmes		Measure taken has been ineffective	NARO	Number of functional ex situ institutions
2.3.1 Promote the role of traditional knowledge, innovations and practices in the management and use of biodiversity	9. 70% of the genetic diversity of crops including their wild relatives and other socio-economically valuable plant species conserved, while respecting, preserving and maintaining associated indigenous and local knowledge		Measure taken has been partially effective	NCRI Academia	Indigenous knowledge and practices are being widely applied in biodiversity conservation
3.1.5 Identify and implement PA networks to conserve ecologically sensitive vegetation types, habitats, species and genetic diversity	10. Effective management plans in place to prevent new biological invasions and to manage important areas for plant diversity that are invaded		Measure taken has been ineffective	UWA NFA Local governments	Number of PA networks with well-protected ecosystems, species and genetic resources

Description of actions	Relevant GSPC Target	Progress	Effectiveness	Links to websites, key documentation	Methodology or approach to assessing progress
4.1.4 Promote and support Green Procurement through purchasing of environmentally preferable products or services, taking into consideration the necessity, not only for quality and price, but also for biodiversity conservation-conscious business	11. No species of wild flora endangered by international trade		Measure taken has been ineffective	NEMA	Number of economic instruments supporting biodiversity conservation and sustainable use
3.3.4 Effectively combat poaching and illegal wildlife trade and trafficking through strengthening law enforcement	12. All wild harvested plant-based products sourced sustainably		Measure taken has been effective	UWA MTWA	Deterrent laws in place -Number of points of entry and exit controlled -Number of cases reported and successfully prosecuted -Number of well trained, motivated, equipped and coordinated law enforcement personnel
4.3.3 Disseminate traditional knowledge information/documents to enhance sustainable use of biodiversity (planning for food security and health care, i.e. medicinal plants)	13. Indigenous and local knowledge innovations and practices associated with plant resources maintained or increased, as appropriate, to support customary use, sustainable livelihoods, local food security and health care		Measure taken has been partially effective	NCRI	Documents on indigenous knowledge distributed to relevant stakeholders
2.1.6 Enhance national capacity in information management and research which supports biodiversity conservation	14. The importance of plant diversity and the need for its conservation incorporated into communications, education and public awareness programmes		Measure taken has been partially effective	UNCST NEMA	-Number of incidences of human wildlife conflicts in previously vulnerable areas -Number of human wildlife mitigation initiatives in place
5.1.1 Undertake intensive awareness raising on the content of NBSAPII at all levels	15. The number of trained people working with appropriate facilities sufficient according to national needs, to achieve the targets of this Strategy		Measure taken has been partially effective	NEMA Local governments	Number of stakeholders at all levels are aware of NBSAPII
2.1.7 Ensure that Uganda benefits from international cooperation and opportunities for information exchange and support in the field of biodiversity at the local, national, regional and international levels	16. Institutions, networks and partnerships for plant conservation established or strengthened at national, regional and international levels to achieve the targets of this Strategy		Measure taken has been partially effective	NEMA	Number of research grants received -Number of programmes funded -Level of funding and information exchange on biodiversity achieved

6. CONTRIBUTION OF INDIGENOUS PEOPLES AND LOCAL COMMUNITIES TOWARDS ACHIEVEMENT OF AICHI BIODIVERSITY TARGETS

6.1 Specific contributions indigenous groups and local people

6.1.1 The Benet

The Benet, who number around 20,000 people, live in the north-eastern part of Uganda and are former hunter/gatherers. These people live on the margins of society in very remote and inaccessible parts on the slopes of Mountain Elgon. They depend on the forest as hunter-gatherers and are excluded from mainstream society, which has resulted in forced dispossession of their forest land. They are said to have resided in the forest on Mountain Elgon for over 200 years, and while the colonial government moved to conserve this area, it accepted the residence of the Benet.

6.1.2 The Batwa

The 6,700 or so Batwa, who live primarily in the south-western region of Uganda, are also former hunter/gatherers. They were dispossessed of part of their ancestral land when the Bwindi and Mgahinga forests were gazetted as national parks in 1991. The Batwa are a minority group of people found in the South-Western districts of Kabale, Kisoro, Kasese and Bundibugyo. The Batwa lived near Echuya Forest and Mgahinga and Bwindi Conservation Area as their ancestral homes. Following the 1990 Ugandan Government Policy of Biodiversity Conservation, the Batwa were evicted from these forests. These areas were gazzated as protected areas and the Batwa lost their original home land (forests). They were neither resettled nor compensated by government rendering them completely homeless. As squatters, the Batwa could only be allowed to construct a hut in which they lived as they guarded crops for the landlords. The huts were too small, poorly mudded and sometimes made of grass which acted as both the walls and roofs. These kinds of shelter made the Batwa vulnerable and subjected them to all forms of social discrimination and marginalization by the non-Batwa in their communities. In cases where they failed to abide by the land lords' requirements, the Batwa families were summarily chased away.

Due to these poor living conditions, the Batwa were perceived as backward and people of low calibre. The non-Batwa sometimes were not willing to associate with them or even share a meal. The Batwa had no concept of land ownership because they never stayed in one place for a long time.

The Batwa contribute to the ecotourism and conservation of the Mt. Gorilla in the Mgahinga Gorilla National Park (MGNP). The Batwa Trail Tourism Product was developed in MGNP in July 2010 to diversify tourism activities in Mgahinga by sharing the unknown Batwa culture with the tourists as well as improving the Batwa livelihood. The Batwa used to earn a living from in Mgahinga forest before it was gazetted a national park and they have a strong attachment to the forest. To date the Batwa trail product has transformed the Beneficiaries with skills, gained confidence through exposure and they are able to generate extra income through handcrafts and are now integrated with other communities in various areas.

6.1.3 The Tepeth

The Tepeth (or Tepes) who inhabit Mt. Napak in Karamoja Sub-region are nomadic hunters and gatherers. The Tepeth speak the So language. They reside in conical huts made of sticks, thatch and mud in the semiarid savannahs and scrubby forests. The Tepeth are also said to have been the original people of Karamoja. They were once the occupants of Moroto but due to tribal wars with the Karimojong, they were driven up the top of mount Moroto and are now confined to the top of the mountain. They are one of the few peoples in Uganda who still under cover, practice Female Genital Mutilation (FGM) despite campaigns by Government against the practice. Their population is estimated at 17,000. In Moroto, the Tepeth occupy the sub-counties of Katikekile and Tapac, located in the mountain valleys of Mount Moroto at the border with the Republic of Kenya. They rear some animals on the slopes but come down to graze them They have experienced marginalization due to their being a minority ethnic group and the geographical location of their area. A parish like Natumkalei has neither a primary school nor any health facility. They experience a lot of insecurity from some of the tribes that border them. To the North, the Turkana are their immediate neighbours with whom they have a lot of enmity. They are also accused of forming alliances with their Eastern neighbours, the Pokot, to attack and raid the Turkana.

6.1.4 The IK Community

The Ik community is a small minority ethnic group in the Morungole highlands, Kamion Sub-county in Kaabong District in Karamoja Sub-region in the parishes of Kamion, Timu and Lokwakaramoe near the border with Kenya, along the escarpment between Timu forest in the South and Kidepo National Park on Uganda's northern frontier with Sudan. The Ik (meaning head/first to arrive) acquired the name ‘Teuso’ (meaning poor people, dogs, or those without cattle or guns) from their neighbors after they were evicted from Kidepo. The Ik are divided into 10 clans (Jigeta, Komokua, Telek, Ngidoza, Ilengik, Kadunkuny, Ngibongorena, Uzet, Nyorobat and Ngibonga). Their population is estimated at 12,000 people with a fertility rate of about 4%. The Ik community is neighbored by the following tribes; the Turkana (living in western Kenya) to the east, Dodoth to the west, the Toposa (living in southern Sudan) to the north and the Napore to the South.

As a result of their location in relation to their neighbors, the Ik are incredibly vulnerable and liable to attacks from both Dodoth and Turkana warriors. They are historically a non-violent people and, as a result, they have become what one report has described as “the archetypal middlemen – unarmed, non-combative and numerically weak”. Their problems mainly arise, both directly and indirectly, from the activities of the Dodoth warriors. The Ik are geographically located between conflicting communities that are numerically strong and usually armed yet the Ik are numerically weak, not armed and their land is rich in pasture, a situation that makes them more vulnerable to constant attacks (CECORE, 2011). They are marginalized because they practice a culture different from most Karamojong, even their language is different. For example, while the Karamojong marry using cows, they marry with gourds, melons. They still use spears, arrows, and are predominantly agriculturalists. While Karamojong boys can marry Ik girls, Ik boys are not allowed to marry Karamojong girls.

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ANNEXES

Annex 1: Mandates of the National Research Institutess under NARO

National Agricultural Research Laboratories (NARL) – Kawanda conduct research on important Ugandan staple crops (including) but also serves as the country's leading centres on biotechnology. NARL research is carried out in eight units; (i) The Plant Genetic Resources Centre and Entebbe Botanic Gardens whose duties include characterizing Uganda's plant genetic resources and encouraging their sustainable use by farmers; (ii) The Natural Agricultural Biotechnology Centre pursues research that relies on more traditional breeding technology, including tissue culture; (iii) The Crop Post-Harvest Research Unit explores strategies for reducing post-harvest crop losses, including improvements in storage techniques, pestmanagement andmarketing systems; (iv) The Soil Fertility Management and Agrometeorology Unit concentrates on soil management and updated soil maps of Uganda and advice to farmers and land owners on the best use of their soil; (v) The Biocontrol Unit develops and promotes the use of biological control of pests, plant diseases and weeds; (vi) The Agricultural Engineering and Appropriate Technology Research Centre adapts agricultural engineering technologies to meet farmer and market demands; (vii) The Food Biosciences Research Centre conducts research on food quality, safety, nutrition, preservation, processing, storage and marketing; and (viii) The Agricultural Research Information Centre coordinates agricultural information for NARO and promotes linkages between the different parts of Uganda's agricultural research system.

National Crops Resources Research Institute(NaCRRI) is mandated to conduct, carry out research and knowledge generation Programs in Legumes Cassava Cereals - Maize Cereals - Rice Horticulture and Oil Palm Sweet Potatoes Research activities in the Institute are carried out under mandated commodity programs and Units.

The National Fisheries Resources Research Institute (NaFIRRI) conducts basic and applied research of national and strategic importance in Aquaculture, Capture fisheries, Water environment, Socio-economics and Marketing, and Information Communication Management, and emerging issues in the fisheries sector.

The National Forestry Resources Research Institute (NaFORRI) is a National Agricultural Research Institute (NARI) mandate to undertake research in all aspects of forestry. Research in NaFORRI aims at increasing the benefits derived from trees and forests through conservation and sustainable management of the forest and tree resources.

The National Livestock Resources Research Institute (NaLIRRI), is mandated under the National Agricultural Research Act 2005 of Uganda to generate and transfer livestock-based technologies, knowledge and innovations in areas of: Livestock Health, Breeding, Nutrition, Apiculture and any Emerging issues such as Avian Influenza, Acaricide resistance in ticks and Climate Change challenges. The mandated commodities include: dairy and beef cattle, goats, pigs, poultry, pastures and honey bees.

The National Semi-Arid Resources Research Institute (NaSARRI) undertakes research in crops production for semi-arid production systems in the areas of seed research and production management, together with range management. The operation area covers five (5) agro – ecological zones comprising of the Eastern Savannah, Karamoja Dry lands, Mid–Northern, Northern and West Nile

The National Coffee Research Institute (NaCORI) carries out research and knowledge generation programmes in Coffee and Cocoa. NaCORI came into existence in 2014 in response to the National Coffee Policy (2013).

Annex 2: Technical Committee on Biodiversity Conservation

#	Name	Role on Committee	Institution
1.	Prof. Joseph Obua	Chairperson	Makerere University (Environmental Forestry and Policy)
2.	Aggrey Rwetsiba	Member	Uganda Wildlife Authority
3.	Aventino Bakunda	Member	Ministry of Agriculture, Animal Industry and Fisheries
4.	Dr. Samson Gwali	Member	National Forestry Resources Research Institute
5.	Dr. Robert Kityo	Member	Makerere University (Zoology)
6.	Dr. Gerald Eilu	Member	Makerere University (Forest Ecology)
7.	Dr. Esther Katuura	Member	Makerere University (previously National Chemotherapeutic Research Institute
8.	Obed Tugumisirize	Member	National Forestry Authority
9.	Dr. Mary Namaganda	Member	Makerere University (Molecular systematic and curation)
10.	Innocent Akampurira	Member	Uganda National Council for Science and Technology
11.	Dr. James Kalema	Member	Makerere University (Botany)