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FOREIGN ASSISTANCE ACT 118/119 TROPICAL FOREST AND BIODIVERSITY ANALYSIS

JANUARY 2020

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ACRONYMS

AfDB	African Development Bank
ADS	Automated Directives System
AENN	Addressing Education in the Northeast Nigeria
BA/N	Breakthrough Action Nigeria
CSO	Civil Society Organization
CBD	Convention on Biological Diversity
CDCS	Country Development Cooperation Strategy
CFC	Chlorofluorocarbon
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CPI	Corruption Perception Index
DFID	UK Department for International Development
DO	Development Objective
EDU	Education
EGE	Economic Growth and Environment
EIA	Environmental Impact Assessment
EIA	Environmental Investigation Agency
FAO	Food and Agriculture Organization of the United Nations
FAA	Foreign Assistance Act
FCWC	Fisheries Committee for the West Central Gulf of Guinea
FEPA	Federal Environmental Protection Agency
FMEnv	Federal Ministry of Environment
FRIN	Forestry Research Institute of Nigeria
FTF	Feed the Future
GIS	Geographic Information System
GEF	Global Environment Facility
GDP	Gross Domestic Product
GON	Government of Nigeria
HPN	Health, Population, Nutrition
IAPF	International Anti-Poaching Foundation
IBA	Important Bird Area
IHP	Integrated Health Program

IITA	International Institute for Tropical Agriculture
IR	Intermediate Result
IUCN	International Union for Conservation of Nature
IUU	Illegal, Unreported, and Unregulated
JICA	Japan International Corporation Agency
MPA	Marine Protected Area
NBF	National Biosafety Framework
NBSAP	National Biodiversity Strategy and Action Plan
NCF	Nigeria Conservation Foundation
NESREA	National Environmental Standards and Regulations Enforcement Agency
NGO	Non-governmental Organization
NIOMR	Nigerian Institute for Oceanography and Marine Research
NLTP	National Livestock Transformation Plan
NNPS	Nigerian National Park Service
NRM	Natural Resource Management
NSOER	National State of the Environment Report
PCA-CVE	Post Conflict Activity to Counter Violent Extremism
PDG	Peace Democracy and Governance
PES	Payment for Ecosystem Services
REDD+	Reducing Emissions from Deforestation and forest Degradation
SOW	Scope of work
SME	Small and Medium Enterprise
SPACE	Sustainable Practices in Agriculture for Critical Environments
SPDC	Shell Petroleum Development Company
TB	Tuberculosis
UN	United Nations
UNEP-GEF	United Nation Environmental Program – Global Environment Fund
USAID	United States Agency for International Development
USFWS	United States Fish and Wildlife Service
WA BiCC	West Africa Biodiversity and Climate Change
WASH	Water Sanitation and Hygiene
WCS	Wildlife Conservation Society
WWF	World Wildlife Fund

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EXECUTIVE SUMMARY

INTRODUCTION

This report evaluates the status of tropical forests and biodiversity throughout Nigeria and supports the USAID/Nigeria Mission in informing the strategic planning and prioritization for the next Country Development Cooperation Strategy (CDCS) for the period 2020-2025. This Tropical Forest and Biodiversity Analysis (Analysis) complies with Sections 118 and 119 of the Foreign Assistance Act (FAA) of 1961, as amended, and Agency guidance on country strategy development under the Automated Directives System (ADS) 201. Specifically, this Analysis identifies the following, as required by FAA Sections 118 and 119:

(1) The actions necessary in Nigeria to achieve conservation and sustainable management of tropical forests and biodiversity; and

(2) The extent to which the actions proposed for support by the Agency meet the needs thus identified.

The Analysis addresses Nigeria's context and biophysical setting (Section 2), the status of biodiversity and tropical forests (Section 3), the value and economic potential of biodiversity and tropical forests (Section 4), and the legal and institutional framework related to biodiversity and tropical forests (Section 5). It then analyzes direct threats and their drivers (i.e., root causes) (Section 6) as a means to identifying actions necessary for biodiversity and tropical forestry conservation (Section 7). The Analysis then discusses the extent to which USAID/Nigeria programming contributes to those actions necessary (Section 8) and offers guiding principles and targeted recommendations for future USAID programming to support conservation of biodiversity and tropical forests (Section 9).

STATUS OF TROPICAL FORESTS AND BIODIVERSITY

Nigeria's tropical forests and biodiversity are under extreme threat and in steep decline. The country has an abundance of natural resources across a variety of ecosystems including the wetlands and Lake Chad in the Sahel, the mosaic of open plains and forests in the savannah, the northern region, the montane and Guinean rainforest in the central belt, and coastal mangroves in the southern region. The pressure of dramatic increased population growth and economic growth in Nigeria over the last 50 years, including notably the industrial development of oil and gas exploitation in the Niger Delta, has degraded or destroyed much of the natural features of these ecosystems.

Even though Nigeria has set aside key areas for protection across the country in forest and game reserves during colonial times and in national parks more recently, these protected areas have not been preserved. In most cases, it is due to lack of regulatory enforcement and management neglect. Unfortunately, some of these protected areas have become havens for criminals and insurgents (e.g., the Boko Haram in protected areas in Northeast Nigeria) and, as a result, have become sources of insecurity across the country.

Fortunately, a few examples of tropical forests and biodiversity remain fairly intact in Nigeria due to historic isolation, namely the areas along the boundary with Cameroon, in the southeastern geographic region (i.e., in and around the Cross River National Park in Cross River state), and in the northeastern

region (i.e., in and around the Gashaka-Gumti National Park in Taraba and Adamawa states). With the exception of these examples, habitat has been otherwise destroyed or degraded and, as a result, aquatic and terrestrial species are in decline across the country.

The FAA 118/119 Analysis Team evaluated the threats and drivers to tropical forest and biodiversity loss and provided recommendations to inform CDCS development and to help USAID capitalize on important opportunities to protect Nigeria's remaining natural resources.

THREATS

The analysis team leveraged information from stakeholder interviews, key site visits, literature review, and desktop research to identify threats to Nigeria's tropical forest and biodiversity, as described in Section 6.1. The key threats are listed below in declining order of severity:

- Agricultural expansion and poor agricultural management practices
- Unsustainable timber and illegal timber industry
- Wildlife poaching, trafficking of high-value species, and bush- and sea-meat hunting
- Major infrastructure and energy development projects impacting ecologically important areas
- Livestock encroachment and overgrazing
- Extractive industries including mining and sand dredging and oil production
- Unsustainable harvest of non-timber forest products
- Climate change
- Charcoal and wood fuel production
- Land use change from new settlement development and existing settlement expansion
- Exploitation of fish stocks and illegal fishing

ACTIONS NECESSARY TO SUPPORT BIODIVERSITY AND TROPICAL FORESTS IN NIGERIA

The actions necessary to protect tropical forest and biodiversity in Nigeria are identified in Section 7, and are drawn from interviews with over 25 stakeholders, discussions with the Mission, key site visits, and desk top research. Actions necessary (Section 7) encompass the range of actions required to effectively support conservation of tropical forests and biodiversity, while recommendations (Section 9) are specific to USAID strategic planning and programming. In Section 8, the extent to which existing planning and programming at USAID/Nigeria address these actions was evaluated. The resulting recommendations are described in additional details in Section 9, with the highest-priority recommendations summarized below.

HIGHEST-PRIORITY RECOMMENDATIONS FOR USAID PROGRAMMING

Table ES-1 below indicates selected "High Priority" recommendations, with highest-priority actions identified for the Mission's offices including the Program Office (Cross-Sectoral), Economic Growth, Peace and Democratic Governance, Health Population and Nutrition, HIV/AIDS and Tuberculosis (TB), and Education. Additional recommendations are provided in Section 9.

TABLE ES- 1. HIGH PRIORITY RECOMMENDATIONS AND OPPORTUNITIES FOR USAID PROGRAMMING

PROGRAM OFFICE (BIODIVERSITY CONSERVATION FOCUSED – CROSS SECTORAL)

1. *Readily Actionable* – Implement biodiversity and forest conservation programming at key locations in Nigeria, focusing on habitat with flagship flora and fauna, e.g., Cross River landscape in Cross River watershed – mahogany, gorilla, and chimpanzee (highest biodiversity pool in West Africa). Programming should include capacity development and infrastructure for ranger patrols, support to local communities, and other key interventions.
2. *Strategic Opportunity* – Work to expand protected areas; assist with the development of a marine protected area.
3. *For Future Consideration* – Increase participatory resource-use planning (e.g., fisheries and marine use, forestry, wildlife conservation, mangrove preservation).

ECONOMIC GROWTH AND ENVIRONMENT (EGE)

1. *Readily Actionable* – Provide technical assistance as part of agricultural programming that conserves forests in the upper portions of key watersheds to protect and maintain water flow in downstream Feed-the-Future (FTF) zones of influence (e.g., forest conservation in upper watershed of Cross River basin for downstream rice intensification projects in Ebonyi State).
2. *Strategic Opportunity* – Provide technical assistance to develop techniques to decrease herder-farmer conflict and grazing in protected areas like Yankari Game Reserve, e.g., re-establishment of stock routes and grazing reserves for transhumance. (This example could be planned in collaboration with PDG and integrated with activities like the existing "Engaging Communities for Peace in Nigeria" activity in the North East).
3. *For Future Consideration* – Develop sustainable management fisheries program. Provide support for co-management, use rights, capacity and effort-reduction strategies; improved science-informed decision making; and building the political will and public support necessary to make difficult decisions and change the behavior needed to rebuild Nigeria's marine fisheries sector.

PEACE AND DEMOCRATIC GOVERNANCE (PDG)

1. *Readily Actionable* – Support civil society organizations (CSOs) and non-governmental organizations (NGOs) to promote environmental advocacy through media platforms and influencers by: (1) recruiting popular entertainers to serve as brand ambassadors (e.g., Tita Da.Fire for threatened vultures for Nigeria Conservation Foundation (NCF)); (2) supporting radio and TV biodiversity-themed programs; and (3) supporting the production of biodiversity-themed music, documentaries, dramas, and jingles.
2. *Strategic Opportunity* – Provide technical assistance to state governments to review and revise, existing policies on protected area management and enforcement of hunting/logging regulations as well as prosecution of environmental and wildlife crime.
3. *For Future Consideration* – Work with the HPN and HIV/AIDS/TB offices on strategic messaging on the value of biodiversity/forest conservation via Social and Behavioral Change mechanism.

HEALTH, POPULATION, NUTRITION (HPN), AND HIV/AIDS/TB

1. *Readily Actionable* – Promote environmentally-friendly behaviors in health programming, in collaboration with EGE including: (1) renewable energy alternatives; (2) cleaner and efficient burning systems (e.g., bio gel stoves); and (3) recycling principles and proper waste management.
2. *Strategic Opportunity* – Leverage technical assistance to health clinics, such as through the existing Integrated Health Program (IHP) activity, in and around protected areas and areas of high biodiversity (e.g., in and around Yankari Game Reserve and Cross River National Park) in exchange for local protection/ conservation in these areas.
3. *For Future Consideration* – Develop a program to train and employ disadvantaged women (e.g., unemployed

TABLE ES- 1. HIGH PRIORITY RECOMMENDATIONS AND OPPORTUNITIES FOR USAID PROGRAMMING

single mothers, widows, survivors of sexual and physical abuse) to act as rangers in protected areas (similar to the International Anti-Poaching Foundation (IAPF) Akashinga project in Zimbabwe).
EDUCATION
1. *Readily Actionable* – Support environmental awareness programs in both formal and nonformal learning centers, integrated into activities like the Addressing Education in the Northeast Nigeria (AENN) activity.
2. *Strategic Opportunity* – Promote primary schools for girls in communities in and around protected areas, with appropriate awareness to the religious and cultural context, in exchange for local support/contribution to conservation of biodiversity/forests.
3. *For Future Consideration* – Design a program integrating agroforestry/afforestation at schools in North East, based on conservation clubs, fruit tree nurseries with boreholes at schools, student management of trees at homesteads, with rewards (e.g., scholarships) for students. (This program could be integrated, for example in the existing Post Conflict Activity to Counter Violent Extremism (PCA-CVE) in the Borno State).

1. INTRODUCTION

1.1 PURPOSE AND SCOPE

The USAID/Nigeria Mission (the Mission) is required by Sections 118/119 of the Foreign Assistance Act (FAA) to prepare an analysis of the state of Nigerian tropical forest and biodiversity (the Analysis). Specifically, FAA Section 118 Tropical Forests and Section 119 Endangered Species, as amended, require that country development strategies, statements, or other country plans prepared by USAID include an analysis as follows:

"FAA Section 118 (e) Country Analysis Requirements. Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of:

> (1) The actions necessary in that country to achieve conservation and sustainable management of tropical forests; and
> (2) The extent to which the actions proposed for support by the Agency meet the needs thus identified.

According to FAA Section 119 (d) Country Analysis Requirements, each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of:

> (1) The actions necessary in that country to conserve biological diversity; and
> (2) The extent to which the actions proposed for support by the Agency meet the needs thus identified."

The Analysis ensures compliance with FAA 118/119 and provides recommendations to inform the Mission's 2020-2025 CDCS. The Analysis includes an evaluation of the status of Nigerian biodiversity and tropical forests, an analysis of the legal and institutional frameworks affecting conservation, an economic valuation of ecosystems, a comprehensive appraisal of threats to biodiversity and the underlying drivers thereof, a summary of necessary actions to protect biodiversity and tropical forests, linkages to current USAID programs, and recommendations for strategic opportunities moving forward.

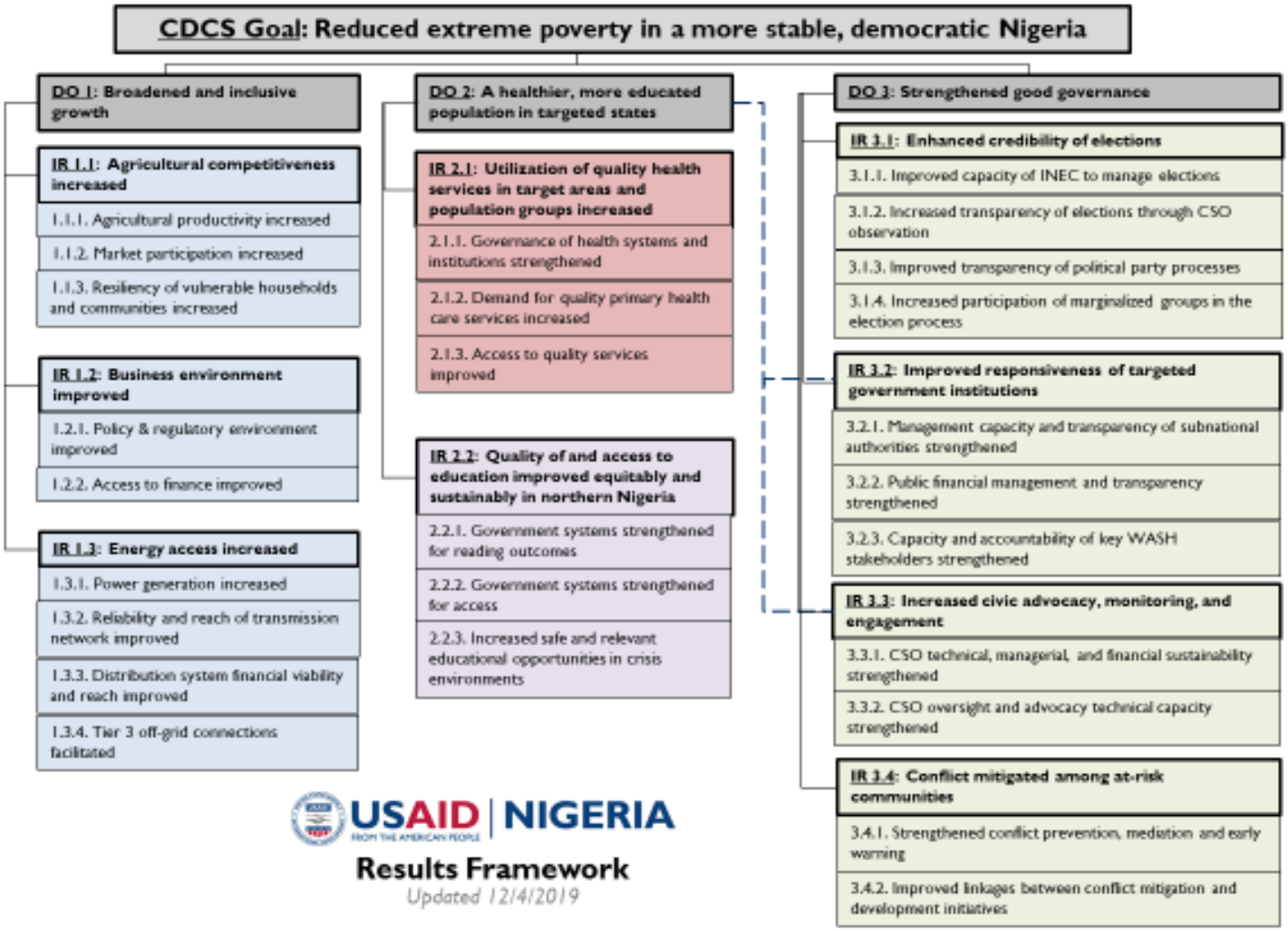
In developing recommendations, the Analysis Team identifies key changes in the status of institutional management of conservation, use of natural resources, and biodiversity that must be considered at a programmatic level. This Analysis builds on the Convention on Biodiversity Nigeria's *Fifth National Biodiversity* Report, published in 2015, and follows the 2013 *Nigeria Biodiversity and Tropical Forests 118/119 Assessment.*[1] The 2013 Assessment 1) outlined the state of biological diversity in Nigeria and changes to key ecosystems; 2) identified the threats to the environment and biodiversity and their causes; 3) discussed the necessary steps from the political, economic and social contexts for the protection of Nigerian biodiversity; and 4) assessed any potential issues with proposed USAID planning and identified potential opportunities for the Nigeria Mission to contribute to the needed actions through its programming.

[1] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

1.2 BRIEF DESCRIPTION OF THE USAID PROGRAM

The overarching goal of the current USAID/Nigeria CDCS (2015- 2020) is "reduced extreme poverty in a more stable, democratic Nigeria."

FIGURE 1. USAID/NIGERIA CDCS RESULTS FRAMEWORK



DO 1: BROADENED AND INCLUSIVE GROWTH

Development Object (DO) 1 consists of three Intermediate Results (IRs): IR 1.1: Agricultural Competitiveness Increased; IR 1.2: Business Environment Improved; IR 1.3: Energy Access Increased. Under DO 1, USAID looks to achieve more inclusive growth, reduced regional inequalities, and poverty reduction.

DO 2: A HEALTHIER, MORE EDUCATED POPULATION IN TARGETED STATES

DO 2 consists of two IRs: IR 2.1: Utilization of Quality Health Services in Target Areas and Population Groups Increased; IR 2.2: Quality of and Access to Education Improved Equitably and Sustainably in Northern Nigeria. DO 2 asserts that if Nigerian state and local governments improve the provisioning of and access to education and health services, the result will be a healthier, more educated populace. With increased provision of health services and education, the Nigerian workforce will be more productive, contributing to economic growth and poverty reduction. Increased social services provisions will also likely mitigate several of the key grievances and factors influencing violence in the North.

DO 3: STRENGTHENED GOOD GOVERNANCE

DO 3 consists of four IRs: IR 3.1: Enhanced Credibility of Elections; IR 3.2: Improved Responsiveness of Targeted Government Institutions; IR 3.3: Increased capacity for civic advocacy, monitoring, and engagement; and IR 3.4: Conflict Mitigated among At-risk Communities. USAID/Nigeria strives to strengthen the state and local government's institutional capacity to administer elections, respond to citizen needs, and increase the government's transparency and accountability. DO 3 asserts that strengthened good governance will result in increased, more inclusive economic growth, a healthier, more educated populace, and overall poverty reduction.

1.3 METHODOLOGY

The methodology for the Tropical Forest and Biodiversity Analysis consisted of five phases:

- Phase 1: Work planning
- Phase 2: Desk-based research, preliminary writing, Washington, D.C. (DC)-based consultations, and logistical arrangements for in-country site visits and consultations
- Phase 3: In-country consultations and site visits
- Phase 4: Post-field work DC- and Nigeria-based consultations
- Phase 5: Report writing

TABLE 1. FIVE PHASES OF ASSESSMENT

PHASE	DESCRIPTION
PHASE 1: WORK PLANNING	Work plan development, completed within 12 days after the beginning of the contractual period of performance, laid out the work to be completed over the course of the assessment.
PHASE 2: DESK-BASED RESEARCH	Pre-fieldwork research and planning, including a thorough desk-based review by the Analysis Team,[2] predominantly DC-based stakeholder consultations, and the beginning of report writing. During this period, the team had in-person (in DC) and remote

[2] The Analysis Team was comprised of the following core team members: Mr. James Jolley and Mr. Josh Habib. This core team was assisted by home office staff and selected technical experts who assisted in report research, writing, geographical information, and additional desk support as needed throughout the course of the preparation of the Assessment. The technical support during the field visits included experts Mr. Nduka Okaro and Dr. Iyiola Tella.

TABLE 1. FIVE PHASES OF ASSESSMENT	
PHASE	DESCRIPTION
	consultations with representatives from the U.S. Fish and Wildlife Service (USFWS), the World Resources Institute, the Wildlife Conservation Society, Forest Trends, the Environmental Investigation Agency (EIA), the Global Environment Facility (GEF), and other key stakeholders.
PHASE 3: IN-COUNTRY CONSULTATIONS AND SITE VISITS	The Analysis Team conducted in-country consultations and site visits from September 9 – 30, 2019. In-country consultations included Mission staff, USAID implementing partners, Government of Nigeria entities, NGOs, private sector entities, and individuals familiar with implementing projects on environmental biodiversity and forest conservation in Nigeria. Consultations and site visits were conducted in Abuja, Bauchi, Lagos, Ibadan, Calabar, and Ikom. Initial report drafting, research, and review of the available literature continued throughout the in-field portion of the analysis. Prior to departure, the Analysis Team held an exit briefing with Mission management, the program office, and technical teams to provide them with an overview of the analysis and preliminary report findings.
PHASE 4: POST-FIELD WORK CONSULTATIONS	The Analysis Team conducted final consultations over the phone with stakeholders who were unavailable in-country. These consultations filled gaps as determined by the team over the course of in-country consultations and ongoing desk research, and informed by the USAID exit briefing.
PHASE 5: REPORT WRITING	The Draft Analysis was written according to USAID's 2019 FAA 118/119 Assessment Best Practices Guide (FAA 118/119 Best Practices Guide), and based on the accumulated literature, geographic information system (GIS) analysis, and stakeholder consultations. The Final Analysis incorporated feedback and addressed comments received from Mission review over an initial 2-week comment period and follow-on final review.

2. COUNTRY CONTEXT AND BIOPHYSICAL

2.1 COUNTRY CONTEXT

Nigeria is the most populous country in Africa. Since gaining independence in 1960, it has continued to grow in both size and influence. With a population of approximately 203 million people, Nigeria accounts for 47% of the total West African population.[3] Increasing at an annual growth rate of 2.7%, Nigeria's population is projected to reach 392 million by 2050.[4]

The Nigerian federation, a conglomerate of 36 autonomous states, has 250 distinct ethnic groups.[5] The largest group, the Hausa, has historically represented about 27% of the population, while the Igbo and Yoruba account for 14% each. The official language of Nigeria is English, though other predominantly spoken languages include Hausa, Yoruba, Igbo (Ibo), and Fulani. Roughly 52% of the country identifies as Muslim, 36% as various forms of Christianity, and approximately 10% as Roman Catholic.[6]

Nigeria is Sub-Saharan Africa's largest economy and relies heavily on oil exports. Oil accounts for about 90% of total exports and 75% of the government's revenue.[7] In addition to substantial access to oil, Nigeria also has the largest natural gas reserves on the continent. Between 2006 and 2016, Nigeria's gross domestic product (GDP) grew at an average rate of 5.7% per year.[8] After the recession in 2017, however, oil prices declined, and the economic growth rate fell below the population growth rate. The projected GDP for 2019 is approximately 2%, reflecting the regulatory uncertainty of the oil and gas industry.[9] The volatility of Nigeria's economic growth and its reliance on oil impose a cost on the welfare of citizens across the country. In 2018, approximately 25% of the workforce was unemployed and an additional 20% underemployed.[10]

The main non-oil sector of the Nigerian economy is agriculture. Though not as significant to the GDP as the oil industry, the agricultural sector has witnessed an expansion as a result of policy changes and focused efforts to support domestic farmers.[11] The established farming systems are relatively small-scale with scattered landholdings and low-input technology. Low-input technology restricts the capacity for productivity. Nigeria's diverse terrain and climate allow a variety of crops to thrive. The savannah in the northern region of the country allows for production of crops, such as sorghum and millet. In the middle belt of Nigeria, the land yields cassava, maize, and yams, in addition to sorghum. Flooded regions

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[3] "Overview," World Bank, last modified 13 October 2019, www.worldbank.org/en/country/nigeria/overview#1.
[4] "The World Factbook: Nigeria," CIA, last modified 28 January 2020, https://www.cia.gov/library/publications/resources/the-world-factbook/geos/ni.html.
[5] *Ibid*.
[6] *Ibid*.
[7] "Country Profile – Nigeria," AQUASTAT - FAO's Information System on Water and Agriculture, FAO, 2016, www.fao.org/nr/water/aquastat/countries_regions/NGA/index.stm.
[8] "Overview," World Bank, last modified 13 October 2019, www.worldbank.org/en/country/nigeria/overview#1.
[9] *Ibid*.
[10] *Ibid*.
[11] FGN. *Nigeria's Path to Sustainable Development Through Green Economy, Country Report to the Rio +20 Summit*. 2012. https://sustainabledevelopment.un.org/content/documents/1023nigerianationalreport.pdf.

can support rice, and the South of the country yields crops, such as cocoa and oil palm.[12] However, with the expansion of agriculture, Nigeria has witnessed land-use changes that have impacted ecosystems across the country's forests and savannas.

Conflict and Insecurity: The Boko Haram insurgency in recent years has led to increased insecurity and a decline in economic development in northern Nigeria. Boko Haram, a jihadist terrorist organization, is based in northern Nigeria and has threatened future social and economic investment into the poverty-stricken region of the country.

Nigerian politics were marked by coups and military rule since independence in 1960 until 1999 when a democratic constitution was adopted, ushering in an era of election-based, civilian government. The most recent presidential election was on February 23, 2019, which resulted in the re-election of President Muhammadu Buhari. President Buhari has made a concerted effort to alleviate corruption, encouraging heightened bureaucratic transparency.[13] However, Nigeria still receives low marks on the corruption perception index, ranked 144 out of 180.[14] Without a flow of investment into the country, Nigeria's human capital development remains low, receiving a ranking of 152 out of 157 in the World Bank's 2018 Human Capital Index.[15] Nigeria is rich in resources such as oil and natural gas; however, the country's development has stagnated as a result of extreme poverty, low education rates, crime, lack of access to healthcare, and insufficient economic policies.

2.2 BIOPHYSICAL SETTING

Nigeria is approximately twice the size of California with a total land area of 923,770 square kilometers.[16] Nigeria lies between latitude 9° 04' 39.90" N and 39° N and longitude 8° 40' 38.84" E.[17] The country is bordered by Benin to the west, Niger to the north and northwest, Chad to the northeast, and Cameroon to the east (see Figure 2, for its location).[18] The Atlantic Ocean forms the southern border of Nigeria with 850 kilometers of coastline.[19] The highest elevation in Nigeria, Chappal Waddi, is 2,419 meters above sea level.

[12] "Country Profile – Nigeria," AQUASTAT - FAO's Information System on Water and Agriculture, FAO, 2016, www.fao.org/nr/water/aquastat/countries_regions/NGA/index.stm.
[13] "The World Factbook: Nigeria," CIA, last modified 28 January 2020, https://www.cia.gov/library/publications/resources/the-world-factbook/geos/ni.html.
[14] Nwafor Sunday, "Nigeria Ranks 144/180 On Transparency International's Corruption Perception Index," *AllAfrica*, 29 Jan. 2019, https://allafrica.com/stories/201901290456.html.
[15] *Ibid*.
[16] "The World Factbook: Nigeria," CIA, last modified 28 January 2020, https://www.cia.gov/library/publications/resources/the-world-factbook/geos/ni.html.
[17] "GPS Coordinates of Nigeria. Latitude: 9.0778 Longitude: 8.6775." Latitude.to, date accessed September 2019, https://latitude.to/map/ng/nigeria.
[18] "Nigeria in Africa," WikiMedia Common, last modified 7 April 2011, https://commons.wikimedia.org/wiki/File:Nigeria_in_Africa_(-mini_map_-rivers).svg.
[19] "Country Profile – Nigeria," AQUASTAT - FAO's Information System on Water and Agriculture, FAO, 2016, www.fao.org/nr/water/aquastat/countries_regions/NGA/index.stm.

FIGURE 2. LOCATOR MAP OF NIGERIA[20]

Nigeria hosts a variety of terrain and climate. The seven main ecological zones are the Mangrove Swamp and Coastal Vegetation, Freshwater Swamp Forest, Lowland Rain Forest, Derived Savanna, Guinea Savanna, Sudan Savanna, and Sahel Savanna.[21] The mountainous regions in Nigeria can be found along the border of Cameroon to the east in Adamawa, Taraba, and the northern region of the Cross River State, as well as in the Jos Plateau.[22] The Nigerian climate is semi-arid in the north and gradually changes into savanna, then tropical rainforest with humid conditions to the south. While the tropical coast of Nigeria averages 2,000 mm/year, raining year-round, the rest of the country's rainfall follows a wet and dry season pattern.[23]

[20] Map of Africa Showing Nigeria in Red [map]. February 2020. https://yandex.com/collections/card/5ac5016facbcf6ac504d0047/.
[21] FDF and FMEnv. *National Forest Reference Emission Level for the Federal Republic of Nigeria*. January 2019. https://redd.unfccc.int/files/2019_submission_frel_nigeria.pdf.
[22] *Ibid*.
[23] "Country Profile – Nigeria," AQUASTAT - FAO's Information System on Water and Agriculture, FAO, 2016, www.fao.org/nr/water/aquastat/countries_regions/NGA/index.stm.

3. STATUS OF NIGERIA'S TROPICAL FORESTS AND BIODIVERSITY

Nigeria is not currently classified as a Tier 1 or 2 biodiversity country under USAID guidelines, and does not therefore receive biodiversity funding.[24] Nevertheless, the country does have numerous regions rich in biodiversity and home to critical ecosystems. These regions include, but are not limited to, the rainforests of the Cross River basin, the mountains along the Cameroon border with Nigeria, and the coastal creeks of the Niger Delta (Figure 3). [25, 26, 27] Challenges to biodiversity conservation, noted in *Nigeria's Fifth National Report on Biodiversity* (December 2015), include limited financial resources, little engagement with local government, diversion of "Ecological Funds" to non-environmental activities, weak coordination across relevant institutions, minimal political will, and a general lack of applied research.[28] In addition to the institutional roadblocks to conservation, the main challenge is the relationship between Nigerians living below the poverty line and the natural environment. Many livelihoods depend on ecological services which degrade the living environment and its surrounding ecosystems when overharvested.

The two largest rivers in Nigeria, the Niger and Benue Rivers, are home to diverse marine and freshwater ecosystems and also support agriculture and commerce. In the central region of the country, the three main plateau landscapes boast the highest peaks in Nigeria. In southwestern Nigeria, the Nigerian Lowland Forests only contain five of the 274 endemic mammalian species, but are home to a critically endangered, endemic primate, the white-throated guenon (Cercopithecus erythrogaster).[29] The World Wildlife Fund (WWF) considers rapid population growth and agricultural expansion to be the primary threats to this primate. The Wildlife Conservation Society (WCS) has focused its efforts on the Cross River gorilla, a critically endangered species, found only in Nigeria and Cameroon.[30] Despite efforts to protect this native species, there are only approximately 300 Cross River gorillas left, 100 of which live in Nigeria. See Figure 4 for the range of the critically endangered Cross River gorilla. Other notable endangered species in Nigeria include the Northwestern African cheetah, West African lion, Dama gazelle, and Western gazelle. The West African lion population in Nigeria has dwindled to just 34,

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[24] Tier 1 and 2 Operating Units are responsible for activities in USAID-assisted countries or regions that are the highest ranked in terms of biological criteria. The Tier rankings are based on the Global Environment Facility's Global Benefits Index for Biodiversity that contains a preponderance of globally significant ecoregions as determined by the World Wildlife Fund's Global 200 list.

[25] Itehm Ukpabi. *Wildlife Conservation Society Cross River National Park (Oban Division) Annual Report: January – December 2018.* Wildlife Conservation Society, 2019. https://nigeria.wcs.org/About-Us/Publications/Categoryid/930.aspx.

[26] The Niger Delta is a World Wildlife Fund (WWF) Global 200 Terrestrial ecoregion, identified as a conservation priority.

[27] Dave Smetana, "The Nature Conservancy Terrestrial Ecosystems," The Nature Conservancy, Data Basin, last modified 9 Jan. 2014, https://databasin.org/datasets/9c7bc177c6154d71b045839 1f3177053.

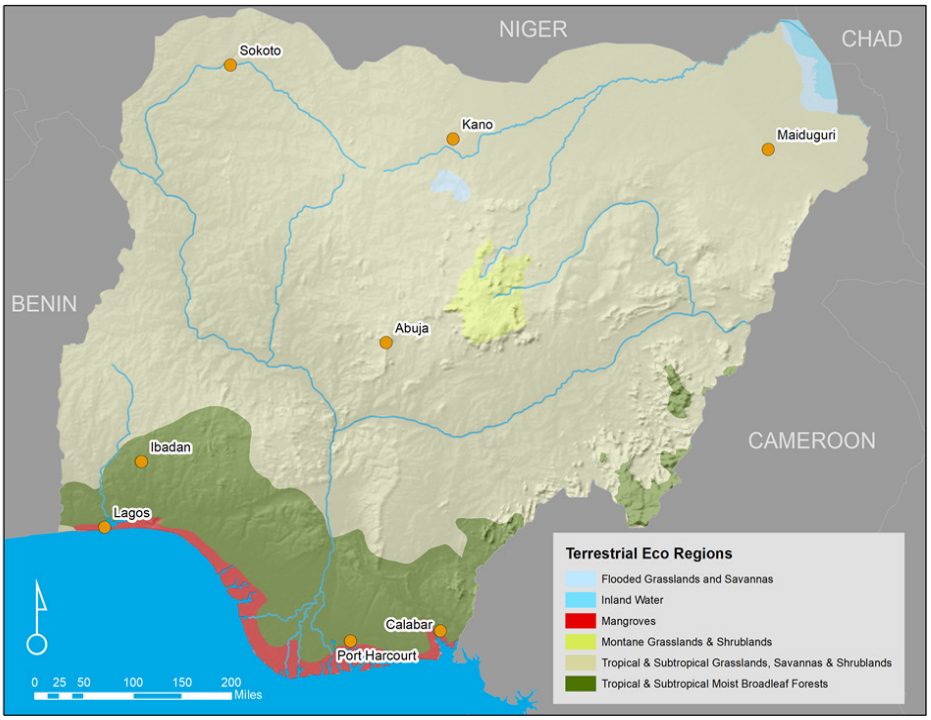
[28] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[29] Allard Blom, "Western Africa: Western Cameroon Extending into Nigeria," WWF, World Wildlife Fund, www.worldwildlife.org/ecoregions/at0103.

[30] Stephen Messenger, "There Are Only 100 Gorillas Left in Nigeria, Conservationists Say," *The Dodo*, 24 July 2014, www.thedodo.com/there-are-only-100-gorillas-le-639866691.html.

and the North African cheetah, found in various regions in Nigeria, has a global population size of 250.[31] These well-known mammals are threatened by deforestation, hunting, and farming practices that continue to expand in Nigeria.[32]

FIGURE 3. NIGERIA'S TERRESTRIAL ECOREGIONS[33]



Despite some success stories of endangered species' population recovery in protected areas, most native populations are in decline across Nigeria. The threats to biodiversity in Nigeria have been acknowledged internationally, and the Nigerian government has outlined a plan to combat the ongoing damage to the native ecosystems. Major threats to biodiversity in Nigeria include land-use conversion, habitat degradation, over-exploitation, invasive species, climate change, and poaching.[34] Land use conversion involves replacement of natural ecosystems with large-scale farming and mono-cultural plantations, for example, for exotic tropical hardwood species such as teak (Tectona grandis).[35] Declining biodiversity trends are observed in forests, dry and sub-humid savannas, and marine, coastal, and inland water bodies. The steady disappearance of plants and animals is a result of population growth,

[31] Kenneth Kimutai, "Endangered Mammals of Nigeria," WorldAtlas, accessed 1 August 2019, https://www.worldatlas.com/articles/endangered-mammals-of-nigeria.html.

[32] *Ibid.*

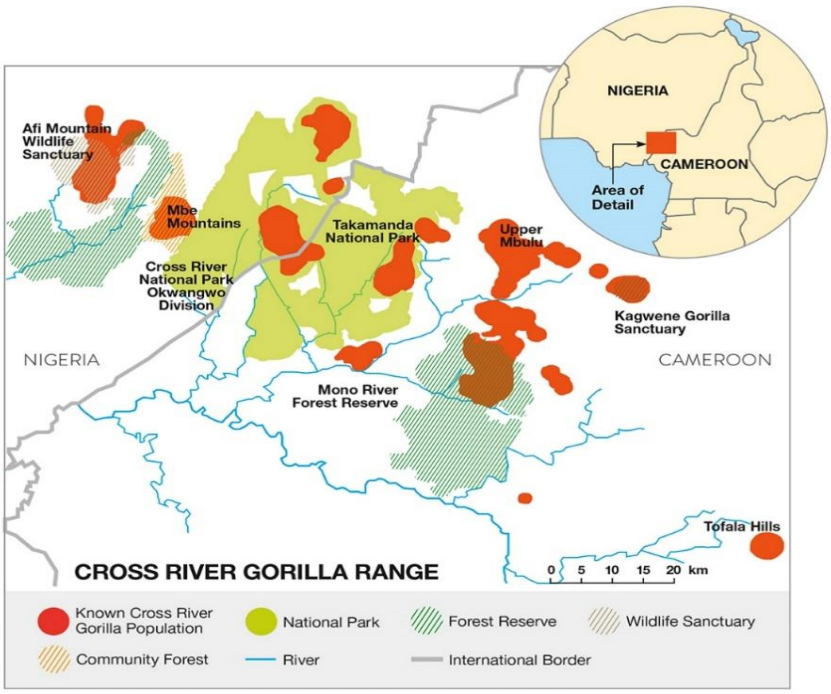
[33] Map developed at the Cadmus Group. Map data derived from The Nature Conservancy. "The Nature Conservancy Terrestrial Ecosystems" (2014). https://databasin.org/datasets/9c7bc177c6154d71b0458391f3177053.

[34] USAID, *GEMS USAID/West Africa Phase I,* 1 July 2018, http://www.usaidgems.org/Documents/FAA&Regs/FAA118119/AF%2073_W_AFR_118_119_Revised_WithAnnex_FINAL_6August2018.pdf

[35] ARD, Inc. *Nigeria Environmental Analysis Final Report*, Under USAID Contract No. LAG-I-00-99-00013-00 BIOFOR IQC, April 2002. https://rmportal.net/library/content/1/118_nigeria/view.

agricultural expansion, exploitation of underdeveloped ecosystems, and a lack of organized environmental protection by the Nigerian government.

FIGURE 4. CROSS RIVER GORILLA RANGE



Revised *Regional Action Plan for the Conservation of the Cross River Gorilla (Gorilla gorilla diehli) 2014–2019*

3.1 ECOSYSTEM TYPES AND STATUS AND ASSOCIATED BIODIVERSITY

3.1.1 TROPICAL FORESTS

Nigeria is home to a variety of forest types including the Cameroonian Highland Forests, Nigerian Lowland Forests, Central African Mangroves, Niger Delta Swamp Forests, Cross-Niger Transition Forests, and Guinean-Forest Savanna Mosaic.[36] Nigerian forests are distinctly different when moving from north to south and provide habitat to native and non-native flora and fauna. These six forest types are each characterized by variations in vegetation that responds to drier middle and northern latitudes, lowland rainforest in the southern humid zone, and coastal mangroves and freshwater swamp forests.[37] Table 2 lists forest type and coverage in Nigeria. Additional details of the different forest types are provided in Section 3.2. The high levels of species diversity and richness are reflected in the differences in forest type and habitat capacity. Unfortunately, Nigerian native forests and endemic flora are being destroyed at an alarming rate, drawing international attention.

[36] Allard Blom, "Western Africa: Western Cameroon Extending into Nigeria," WWF, World Wildlife Fund, www.worldwildlife.org/ecoregions/at0103.
[37] "Nigeria Forest Information and Data," Mongabay.com, https://rainforests.mongabay.com/deforestation/2000/Nigeria.htm.

TABLE 2. FOREST TYPE AND COVERAGE IN NIGERIA	
FOREST TYPE	HECTARES
Cameroonian Highland Forests	3,884,982
Nigerian Lowland Forest	19,991
Central African Mangroves	1,149,995
Niger Delta Swamp Forests	1,500,008
Cross-Niger Transition Forests	3,331,291
Guinean-forest Savanna Mosaic	800,023

WWF, World Wildlife Fund, https://www.worldwildlife.org/ecoregions/at0106.

3.1.2 SAVANNA-GRASSLANDS AND SHRUBLANDS

Historically, 80% of Nigeria was savanna, much of which has since been converted into developed land or farms.[38] The Nigerian savannas are typically classified into three distinct types based on the amount of rainfall and the season: Sahel, Sudan, and Guinean savannas.[39] The Sahel savanna is characterized by its desert-like nature, as it borders the Sahara Desert. The Sudan Savanna is located in northern Nigeria, and its dry period lasts for approximately six months a year. One key characteristic of the Sudan Savanna is its expansive sand coverage. The largest savanna in Nigeria is the Guinean savanna, characterized by the Guinean high grass that surrounds it. This swath of savanna is found in the middle belt of Nigeria and is notable for its broader range of biodiversity that live in the tall, elephant grass.

Only a small amount of natural savanna is protected in Nigeria, and the many large savanna animals have been greatly reduced in numbers and range as a result. In Nigeria, attempts have been made to preserve savanna habitats and species by establishing protected areas, such as Yankari and Lame-Burra game reserves in Bauchi State. Despite this protection, other large mammals, including African wild dogs, cheetahs, giraffes, and a few antelope species have been nearly eliminated, although elephants and lions can still be found. In other protected areas in Nigeria's savannas, large mammal populations are in even worse shape, and those outside of protected areas are virtually nonexistent. The endangered mammals that can be found in the savannas are listed in Table 3.

TABLE 3. ENDANGERED MAMMALS OF NIGERIAN SAVANNAS[40]		
COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS
Northwest African Cheetah	Acinonyx jubatus hecki	Critically endangered with less than 250 mature individuals
West African Lion	Panthera leo seneglaensis	Presently critically endangered in Nigeria, with about 50 left in the wild at Yankari and Kainji-Lake National Park.

[38] Allard Blom, "Western Africa: Western Cameroon Extending into Nigeria," WWF, World Wildlife Fund, www.worldwildlife.org/ecoregions/at0103.

[39] FGN, *Nigeria's Fifth National Biodiversity Report,* CBD, 2015, https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[40] IUCN Red List of Threatened Species. *IUCN.* https://www.iucnredlist.org/.

TABLE 3. ENDANGERED MAMMALS OF NIGERIAN SAVANNAS[40]		
COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS
Dama Gazelle	Gazella dama	Critically endangered globally with very few located in Nigeria
White-throated Guenon	Cercopithecus erythrogaster	Vulnerable
Preuss's Monkey	Cercopithecus preussi	Critically endangered, found in the Obudu plateau and Okwangwo areas of Cross-River state and South-west Cameroon.
Sclater's Guenon	Cercopithecus sclateri	Endangered
Drill	Mandrillus leocophaeus	Endangered, and found in various locations in Nigeria.
Red Colobus Monkey	Procolobus badius	Endangered
Pennant's Colobus Monkey	Procolobus pennantii	Endangered
Pygmy Hippopotamus	Choeropsis liberiensis	Endangered
Western Gorilla	Gorilla	Critically endangered
Nigeria-Cameroon Chimpanzee	Pan troglodytes ellioti	Critically endangered, with 1500-3000 left in Nigeria and approximately 3500-9000 in Nigeria and Cameroon, the endemic areas.
Gotel Mountain Soft-furred Mouse	Praomys obscurus	Vulnerable
Cameroonian Forest Schrew	Sylvisorex camerunensis	Vulnerable
West African Giraffe	Giraffa Camelopardalis peralta	Vulnerable
Savanna Elephant	Loxodonta africana	Endangered, last remaining population may be in Yankari Game Reserve, where approximately 450 are left.
Crested Servaline Genet	Genetta cristata	Vulnerable
West African Wild Dog	Lycaon pictus manguensis	Endangered, hunted out at Gashaka Gumti recently, but may still be found at Kainji-lake national park.

3.1.3 INLAND WATER RESOURCES

Nigeria is endowed with a diversity of freshwater resources, including seasonal and permanent rivers, lakes, and wetlands. Nigeria has two major rivers, the Niger and its largest tributary, the Benue. Other major tributaries to the Niger and Benue include the Cross, Imo, Ogun, and Osun Benin Rivers. The Niger River discharges to the Atlantic Ocean breaking into tributaries and channels to form the Niger

Delta.[41] The Niger Delta is home to the largest mangrove ecosystem in Nigeria, providing a habitat to thousands of species of plants and animals. The Niger Delta is an ecological hotspot, home to many locally and globally endangered species with approximately 60-80% of all plant and animal species in the country thriving there.[42] In recent years, however, the Niger Delta has been a case study of environmental degradation because of its overexploitation and pollution, despite the vast species diversity. Additional information on the biodiversity of the Niger Delta Swamp Forests can be found in Section 3.2.4.

Nigeria has two notably large lakes: Lake Chad and Kainji Reservoir. Lake Chad is the largest lake in West Africa, and the fourth largest on the continent.[43] It covers 2,500 square kilometers at the borders of Cameroon, Chad, Niger, and Nigeria. Two rivers, the Yobe and the Yedseram-Ngadda, drain northeastern Nigeria and discharge to the wetlands around Lake Chad. Other tributaries to the lake include the Baningi, Logone, and Chari Rivers from watersheds in surrounding countries. Despite its relatively large size, Lake Chad has shrunk by 90% from its 1960s size as a result of climate change, population growth, and overexploitation.[44] The lake is divided into a northern and southern basin by a swamp belt containing islands, reed beds, and open water. During seasonal flooding, local pastoralists make use of the yaeré grasslands in this area.[45] However, year-round, this lake is a source of water for 20-30 million people living in the surrounding area.[46] The sheer number of people who use Lake Chad indicates the need for heightened protection of the natural lake in order to sustain the wildlife and human needs living in the region. Lake Chad supports two species of near-endemic passerine birds, as well as West African manatees, which can be found in the Baningi, Logone, and Chari River tributaries.[47]

Nigeria's Chad Basin National Park (2,258 square kilometers) is an International Union for Conservation of Nature (IUCN) Category II, and one of seven National Parks in Nigeria. The Lake Chad Basin National Park has three separate divisions, the Chingurmi-Duguma section, the Bade-Nguru Wetlands, and the Bulatura sector.[48] The Chingurmi-Duguma section shares a border with Cameroonian park, Waza National Park. This sector has an area of 1,228 square kilometers and frequent floods, creating flood-plain wetlands that attract water birds and other wildlife.[49] The Chingurmi-Duguma notably is home to 66 different species. The Bade-Nguru and Bulatura sectors are comprised mostly of wetlands,

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[41] "Niger Delta Biodiversity Project," UNDP Nigeria, UNDP, 2011, https://www.ng.undp.org/content/nigeria/en/home/operations/projects/environment_and_energy/niger-delta-biodiversity-project.html.

[42] *Ibid*.

[43] Will Ross, "Lake Chad: Can the Vanishing Lake Be Saved?" BBC News, *BBC*, 31 Mar. 2018, www.bbc.com/news/world-africa-43500314.

[44] *Ibid*.

[45] ARD, Inc. *Nigeria Environmental Analysis Final Report*, Under USAID Contract No. LAG-I-00-99-00013-00 BIOFOR IQC, April 2002, https://rmportal.net/library/content/1/118_nigeria/view.

[46] Will Ross, "Lake Chad: Can the Vanishing Lake Be Saved?" BBC News, *BBC*, 31 Mar. 2018, www.bbc.com/news/world-africa-43500314.

[47] Beth Hahn. *Nigeria Biodiversity and Tropical Forests 118/119 Assessment*. USDA Forest Service Office of International Programs, 2013: 1-49, https://ecd.usaid.gov/faa/source/Nigeria_2013.pdf.

[48] "Chad Basin National Park." National Park Service, Nigeria National Park Service, http://nigeriaparkservice.org/?p=136.

[49] "Chad Basin National Park: Chingurmi-Duguma Sector," Data Zone, BirdLife International, 2020, http://datazone.birdlife.org/site/factsheet/chad-basin-national-park:-chingurmi--duguma-sector-iba-nigeria.

with the Bade-Nguru home to the protected Hadejia-Nguru wetlands. These wetlands lie in the Yobe-Komadugu sub-basin of the Chad Basin and are on the list of Ramsar Wetlands of International Importance. This sector is famous for the Dagona Waterfowl Sanctuary, which provides key protected habitat for migratory birds. Over 377 different species of water birds have been spotted breeding or wintering in this sanctuary. The Waterfowl Sanctuary is one of the most important bird protected areas in Nigeria because of the bird species diversity and richness.[50] The Bade-Nguru sector also hosts five of the 994 forest reserves in its 938 square kilometers. Compared to the Bade-Nguru and Chingurmi-Duguma regions, the Bulatura region of the Chad Basin National Park is the smallest with an area of 92 square kilometers. Like the Bade-Nguru, this region is swampy and well-known for its aesthetic sand dunes and valleys that attract tourists to the region.[51]

Many of the water features in Nigeria provide important breeding and feeding habitats for a diversity of bird species. Wetlands and other freshwater habitats in Nigeria provide access to wildlife and abundant fish reserves for locals. As the Nigerian wetlands are an important habitat to a variety of species, water quality and quantity are important to all who depend on the natural resources. However, wildlife populations associated with wetlands have been in decline. Various studies in Nigeria have shown high levels of heavy metals in some rivers where industrial wastes are discharged, and high levels of siltation in areas with extensive logging and farming. The inland water sources near cities face extreme pollution and exposure to hazardous waste.[52] As a result of this pollution, many of the freshwater aquatic ecosystems have been almost completely destroyed and their ecosystems services depleted.

3.1.4 MARINE RESOURCES

Nigeria has a variety of coastal and marine resources that hold ecological and economic significance. Approximately 853 kilometers of the southern border of Nigeria is the Atlantic Ocean, which provides access to a fishery that supports the livelihoods of many Nigerians residing along the coast.[53] Fisheries production is extraordinarily pertinent to Nigeria's socio-economic development. However, as a result of poor fisheries management, the fish supply is far below the demand. The coastal region is heavily populated and surrounded by fishing villages.[54] About 20% of the Nigerian population live along the coast and rely on the fishery for food and livelihoods. The Global Environmental Facility (GEF) has worked to establish mechanisms to analyze and monitor the fishery in order to promote financially and environmentally sustainable fishing practices.[55]

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[50] Gbolagade Lameed, "Species Diversity and Richness of Wild Birds in Dagona-Waterfowl Sanctuary, Nigeria," *African Journal of Food, Agriculture, Nutrition and Development*, Vol. 12, No.5, (August 2012), http://www.bioline.org.br/pdf?nd12062.

[51] "Chad Basin National Park," Africa Tour Operators, *Africa Tour Operators*, 2019, https://www.africatouroperators.org/nigeria/chad-basin-national-park.

[52] Olanike Adeyemo. "Consequences of Pollution and Degradation of Nigerian Aquatic Environment on Fisheries Resources," *The Environmentalist,* Vol. 24 (2004): 297-306, https://doi.org/10.1023/B:ENVR.0000031357.89548.fb.

[53] Olalekan Jacob Olaoye and Wahab Gbenga Ojebiyi. "Marine Fisheries in Nigeria: A Review." *Marine Ecology - Biotic and Abiotic Interactions*, (2018), DOI:10.5772/intechopen.75032.

[54] "Description of Fisheries." Marine Fishery Resources of Nigeria: A Review of Exploited Fish Stocks, FAO, www.fao.org/3/R9004E/R9004E04.htm.

[55] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

Marine fisheries resources in Nigeria provide access to a variety of fish species. In total, there are about 104 marine fish species in Nigeria.[56] These fisheries include sharks, sailfish, finfish, shellfish, and shrimp from over 50 families. Within the marine fisheries, a few of these predominant fish families are Sciaenid, Polydactylus, Sphyraenidae, Lutjanidae, Elopidae, Serranidae, and Carangidae.[57] Other common species caught for food include croakers, grunts, soles, catfish, and shrimp from various families.[58]

3.2 STATUS OF TROPICAL FORESTS AND ASSOCIATED BIODIVERSITY

The status of tropical forests in Nigeria is summarized in Figure 5. The definition of "tree cover" in this map includes trees greater than five meters in height. "Loss" indicates the removal or mortality of tree cover and can be due to a variety of factors, including mechanical harvesting, fire, disease, or storm damage. As such, "loss" does not necessarily equate to deforestation.[59]

3.2.1 CAMEROONIAN HIGHLAND FOREST

This montane forest creates the border between Cameroon and Nigeria. Within Nigeria, the forest covers 38,850 square kilometers.[60] Cameroonian Highland forests are a montane, tropical moist broadleaf-forest type. There are a variety of endemic species of plants and animals within this forest type. Eleven small mammals are considered strictly endemic to the region, including Eisentraut's striped mouse, an African wood mouse species, Mount Oku mouse, Mittendorf's striped grass mouse, two brush-furred mouse species, Oku shrew, Rumpi mouse shrew, western vlei rat, Hartwig's soft-furred mouse, and Siabella's shrew.[61] Notable endangered species include the Cross River gorilla, Preuss's monkey, and the red colobus.[62]

The Cross River gorilla, a species native to Nigeria, is nearly extinct. The Wildlife Conservation Society stated that there are 300 gorillas left in existence and only 100 still in Nigeria.[63] The Cross River gorilla's sole habitat is in this forest type. In the past 25 years, the species has declined over 60%, rapidly falling from categorized as vulnerable to critically endangered.[64] The main cause of their disappearance is rampant bushmeat hunting and forest loss. WCS and WWF are attempting to implement local initiatives to quell hunting, increase awareness, and protect the gorilla.

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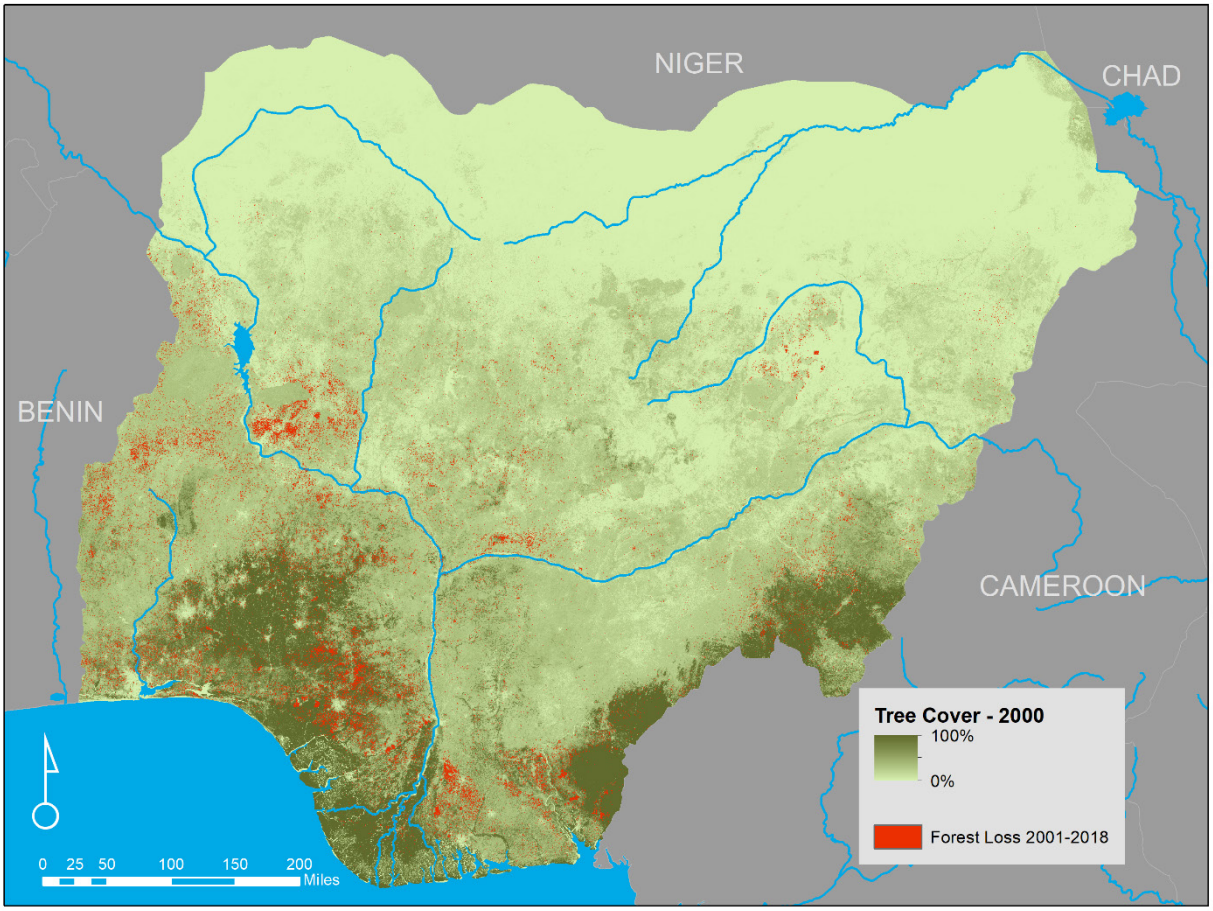
[56] Olalekan Jacob Olaoye and Wahab Gbenga Ojebiyi. "Marine Fisheries in Nigeria: A Review." *Marine Ecology - Biotic and Abiotic Interactions*, (2018), DOI:10.5772/intechopen.75032.
[57] *Ibid.*
[58] *Ibid*.
[59] Matthew Hansen, et. al., "High-Resolution Global Maps of 21st-Century Forest Cover Change," *Science* Vol. 342 Issue 6160 (15 November 2013): 850–853, DOI: 10.1126/science.1244693.
[60] Kenneth Kimutai, "Ecological Regions of Nigeria," WorldAtlas, 18 Oct. 2016, www.worldatlas.com/articles/ecological-regions-of-nigeria.html.
[61] Allard Blom, "Western Africa: Western Cameroon Extending into Nigeria," WWF, World Wildlife Fund, www.worldwildlife.org/ecoregions/at0103.
[62] Kenneth Kimutai, "Ecological Regions of Nigeria." WorldAtlas, 18 Oct. 2016, www.worldatlas.com/articles/ecological-regions-of-nigeria.html.
[63] Stephen Messenger, "There Are Only 100 Gorillas Left in Nigeria, Conservationists Say," *The Dodo*, 24 July 2014, www.thedodo.com/there-are-only-100-gorillas-le-639866691.html.
[64] *Ibid.*

The Cameroonian Highland Forests are threatened by deforestation and clearing efforts, as a result of population increases and the lack of enforcement of environmental regulations. Human activities, such as agricultural encroachment, firewood exploitation, and over-grazing are causing this deforestation. Much of the forest cover that once existed on the plateaus of the Highland Forests has been cleared for agriculture.[65] Because of the high fertility of the volcanic soil in the Highland forest, there is considerable pressure on the Nigerian government to convert swaths of these forests to farmland.[66] A combination of government-funded land-use conversion and illegal encroachment has led to the degradation of this forest region.

FIGURE 5. TREE COVER AND FOREST LOSS[67]



3.2.2 NIGERIAN LOWLAND FOREST

The Nigerian Lowland Forest is located along the coast of southwest Nigeria, east of the Dahomey Gap in Benin and west of the Niger River. The forest extends more than 100 kilometers inland, where it

[65] Allard Blom, "Western Africa: Western Cameroon Extending into Nigeria," WWF, World Wildlife Fund, www.worldwildlife.org/ecoregions/at0103.

[66] *Ibid.*

[67] Map developed by the Cadmus Group. Data for tree cover and forest loss derived from Hansen/UMD/Google/USGS/NASA, 2018.

reaches the Guinean Forest-Savanna mosaic.[68] The vegetation in the Nigerian Lowland Forest is mixed deciduous forest. The forest is divided into two key climatic zones: the parkland and rainforest zones. Rainfall per section of the forest is about 2,000-2,500 millimeters per year in the rainforest zone of the forest and 1,500-2,000 millimeters per year in the main deciduous zone. With a precipitation increase toward the south, this section of the forest is dominated by members of the Leguminosae and the Meliaceae families. Tree families that are associated with the northern region of the Nigerian Lowland Forest include Sterculiaceae, Moraceae, and Ulmaceae.[69]

The Nigerian Lowland Forest boasts five endemic animal species, which is a relatively low number compared to other forest types across the country. The white-throated guenon and Ibadan malimbe are species that are solely found in this forest. Other endemic, endangered species include the endangered primate, the white-throated guenon (*Cercopithecus erythrogaster*), as well as chimpanzees (*Pan troglodytes*) and elephants (*Loxodonta africana*). The endangered status of these three mammals is of concern because of the lack of effective protection of the forest. Given the proximity to populated regions, much of the remaining lowland forest has been designated as a Forest Reserve to protect against encroachment. However, despite these protections, many of the regions have not been sustainably managed, and there is evidence that large sections of the protected forests have still been converted into farmland for exotic tree species[70]

3.2.3 CENTRAL AFRICAN MANGROVES

The Central African Mangroves are the large swath of mangrove swamp along the Atlantic coastline of Nigeria. This intricate mangrove system is made up of a variety of plant species and is home to a host of wildlife living within the swamp lagoons. The Central African Mangrove forest type is regulated by the annual riverine floods.[71] The large inputs of freshwater combine with the salty mangroves, fluctuating the salinity of the ecosystems dramatically during the rainy and dry seasons.[72] The humid, tropical climate can average over 3,000 millimeters of rainfall annually. Mangroves rely on flooding, which disrupts the sediment, moving it to other locations within the mangroves. This deposits a wide range of sediment types (soft mud, clay, peaty clay and silt) that contribute to the diversity of species in this forest type.

The mangrove trees that give the Central African Mangroves their title can grow up to 46 meters and provide ecosystems services such as erosion prevention, water filtration, and production of nutrient rich soil on the riverbanks. This forest type consists of six species of mangrove trees from three separate families: Avicenniaceae (*Avicennia germinans*), Combretaceae (*Laguncularia racemose* and *Conocarpus erectus),* and Rhizophoraceae (*Rhizophora harrisonii, R. mangle,* and *R. racemose*).[73] The mangrove swamps

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[68] Jan Lodewijk R. Were, "Western Africa: Southern Nigeria, extending into Benin," WWF, https://www.worldwildlife.org/ecoregions/at0123.

[69] Jan Lodewijk R. Were, "Western Africa: Southern Nigeria," WWF, https://www.worldwildlife.org/ecoregions/at0106.

[70] Jan Lodewijk R. Were, "Western Africa: Southern Nigeria, extending into Benin," WWF, https://www.worldwildlife.org/ecoregions/at0123.

[71] Sylvia Tognetti, "Western Africa," WWF, www.worldwildlife.org/ecoregions/at1401.

[72] *Ibid*.

[73] Gordon Ajonina, Abdoulaye Diame, and James Kairo. "Current status and conservation of mangroves in Africa: An overview," World Rainforest, 2008, https://wrmbulletin.wordpress.com/2008/08/25/current-status-and-conservation-of-mangroves-in-africa-an-overview/.

provide a healthy habitat for crustaceans, monkeys, birds, turtles, and fish species that use the habitat for shelter and spawning. These ecosystems provide a fertile source of food and commerce, as many of the fish harvested by commercial fisheries spend the early stages of their lives in the mangroves.[74]

The coastal mangroves are home to a healthy ecosystem of thousands of flora and fauna. Coastal mangroves are also particularly important to the large concentrations of migrating birds and fish. The migration patterns of many of the seabirds includes settling in the mangroves. Swaths of fish species rely on the coastal mangroves for spawning. A high diversity of pelagic fish, 48 species in 38 families, are found living within the mangrove ecosystem. Some of the more populous of these pelagic fish families include Clupeidae (*Ethmalosafimbriata, Pellonulaleonensis, Ilishaafricana, Sardinella maderensis*), Belonnidae (*Ablennes hians, Strongulura senegalensis*), Megalopidae (*Tarpon atlanticus*), Hemiramphidae (*Hyporhamphuspicarti*), Elopidae (*Elops lacerta, E. senegalensis*), and Albulidae *(Albula vulpes*).[75] Nigeria's mangrove system is one of the largest in Africa and one of the most diverse on Earth. The system expands into the Niger Delta, where there is a combination of delta mangroves and swamp forest habitat.

Despite the incredible ecosystem services these mangroves provide, industrial fishing and overconsumption of fish populations threaten the biodiversity in the region. In addition to habitat clearing, oil and chemical companies continue to drill pipelines and rigs into the forests, which pollutes aquatic habitats and disrupts fish spawning in coastal ecosystems. Oil spills occur routinely in the mangroves, and extensive pollution threatens to impact the life cycles of native fish. A separate threat to the Central African mangroves was the introduction of South-East Asian tree species, Nypa palm, in 1906 by the British colonial government.[76] Originally, it was thought that the Nypa palm would protect against coastal erosion. However, by the 1990s, the palm was officially recognized as an "invasive weed" and had displaced many of the native mangroves in the Niger Delta.[77]

3.2.4 NIGER DELTA SWAMP FOREST

The Niger Delta Swamp Forest forms a triangle bound by the Benin River to the west, the Nigerian Lowland Forest to the south, and the Cross-Niger Transition forests on the eastern border. The Central African Mangroves separate the Niger Delta Swamp Forest from the Atlantic Ocean. The total land coverage of the swamp forest is 15,000 square kilometers. The Niger Delta Swamp Forest is rich in species and genetic diversity, though very few official surveys of the swamp forest's flora and fauna were conducted until the past two decades. However, the Niger Delta Swamp Forest plays a key role in supporting the biodiversity in Nigeria and provides critical ecosystems services.

The climate of the Niger Delta is characterized by a long rainy season from April to October. Average precipitation increases in volume from the northern regions of the delta to the coast from 2,500

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[74] Emily Corcoran, Corinna Ravilious, and Mike Skuja. *Mangroves of Western and Central Africa.* UNEP WCMC, June 2007: 1-88, http://wedocs.unep.org/bitstream/handle/20.500.11822/7768/-Mangroves%20of%20West%20Africa-20073922.pdf?sequence=3.

[75] Sylvia Tognetti, "Western Africa," WWF, www.worldwildlife.org/ecoregions/at1401.

[76] BDCP, *Assessment of Control Measures for Nypa Palm Infestation in Nigeria Final Report,* UNIDO, (2007): 1- 112, https://open.unido.org/api/documents/4788762/download/(R)%20NIGERIA.%20ASSESSMENT%20OF%20CONTROL%20MEASURES%20FOR%20NYPA%20PALM%20INFESTATION%20IN%20NIGERIA.%20FINAL%20REPORT%20(23585.en).

[77] FGN, *Nigeria's Fifth National Biodiversity Report,* CBD, (December 2015), https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

millimeters to 4,000 mm, making this region one of the wettest in Africa.[78] The wet season peaks in July, and the only dry months are January and February. However, even during this dry period an average monthly mean of 150 millimeters rainfall is recorded in the delta. Relative humidity rarely dips below 60% and fluctuates between 90% and 100% for most of the year.[79]

The swamp forests of the Niger Delta provide habitat to thousands of species of plants and animals. The Niger Delta is an ecological hotspot, home to many locally and globally endangered species with approximately 60-80% of all plant and animal species in the country thriving there.[80] Experts estimate about 119 mammal species, 201 bird species, 248 fish species, and 30 reptile species.[81] Some of these species include the native Anambra waxbill (*Estrilda poliopareia*), Niger Delta red colobus monkey (*Colobus badius*) and Sclater's guenon (*Cercopithecus sclateri*). Other endangered species include the chimpanzee (*Pan troglodytes*), pygmy hippopotamus (*Hexaprotodon liberiensis heslopi*), African forest elephant (*Loxodonta africana*), manatee (*Trichecus senegalensis*), Grey parrot (*Psittacus erithacus*), Nile crocodile (*Crocodylus niloticus*), Sitatunga (*Tragelaphus spekei*), red-capped mangabey (*Cercocebus torquatus*), olive colobus (*Procolobus verus*), and royal python (*Python regius*).[82]

The Niger Delta's rich biodiversity and high quantity of endemic species are threatened most pertinently by pollution from active oil production in the Niger Delta. Thousands of barrels of oil have been spilled, creating dead zones and wiping out entire terrestrial and aquatic habitats.[83] In recent years, the Niger Delta has been a case study of environmental degradation from industrialization by the oil sector.

3.2.5 CROSS-NIGER TRANSITION FORESTS

The Cross-Niger Transition Forests are tropical forests covering 33,313 kilometers and five Nigerian states. The Niger River separates the Cross-Niger Transition Forests from the lowland forests. This forest type has a 10-month rainy season and a variety of flora and fauna. The forest type received its name from the "transitional" flora, a blend of elements from the Upper Guinean forests of West Africa and the Lower Guinean-Congolese forests of Central Africa.[84]

This forest has been cleared over time as the Nigerian population grew and is now populated with people. There is little untouched vegetation within these transition forests, and little-known original vegetation remains. For example, the drier northern sections of the Cross-Niger transition forest resembled trees in the lowland forests, and the southern section was home to tree species in the tropical areas. However, development, overpopulation, and destruction by wildfire have destroyed much of what once was a healthy, transition forest.

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[78] Jan Lodewijk R. Were, "Western Africa: Southern Nigeria," WWF, https://www.worldwildlife.org/ecoregions/at0106.
[79] *Ibid*.
[80] FGN, *Nigeria's Fifth National Biodiversity Report,* CBD, (December 2015), https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.
[81] Gbaran-Ubie Integrated Oil and Gas Project Biodiversity Action Plan (Shell)
[82] *Ibid*.
[83] *Ibid*.
[84] Jan Lodewijk R. Were, "Western Africa: Southern Nigeria," WWF, https://www.worldwildlife.org/ecoregions/at0106.

3.2.6 GUINEAN-FOREST SAVANNA MOSAIC

The Guinean Forest-Savanna Mosaic divides the Guinean rainforest from the Sudanese savanna, interlacing forest, savanna, and grassland habitats.[85] The savanna houses species such as the hartebeest (*Alcephalus buselaphus*) and warthog (*Phacochoerus aethiopicus*), as well as other carnivores.[86] Grass cutters (*Thryonomys swinderiannus*), giant rats (*Cricetomys spp.*), tree squirrels (*Funisciurus spp.*), and a variety of primates are among the small mammals that live in the Guinean-Forest savanna. The Guinean Forest is a hotspot of diversity, as a result of high species endemism in that region.

The Guinean-Forest Savanna Mosaic is mainly characterized by the grassland and shrubland in northern Nigeria. Though the forest savanna mosaic has a variety of coexisting animal species, the forested portions are heavily populated by humans. Unfortunately, this region has very few formal environmental protections.[87]

Despite a lack of environmental management and long-term planning, some biodiversity in Nigeria remains intact, although highly threatened. Figure 6 represents forest loss hot spot patterns and biodiversity hot spots. In the analysis used to develop this map, a hot spot is an area that exhibits statistically significant clustering in patterns of forest loss over time. [88] Table 5 defines the different forest loss hot spot patterns displayed in Figure 6. The biodiversity hotspots on the map depict areas known to hold especially high numbers of species found nowhere else and must include the following criteria as developed by Myers et al.[89]: 1) it must have at least 1,500 endemic, native vascular plant species, and 2) it must have already lost at least 70% of its primary, native vegetation.[90]

TABLE 4. DEFINITIONS OF HOT SPOT PATTERN TYPES[91]

HOT SPOT TYPE	DEFINITION
Consecutive Hot Spot	A location with a single uninterrupted run of statistically significant hot spot years in the final years of the time series. The location has never been a statistically significant hot spot prior to the final hot spot run and 16 or less years are statistically significant hot spots.
Intensifying Hot Spot	A location that has been a statistically significant hot spot for 17 years, including the year 2018. In addition, the intensity of clustering of high counts in each year is increasing overall and that increase is statistically significant.

[85] Illisa Kelman and Paul Burgess, "Western Africa: Stretching from Nigeria to Senegal," WWF, www.worldwildlife.org/ecoregions/at0707.

[86] Mbolaji Idowu and Olajumoke Morenikeji, "Wild Fauna Conservation in Nigeria," *Environment and Natural Resources Research, Vol. 5 No. 3* (June 2015): 98-108, https://www.researchgate.net/publication/282070993_Wild_Fauna_Conservation_in_Nigeria.

[87] "Ecoregions 2017 ©," Ecoregions 2017 ©, https://ecoregions2017.appspot.com/.

[88] Matthew Hansen, et. al., "High-Resolution Global Maps of 21st-Century Forest Cover Change," *Science* Vol. 342 Issue 6160 (15 November 2013): 850–853, DOI: 10.1126/science.1244693.

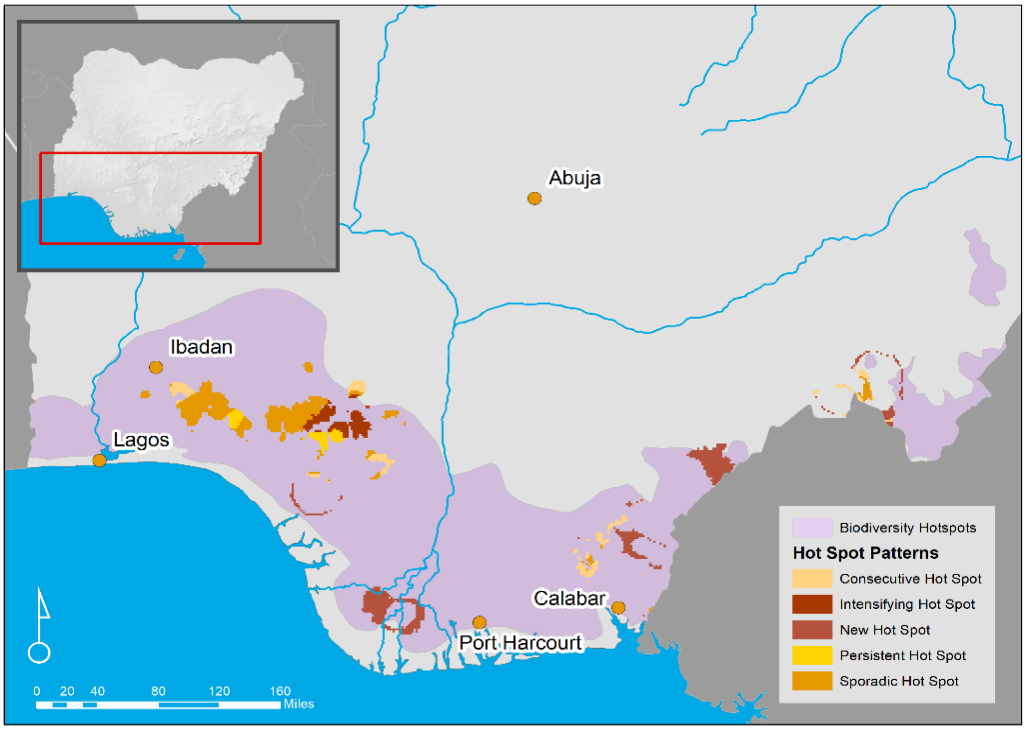
[89] Myers, N., Mittermeier, R., Mittermeier, C. et al. Biodiversity hotspots for conservation priorities. *Nature* 403, 853–858 (2000). https://doi.org/10.1038/35002501

[90] CBI, "Biodiversity Hotspots Revisited, Conservation International, 2011" Data Basin, *Center for Applied Biodiversity Science at Conservation International*, https://databasin.org/datasets/23fb5da1586141109fa6f8d45de0a260.

[91] Nancy L. Harris *et al.* 2017. "Using spatial statistics to identify emerging hot spots of forest loss". *Environmental Research Letters.* **12** 024012.

TABLE 4. DEFINITIONS OF HOT SPOT PATTERN TYPES[91]	
HOT SPOT TYPE	DEFINITION
New Hot Spot	A location that is a statistically significant hotspot only for the year 2018, i.e., the final year of the time series.
Persistent Hot Spot	A location that has been a statistically significant hot spot for 17 years with no discernible trend indicating an increase or decrease in the intensity of clustering over time.
Sporadic Hot Spot	A location that is an on-again then off-again hot spot. 16 or less years have been statistically significant hot spots.

FIGURE 6. HOT SPOT PATTERNS AND BIODIVERSITY HOTSPOTS IN SOUTHERN NIGERIA[92]



3.3 GENETIC DIVERSITY

Nigeria possesses numerous ecologically and economically important species. Varieties of fruits, vegetables, cereals, roots, tubers, and legumes are cultivated in Nigeria. The country is a center of diversity for many taxa such as Cowpea (*Vigna unguiculata*), West African Okra (*Abelmoschus caillei*), West Africa Rice (*Oryza glaberrima*), yams (*Dioscorea spp.*), Bambara groundnut (*Vigna subterranea*), Kerstin's groundnut (*Macrotyloma geocarpum*), African yam bean (Sphenostylis sternocarpa), and winged

[92] Map developed by the Cadmus Group. Data for biodiversity hotspots derived from "Biodiversity Hotspots Revisited, Conservation International". 2011. https://databasin.org/datasets/23fb5da1586141109fa6f8d45de0a260. Data for hot spot patterns derived from Nancy L Harris *et al.* 2017. "Using spatial statistics to identify emerging hot spots of forest loss". *Environmental Research Letters.* **12** 024012.

bean (*Psophcarpus tetragonolobus*).[93] Nigeria has a high rate of biodiversity loss as a result of habitat destruction and dependence on agricultural genetic resources, particularly by the population dwelling in rural areas.[94] The principal factors contributing to genetic loss in Nigeria are the replacement of local varieties; land clearing; pests, weeds, or diseases; population pressure; and changing agricultural systems.

To combat these challenges, Nigerian agricultural organizations and farmers practice both *in situ* conservation (maintenance, protection, and management of a variety of life in their original habitats) and *ex situ* conservation (collection and maintenance of whole or parts of individuals of some species or their population in facilities away from their original habitats such as protected areas, gene banks, and zoological/botanical gardens). Sites for *in situ* conservation are both in wild and farmed areas, and they contain most of Nigeria's forest and wildlife resources. Maintaining the biodiversity of agricultural crops' wild relatives is important as they serve as reservoirs of traits and characteristics useful for improving crop varieties, and they are best conserved in their natural habitats to allow evolution and adaptive changes.

The major food crops in Nigeria are Guinea corn/sorghum, millet, maize, rice, cassava, yam, cocoyam, and cowpea. Guinea corn (*Sorghum bicolor L. moench*) is the most widely cultivated cereal crop in Nigeria and the most important food crop in the savanna regions. Sorghum is zone-specific with different varieties bred for specific zones. The indigenous varieties are generally tall, while the exotic species are typically dwarfed. Sorghum has wide genetic variability in Nigeria because of the free gene exchange between the cultivated and the wild species.[95]

Millet and maize are the next two most important cereal crops in Nigeria. Both are relatively versatile and can be found in different regions in Nigeria. Millet is cultivated mainly in the drier, northern regions of Nigeria, but its secondary and tertiary gene pools extends to the more humid southern regions.[96] Maize is grown in nearly all geo-ecological zones in Nigeria but is most productive in the northern and middle belt. Maize thrives in regions with consistent sunlight and moderate rainfall.

Nigeria has a wide diversity of forage species. According to the National Center of Genetic Resources and Biotechnology, Nigeria boasts about 2,200 verified nutritious species which include 600 grasses, 540 herbaceous legumes, 380 browse species, and over 600 others of lower nutritional values. However, information sharing on plant genetic resources among stakeholders in Nigeria is poorly coordinated. There is a wide gap of knowledge of the genetic diversity of wild plants due to a lack of data on plant genetic resources for food and agriculture.[97] Only a small fraction of the total plant genetic resources in Nigeria are properly documented and profitably used for food and agriculture.

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[93] NCGRB, *State of Plant Genetic Resources for Food and Agriculture in Nigeria*, (October 2008): 15. http://www.fao.org/pgrfa-gpa-archive/nga/Nigeria2.pdf.

[94] *Ibid*.

[95] *Ibid*.

[96] *Ibid*.

[97] *Ibid*.

TABLE 5. MAJOR AND MINOR FOOD CROPS IN NIGERIA		
CROP GROUPS	MAJOR	MINOR
Cereals	Guinea corn/sorghums, millet, maize, rice	Bread wheat, fonio/hungry rice, Nigerian tef
Food Legumes	Cowpea	Lima bean, common bean, pigeon pea, sword bean, kersting's groundnut, soybean, bambara groundnut, groundnut, African yam bean, winged bean
Tubers	Cassava, yams, cocoyam	Sweet potato, Irish potato
Oil crops	Oil palm, egusi melon, cotton	Sesame, coconut, beni seed, castor oil, sunflower
Plant-based sweeteners	Sugarcane	Sugar beet, Eeran, Agbayun, serendipity berry
Horticultural crops	**Vegetables:** peppers, tomato, onion, okra, jute mallow, eggplant, fluted pumpkin, locust bean tree **Fruits:** banana, plantain, pawpaw, orange, pineapple, carrot, mango	**Vegetables:** West African okra, Efinrin, cucumber, pumpkin, lettuce, African lettuce, bitter leaf, Lagos spinach, roselle, bottle gourd **Fruits:** Guava, pear, cashew, walnut
Cash crops	Cacao tree, coffee, kola	Tea
Source: National Center for Genetic Resources and Biotechnology, State of Plant Genetic Resources for Food and Agriculture in Nigeria, pg. 15, 2008.		

3.4 STATUS AND MANAGEMENT OF PROTECTED AREAS

As a party to the Convention on Biological Diversity, Nigeria has committed to ambitious national targets for conservation by 2020, in line with the Aichi Biodiversity Targets (i.e., 20 biodiversity-related targets set by the Convention on Biological Diversity).[98] The Nigerian government has outlined 14 specific targets in the National Biodiversity Strategy and Action Plan that went into effect in December 2016. The national targets and related global strategic goals are as follows:

"**Target 1**: By 2020, 30% of Nigeria's population is aware of the importance of biodiversity to the ecology and economy of the country.

Target 2: By 2020, a comprehensive program for the valuation of biodiversity is developed and implemented, and payments for ecosystem services (PES) and goods are mainstreamed into the national budget.

[98] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

Target 3: By 2020, national ecosystem-based spatial planning process and plans are adopted that promote the values of biodiversity and ecosystem services to sustain development.

Target 4: By 2020, up to 15% of the areas of degraded ecosystems in Nigeria are under programs for restoration and sustainable management.

Target 5: By 2020, six (6) management plans are implemented for habitats of endemic and threatened plants and animals, including sites for migratory species.

Target 6: By 2020, at least 10% of Nigeria's national territory is sustainably managed in conservation areas at varied levels of authority, with representation of all ecosystem types.

Target 7: By 2020, the genetic diversity of cultivated plants, domesticated animals and their threatened wild relatives, including culturally valuable species, are documented, maintained and valorized in two key institutions in Nigeria.

Target 8: By 2020, at least 60% of identified pollution sources, including those from extractive industries and agricultural inputs, are brought under control and guidelines are put in place to mitigate their effects on ecosystems.

Target 9: By 2020, invasive alien species and pathways are identified and prioritized, and priority species controlled or eradicated, and measures are in place to manage pathways in the six ecological zones.

Target 10: By 2015, the Nigerian NBSAP has been fully revised and adopted by government as a policy instrument, and its implementation commenced in a participatory manner.

Target 11: By 2015, the Nagoya Protocol on Access to Genetic Resources and the fair and equitable sharing of Benefits Arising from their utilization is acceded to and its implementation through a national regime on Access and Benefit Sharing, ABS, commenced.

Target 12: By 2020, community participation in project design and management of key ecosystems is enhanced in one (1) each of the six (6) ecological zones.

Target 13: By 2020, national-based funding for biodiversity is increased by 25%, with effective international partnership support.

Target 14: By 2020, the capacity of key actors is built, and gender mainstreaming carried out for the achievement of Nigeria's biodiversity targets."[99]

Thus far, Nigeria has developed various strategies and programs for the sustainable management of biodiversity. These strategies have been put in place to strengthen the likelihood of achieving the Aichi targets by 2020. The Department of Forestry in the Federal Ministry of Environment and the State Ministries of the Environment have also set up various initiatives to manage wetlands and arid zones by encouraging the support of local communities. The major constraint to achieving the Aichi targets is inadequate funding of both biodiversity programming and implementation.[100] Since the UNDP midterm

[99] FMEnv. *FRN NBSAP 2016-2020.* CBD. 2015. https://www.cbd.int/doc/world/ng/ng-nbsap-v2-en.pdf.
[100] Sustyvibes,"How Nigeria strives to achieve biodiversity conservation targets, by CBD," Sustyvibes. 2017. https://sustyvibes.com/nigeria-strives-achieve-biodiversity-conservation-targets-cbd/.

report was released in 2017, Nigeria has made progress on several of their 14 Aichi targets. For example, Nigeria has implemented a Reducing Emissions from Deforestation and Forest Degradation (REDD+) program in alignment with Targets 2 and 3. They have also made progress on Target 5 through the development of the *Regional Action Plan for Conservation of the Cross River Gorilla.* This Action Plan aims to address the continuing loss of the endangered gorilla.[101] Nigeria has taken steps to safeguard genetic diversity by conserving indigenous, medicinal, and traditional plant species as enumerated in Target 7. Nigeria has also completed a 2015 National Biodiversity Strategy and Action Plan (NBSAP), a goal specified in Target 10. Key takeaways from the mid-term evaluation are that there is an overall decline in biodiversity as a result of human-induced factors, and that the freshwater ecosystems in Nigeria are especially threatened. The negative impacts of climate change continue to place pressure on species and ecosystems, and Nigeria is focused on increasing the capacity of stakeholders to manage the adverse impacts of climate change.

Currently, protected areas in Nigeria cover 12,735,900 hectares, which is 13.93% of the total terrestrial area of Nigeria.[102] Table 7 provides an overview of the types and quantity of Protected Areas in Nigeria. See Figure 7 for a visual representation of the locations of the protected areas described in Table 7 and 8. These protected areas include several national parks, forest reserves, game reserves, and Ramsar Sites. Nigeria has 11 Ramsar Sites designated as "Wetlands of International Importance," all of which are home to a variety of endemic flora and fauna.[103] Please see Annex G for a summary of the Ramsar Wetlands in Nigeria. The below Table 8 specifically depicts the differentiation given by the IUCN. While there are 27 reported areas, 961 have not been reported and categorized.

TABLE 6. CATEGORIES OF TERRESTRIAL PROTECTED AREAS IN NIGERIA

CATEGORY	NUMBER
Ramsar Sites	11
World Heritage Sites	2
Forest Reserves	994
Biosphere Reserve	1
Imported Bird Areas	27
Game Reserves	32
National Parks	7
Nature Reserves	

[101] *The State of Biodiversity in Africa: A Mid-Term Review of Progress Towards the Aichi Biodiversity Targets.* UNDP, 2016: 1-95, https://www.unep-wcmc.org/system/comfy/cms/files/files/000/000/731/original/Biodiversity_Review_AFRICA.pdf.
[102] "Nigeria, Africa," Protected Planet, last modified February 2020, https://www.protectedplanet.net/country/NG.
[103] "Nigeria," Ramsar Sites Information Service, *RAMSAR,* https://rsis.ramsar.org/ris-search/?f%5B0%5D=regionCountry_en_ss%3ANigeria&pagetab=2.

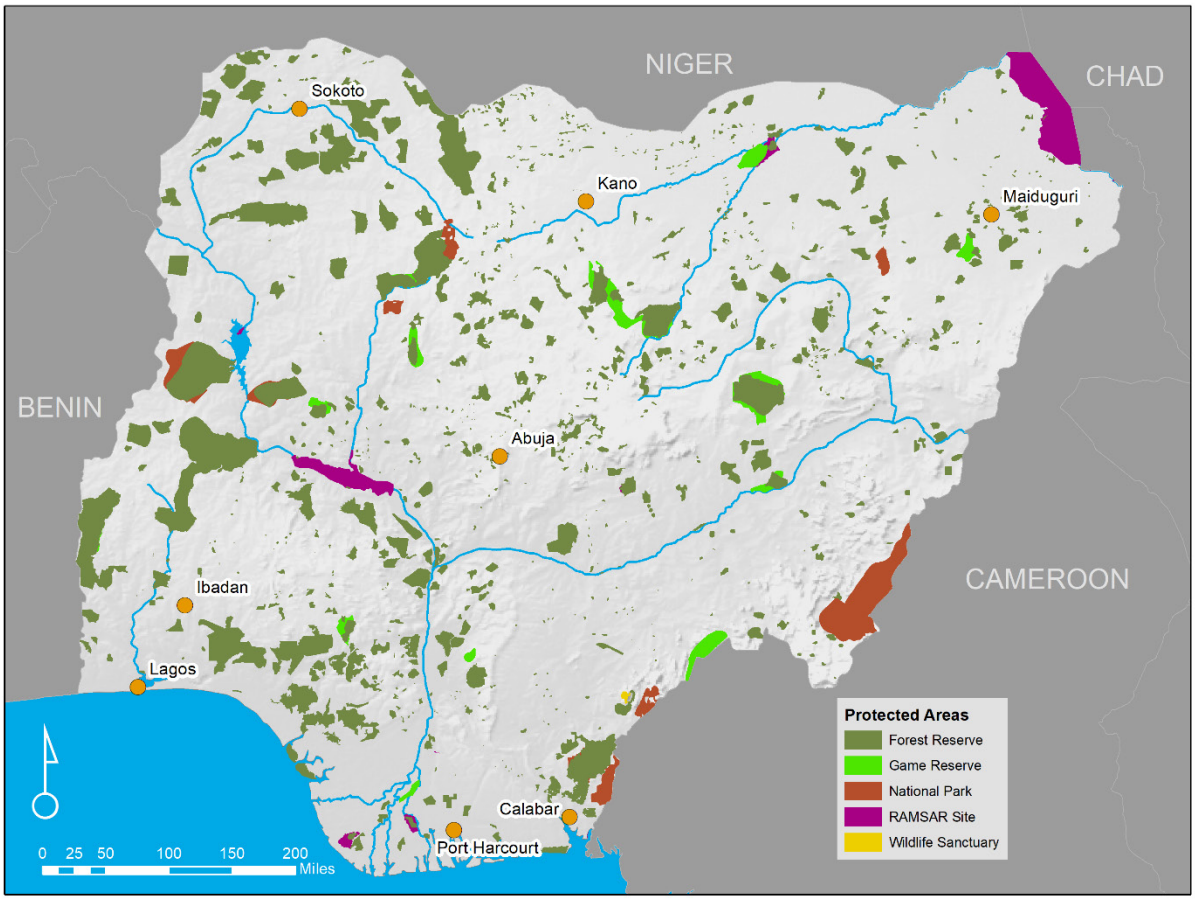
TABLE 7. CATEGORIES OF PROTECTED AREAS BY IUCN CATEGORY IN NIGERIA		
IUCN CATEGORY	NUMBER	% OF TOTAL PROTECTED AREAS
Ia: Strict Nature Reserve	5	0.51%
Ib: Wilderness Area	0	-
II: National Park	8	0.81%
III: National Monument or Feature	0	-
IV: Habitat/Species Management Area	14	1.42%
V: Protected Area with Sustainable Use	0	-
VI: Protected Landscape/Seascape	0	-
Not Reported	961	97.26%
Total	**988**	

Protected areas in Nigeria that receive protection typically harbor endangered species, such as the endangered Cross River gorilla, drill monkeys, and a few guenons only found in Nigeria. In 2000, the Afi Mountain Wildlife Sanctuary was established to protect wildlife, specifically, the Cross River gorillas. WCS has played a key role in promoting local engagement with endangered species protection, particularly as it relates to the Cross River gorillas.[104] WCS is also interested in strengthening the protection of elephants at the Yankari Game Reserve through enhanced law enforcement action and monitoring. The small population of 100-150 elephants is one of the few remnant populations surviving in this part of Africa and is therefore regionally and nationally important.[105] The USFWS has funded this project in the past, helping to ensure that no elephants have been poached since May 2015. However, the population remains unstable and in need of constant surveillance.

Some of the primary concerns and threats to sustained protected areas management in Nigeria are the lack of resources necessary to enforce the current regulations and ensure future protection. The Nigerian government does not have enough funding or manpower to effectively manage the areas deemed "protected." Without enforcement, these most vulnerable ecosystems continue to be threatened by agricultural expansion, overharvesting, livestock grazing, poaching, and illegal resource use/extraction. Overfishing and the potential fishery collapse is also a pressing threat to the coastal and marine ecosystems in Nigeria. The Government of Nigeria needs to mobilize NGOs and other implementing partners to actively manage these protected areas, otherwise the regulations are meaningless.

[104] "Initiatives Local Livelihoods." WCS Nigeria, *https://nigeria.wcs.org/Global-Initiatives/Local-Livelihoods.aspx*.
[105] Beth Hahn, Nigeria Biodiversity and Tropical Forests 118/119 Assessment, USDA Forest Service Office of International Programs, (2013): 1-49, https://ecd.usaid.gov/faa/source/Nigeria_2013.pdf.

FIGURE 7. PROTECTED AREAS IN NIGERIA BY TYPE[106]



3.5 STATUS AND MANAGEMENT OF KEY NATURAL RESOURCES OUTSIDE OF PROTECTED AREAS

Many Nigerians rely on local forests for food such as fruit, nuts, crops, and bushmeat. Nigerians also benefit from forest resources as a source for wood fuel and building material. Unfortunately, despite increased regulatory schemes to protect the natural resources provided by forests, there has been unprecedented levels of illegal logging and unsustainable resource extraction, inside and outside of protected areas. Originally covering 20 percent of the country, close to 96 percent of Nigeria's original forest cover has been cleared or degraded in some way.[107] Each of the six forest types listed in Section 3.2 face a host of different threats to their biodiversity.

[106] Map developed by the Cadmus Group. Data derived from UNEP-WCMC, "World Database on Protected Areas," Data Basin, *CBI*, 25 October 2018, http://wcmc.io/WDPA_Manual.

[107] FGN. *Nigeria's Path to Sustainable Development Through Green Economy, Country Report to the Rio +20 Summit*. 2012. https://sustainabledevelopment.un.org/content/documents/1023nigerianationalreport.pdf.

The rising deforestation and environmental degradation are estimated to cost Nigeria over $6 billion a year.[108] Government institutions have failed to effectively curb illegal logging. Only 6% of the land area is actively protected.[109] The Federal Department of Forestry in Nigeria has begun to develop a series of demonstration sites around the country to showcase sustainable forestry practices as models for community forests. NGOs are working with communities to engage citizens to participate in protecting their nearby forest resources. Designations from external groups, such as the IUCN and UNEP, exist which may facilitate conservation efforts and encourage the government to allocate resources to protecting these areas.

In general, the remaining natural forests and biodiversity of Nigeria exist primarily in protected areas. Nearly all the protected areas in Nigeria are located near communities, leaving the forests susceptible to encroachment for farming and other activities. Some areas of ecological importance are isolated in pockets of protected forest, while other recognized ecosystems have very few protections.

For example, despite the unusual variety of fauna in the Jos Plateau region, there are no protected areas or conservation initiatives.[110] The plateau has a high human population density, and nearly all the original grasslands have been replaced with farms. The remaining forests on the plateau have been depleted by the collection of firewood.[111] Similarly, the Guinea Savanna-Forest mosaic, one of the key forest types, has no traditional environmental protection. Though the region has high levels of species endemism, much of the forest has been either depleted or converted to farmland.[112]

The Environment Investigation Agency, known as EIA Global, completed a recent study on the flourishing trade of rosewood in Nigeria, despite international regulations limiting the harvest and trade of the species the *Pterocarpus erinaceus,* also known as "kosso." The illegal logging and trade of kosso violates the Convention on International Trade in Endangered Species (CITES) of Wild Flora and Fauna.[113] The continuing illegal logging of kosso from Nigerian forests creates brittle forests and damages ecosystems in and around protected areas in Taraba and Adamwa States. While the Nigerian government has expressed interest in protecting the forests from illegal logging, the necessary procedures and regulatory protections and enforcement have been insufficient.

Even in areas technically protected or classified as forest reserves, evidence suggests that the protections are not stringent or broad enough to adequately preserve the ecosystems and ensure species conservation. The Omo Forest Reserve in southwestern Nigeria, for example, is a key habitat for endangered chimpanzees and elephants in the region. Despite expected protections given its status of forest reserve, this patch of forest has been damaged by years of logging and hunting in the region and

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[108] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.
[109] *Ibid*.
[110] Jan Lodewijk R. Were, "Central Africa: Nigeria," WWF, https://www.worldwildlife.org/ecoregions/at1010.
[111] *Ibid*.
[112] "Ecoregions 2017 ©." Ecoregions 2017 ©, https://ecoregions2017.appspot.com/.
[113] EIA, *The Racket Continues: The unabated illegal and unsustainable timber trade from Nigeria*, (2017): 1-8.

these endangered mammals are now rare in the Omo forest. The NCF is working with state governments to enforce and establish conservation areas in the region.[114]

Similarly, the Stubbs Creek Game Reserve is another case of an official reserve where the protections have not been enforced.[115] The Reserve, located in Akwa Ibom Region, has been mostly converted into a plantation, despite the existence of endemic species of fauna and flora. The remaining biodiversity in the Stubbs Creek Game Reserve is protected by local communities, as passed down by tradition.[116] Community efforts have been more effective than government regulations in preserving the habitats in these sacred groves. This type of grassroots protection is not limited to the Stubbs Creek Game Reserve and has also been implemented in the Niger Delta to protect the native crocodiles. Since the delta is the last remaining habitat for the dwarf crocodiles, community members, who have cultural ties to the reptile, have banded together to protect them.[117]

Key ecosystems remain outside of official protected areas. For example, the Niger Delta, recognized as a biodiversity hotspot, has only 38 forest reserves, which cover 1,952 of the Delta's 70,000 square kilometers. [118] The protected forest reserves account for a mere 2.8% of the total area of the critical region. The limited protected areas network in the Niger Delta is reflective of the zones created for wood and timber production. Most of the protected areas are timber related, and the protections even within these reserves are poorly managed. Only three environmental protection officers officially protect the entire delta region of 7 million hectares.[119] There has been limited effort by the Government of Nigeria to expand protected areas in the Niger Delta, despite its global renown as a biodiversity haven. According to the UNDP, the only biodiversity surveys in the Niger Delta have been performed for bird species.[120] GEF and other partners are looking to finance work identifying important sites for mammals, fish, amphibians, and invertebrates.[121]

In addition to the Niger Delta, marine and coastal areas in Nigeria have limited protection. There are zero marine protected areas (MPAs) in Nigeria, an astoundingly poor statistic given the diversity and richness of the Nigerian mangroves and fisheries.[122] A case for MPAs is evident in Nigeria, since 25% of the country's 170 million people live on the coast and their livelihoods depend on the rich coastal marine biodiversity in the region.[123] There is a need for improved fisheries management as the impacts of overfishing and pollution continue to decrease the resident fish stock near shore and reduce

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[114] Bethen Morgan, et. al., *Regional Action Plan for the Conservation of the Nigeria-Cameroon Chimpanzee (Pan troglodytes ellioti),* IUCN, (2011), 1-48.
[115] Jan Lodewijk R. Were, "Western Africa: Southern Nigeria," WWF, https://www.worldwildlife.org/ecoregions/at0106.
[116] *Ibid*.
[117] "Niger Delta Biodiversity Project," UNDP Nigeria, *UNDP,* 2011.
[118] *Ibid*.
[119] *Ibid*.
[120] *Ibid*.
[121] *Ibid*.
[122] ARD, Inc. *Nigeria Environmental Analysis Final Report*, Under USAID Contract No. LAG-I-00-99-00013-00 BIOFOR IQC, (April 2002): 0 – D-10, https://rmportal.net/library/content/1/118_nigeria/view.
[123] Yetunde E. Agbeja, "Marine protected area: Prospective tool for ecosystem-based fisheries management in Nigeria," *International Journal of Biodiversity and Conservation,* Vol.9 *(* 2017): 158-166, DOI:10.5897/IJBC2016.1062.

sustainability of migratory fish in the region.[124] Though there are few government protections for the marine areas, NGO groups and other stakeholders are mobilizing efforts to protect key aquatic species.

[124] *Ibid.*

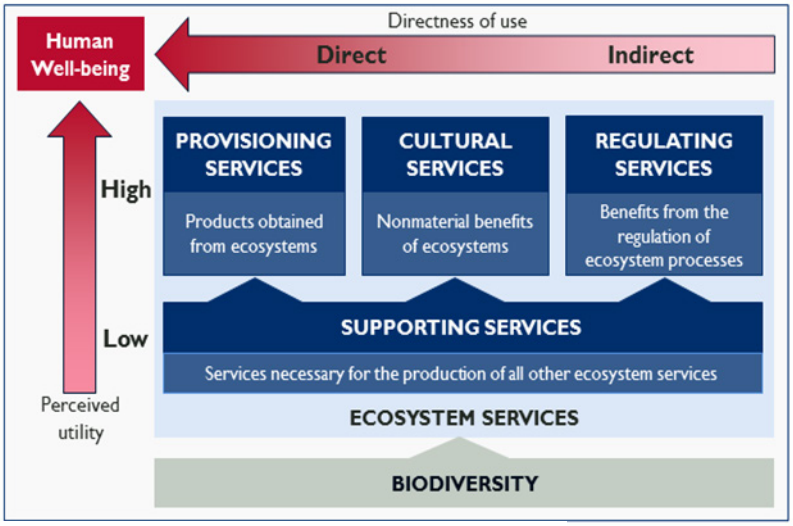
4. VALUATION AND ECONOMIC POTENTIAL

This section provides a brief overview of the value and economic potential of biodiversity and ecosystem goods and services in Nigeria, including a discussion of the various categories of ecosystem services and information on the economic values that have been ascribed to them.

4.1 VALUE OF BIODIVERSITY

Ecosystem services are the benefits humans receive from nature. These benefits include goods such as food, fuel, and fiber; and services such as carbon sequestration.[125] In seeking to understand and characterize the values provided by ecosystem services, economists typically classify these services into four categories. *Provisioning Services* provide products that are used directly by people, such as food, water, and raw materials. *Regulating Services* are outputs from the normal functioning of ecosystems that benefit people in direct ways, such as the regulation of climate, air and drinking water quality, soil formation and retention, moderation of extreme events, and biological control. *Cultural Services* provide benefits to people through meaningful interactions with nature, such as aesthetic enjoyment, recreation, spiritual enrichment, and cognitive development. Underlying these three categories are *Supporting Services*, which are processes that are necessary for the production of other ecosystem services, such as habitat for plants and animals, conservation of genetic diversity, and cycling of nutrients (see Figure 8).[126]

FIGURE 8. BIODIVERSITY AND ECOSYSTEM SERVICES



Source: Nelson 2015

Biodiversity provides the foundation for ecosystem services, as it plays a critical role in both the

[125] "Ecosystem Services," IPBES, *Science and Policy for People and Nature Secretariat*, 2019, https://www.ipbes.net/glossary/ecosystem-services.

[126] Erik Nelson, "The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations," *Journal of Natural Resources Policy Research*. Vol. 5 (March 2015). DOI:10.1080/19390459.2013.763324.

provision of ecosystem services as well as their maintenance over time.[127] Biodiversity also provides significant benefits to human populations. In Nigeria, it is estimated that biodiversity supports 70 to 80% of food requirements for roughly 70% of the rural population and supports 30 to 50% of food requirements of urban and peri-urban communities.[128] Additionally, more than 80 million people in Nigeria rely on the terrestrial and aquatic resources of the Niger River Basin for their livelihood.[129] Across the entire country, over 65% of Nigerians were engaged in biodiversity-related occupations in 2015. These biodiversity-related occupations include farming, fishing, logging, manufacturing, forest resource marketing, and sawmilling and wood processing.[130]

The Niger Delta, located in Southern Nigeria, is the third largest wetland in the world and the largest river delta and mangrove ecosystem in Africa.[131] The Niger Delta is critical to biodiversity in the country and supports a wide variety of terrestrial and aquatic species. This abundant biodiversity has made the Niger Delta an area of international importance, with the area providing habitat to several IUCN "Red List" species.[132] A biological survey revealed that the Niger Delta is home to several previously unknown species, such as the Niger Delta red colobus.[133] The Niger Delta region is also home to roughly 22% of the country's population.[134]

4.2 ECOSYSTEM GOODS AND SERVICES

This section describes some of the key ecosystem goods and services that provide value to Nigeria, broken down by the categories of provisioning services, regulating services, and cultural services.

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[127] Paula Harrison, et al., "Linkages between biodiversity attributes and ecosystem services: A systematic review," *Ecosystem Services*, Vol. 9 (September 2014):191-203, https://doi.org/10.1016/j.ecoser.2014.05.006.

[128] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[129] *Programme for Integrated Development and Adaptation to Climate Change in the Niger Basin.* AfDB, (October 2018): 1- 24, https://www.afdb.org/en/documents/document/multinational-programme-for-integrated-development-and-adaptation-to-climate-change-in-the-niger-basin-pidacc-appraisal-report-109273.

[130] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[131] Gordon Ajonina, Abdoulaye Diame, and James Kairo. "Current status and conservation of mangroves in Africa: An overview," World Rainforest, 2008, https://wrmbulletin.wordpress.com/2008/08/25/current-status-and-conservation-of-mangroves-in-africa-an-overview/.

[132] Olalekan Adekola and Gordon Mitchell. "The Niger Delta wetlands: Threats to ecosystem services, their importance to dependent communities and possible management measures," *International Journal of Biodiversity Science, Ecosystem Services & Management*, Vol. 7, No. 1 (August 2011): 50-68.

[133] M. McGinley. *Encyclopedia of Earth.* "Niger Delta swamp forests." Washington, DC: Environmental Information Coalition, *National Council for Science and the Environment*, 2008.

[134] Olalekan Adekola and Gordon Mitchell. "The Niger Delta wetlands: Threats to ecosystem services, their importance to dependent communities and possible management measures," *International Journal of Biodiversity Science, Ecosystem Services & Management*, Vol. 7, No. 1 (August 2011): 50-68.

4.2.1 PROVISIONING SERVICES

Provisioning services arise from the direct use of goods, such as food, fuel, water, timber, non-timber forest products, medicine, and raw materials. This report focuses on four sources of provisioning services in Nigeria: forests, fisheries, agricultural production, and fresh water.

TABLE 8. PROVISIONING SERVICES IN NIGERIA

CATEGORY	DESCRIPTION
Forests	In 2015, roughly 7.7% of the total land area of Nigeria was covered in forest providing several important goods for the Nigerian population.[135] One key use of Nigerian forests is for fuel, with 70% of Nigerian households and 90% of the country's rural population using fuelwood for their energy needs.[136] In addition to timber, non-timber forest products are important sources of income for many households in Nigeria. A study of Cross River National Park, which lies within the tropical rainforest belt of Nigeria, found 15 types of edible seeds, 3 oil seeds, 44 types of fruit, and 25 species of edible mushrooms.[137] [138] In addition to rainforests, Nigeria also has extensive areas of mangrove forests. The Niger Delta has over 3,100 kilometers of coastline and an estimated 1 million hectares of mangrove. forest, making it the largest mangrove system in Africa.[139] Mangrove forests are also an important source of timber and non-timber forest products for the Nigerian population.[140] Products originating from Nigeria's mangrove forests include saw logs, transmission poles, fuelwood, and chewing sticks, which are used for oral hygiene.[141] [142] In addition to providing food sources, some non-timber products from mangrove, forests are important medicinal resources. In a 1995 report, the annual value of timber products from the Niger Delta was reported to be $22.8 million.[143]
Fresh Water	Fresh water resources in Nigeria support both agricultural and tree crops, including cassava, yam, cocoyam, rice, maize, ogbono, and cocoa, among others. The Niger River Delta is particularly important as a freshwater resource, with about 50% of the area of the delta being composed of thousands of creeks. Additionally, the delta accounts for 55% of all freshwater swamps in the country.[144]
Fisheries	Fisheries play an important role in the health and well-being of the Nigerian people. Three

[135] *Programme for Integrated Development and Adaptation to Climate Change in the Niger Basin,* AfDB, (October 2018): 1- 24, https://www.afdb.org/en/documents/document/multinational-programme-for-integrated-development-and-adaptation-to-climate-change-in-the-niger-basin-pidacc-appraisal-report-109273.

[136] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[137] *Ibid.*

[138] IUCN Niger Delta Panel. *Developing a biodiversity conservation strategy for the Niger Delta: Integrating biodiversity considerations into SPDC's operations*. IUCN, January 2018. https://portals.iucn.org/library/sites/library/files/documents/2018-014-En.pdf.

[139] Gillian Martin-Mehers. IUCN Niger Delta Panel: Stories of influence, *IUCN,* (November 2018): 1-18, https://portals.iucn.org/library/node/47915.

[140] *Ibid.*

[141] M. McGinley. *Encyclopedia of Earth.* "Niger Delta swamp forests." Washington, DC: Environmental Information Coalition, *National Council for Science and the Environment*, 2008.

[142] IUCN Niger Delta Panel. *Developing a biodiversity conservation strategy for the Niger Delta: Integrating biodiversity considerations into SPDC's operations*. IUCN, January 2018. https://portals.iucn.org/library/sites/library/files/documents/2018-014-En.pdf.

[143] *Ibid.*

[144] Gabriel S. Umoh, "The promise of wetland farming: Evidence from Nigeria." *Agricultural Journal*, Vol. 3 (April 2008): 107-112.

TABLE 8. PROVISIONING SERVICES IN NIGERIA	
CATEGORY	DESCRIPTION
	separate studies estimated that, between 1985 and 1994, Nigeria had an inland water mass of approximately 12.5 million hectares that could produce over 500,000 tons of fish under a proper management scenario. Roughly 20% of the Nigerian population are involved in fisheries-related occupations across the country. These occupations include the harvest, trade, and sale of fish, periwinkles, snails, shrimps, and prawns.[145] The Niger Delta area is particularly biologically rich with a diverse array of aquatic life, with roughly 200 species having been identified in the area.[146] [147] Fish are a common source of animal protein for local populations, and also serve as a rich source of amino-acids, vitamins, minerals, and poly-unsaturated fatty acids.[148]
Agricultural Production	Endowed with favorable climatic and ecological conditions, Nigeria's ecosystem supports the production of a wide range of cultivated food crops. Cash crops produced in Nigeria include rice, plantain, pineapple, yam, cassava, cocoyam, oil palm, raffia palm, potatoes, coconut, cocoa, mango, and groundnut. These crops play an important role in providing food sources for local populations.[149] A 2018 study found that agriculture comprises roughly 25% of the country's GDP.[150] Additionally, around 70% of Nigeria's population is employed by the agricultural sector.[151] The wider Niger River Basin produces an estimated 50 million tonnes of agricultural products per year, with more than 70% of this total being generated by Nigeria.[152] In addition to commercial agricultural operations, other species are consumed by local populations, including ogbono (bush mango), giant snails, as well as a variety of other fauna.[153]

[145] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.
[146] Alicia Fentiman. "The Anthropology of Oil: The Impact of the Oil Industry on a Fishing Community in the Niger Delta." *Social Justice* Vol. 23, No. 4 (1996): 87-99. www.jstor.org/stable/29766976.
[147] N. Uluocha and I. Okeke. "Implications of wetlands degradation for water resources management: Lessons from Nigeria." *Geojournal*, Vol. 61 (October 2004): 151-154.
[148] Martin E. Allison and Daniel Okadi. "Species distribution and abundance in the lower Nun River, Niger Delta, Nigeria." *Journal of Fisheries International,* Vol. 4 No. 1 (February 2009): 13-18.
[149] Olalekan Adekola and Gordon Mitchell. "The Niger Delta wetlands: Threats to ecosystem services, their importance to dependent communities and possible management measures." *International Journal of Biodiversity Science, Ecosystem Services & Management*, Vol. 7, No. 1 (August 2011): 50-68.
[150] *Nigeria Biannual Economic Update*. World Bank Group, April 2018. http://documents.worldbank.org/curated/en/769551524576691390/pdf/WP-NigeriaBiannualEconomicUpdateAprilFinalVersion-PUBLIC.pdf.
[151] *Nigeria CDCS 2015-2020*. USAID, 2015. https://www.usaid.gov/sites/default/files/documents/1860/Nigeria_CDCS_2015-2020.pdf.
[152] *Federal Republic of Nigeria Country Strategy Paper 2013-2017.* AfDB, January 2013. https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Nigeria%20-%202013-2017%20-%20Country%20Strategy%20Paper.pdf.
[153] Luca Luiselli. "Comparative abundance and population structure of sympatric Afrotropical tortoises in six rainforest areas: The differential effects of "traditional veneration" and of "subsistence hunting" by local people." *Acta Oecologica* Vol. 24 (July 2003): 157-163.

4.2.2 REGULATING SERVICES

Regulating services include the functions and processes of ecosystems that provide sustenance and maintenance value to human beings. One key regulating services is climate regulation through providing reduction in greenhouse gases by sequestering C or mitigation methane emissions. Finima Nature Park in the Niger River Delta, for example, helped to sequester 67,407 tons of carbon in 2019 from the atmosphere.[154] Other regulating services provided by natural areas in Nigeria include the regulation of the movement of essential water and sediments, regulation of surface and ground water quality and volume, flood control, and salinity control and purification by removal of nutrients and other pollutants.[155]

4.2.3 CULTURAL SERVICES

Cultural services result from meaningful interactions that people have with ecosystems, which includes outdoor recreation, aesthetic enjoyment, education, and the intrinsic spiritual value of land. The rich biodiversity of Nigeria suggests that opportunities exist for ecotourism businesses in the country, though these options are currently underdeveloped. In addition, the potential for ecotourism in Nigeria is hampered by declining ecological health (in part due to oil and gas development), insecurity, and regional social conflicts.[156] For example, a recent study found that roughly 10% of the Nigerian mangrove ecosystem has been degraded or destroyed due to oil pollution or settlement activity.[157] Despite these challenges and concerns, Nigeria does have a well-established system of protected areas including several Ramsar sites (see discussion in Section 3.4).[158] The Lekki Conservation Center, a conservation-oriented park in Nigeria, hosted 45,439 visitors in 2016.[159]

Besides outdoor recreation, other cultural services are important to Nigeria, though their value is not easy to quantify or monetize. Additional cultural services include the use of land for educational purposes as well as spiritual and traditional uses of plants, animals, and natural ecosystems.[160]

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[154] *Carbon Stock and Ecosystem Service Assessment of Finima Nature Park*, Nigerian Conservation Foundation, (September 2019), http://finimanaturepark.com/wp-content/uploads/2019/10/Carbon-Stock-Assessment-Report.pdf.

[155] N. Uluocha and I. Okeke. "Implications of wetlands degradation for water resources management: Lessons from Nigeria." *Geojournal*, Vol. 61: 151-154 (October 2004).

[156] Olalekan Adekola and Gordon Mitchell. "The Niger Delta wetlands: Threats to ecosystem services, their importance to dependent communities and possible management measures." *International Journal of Biodiversity Science*, Ecosystem Services & Management, Vol. 7, No. 1 (August 2011): 50-68.

[157] IUCN Niger Delta Panel. *Developing a biodiversity conservation strategy for the Niger Delta: Integrating biodiversity considerations into SPDC's operations*. IUCN, January 2018. https://portals.iucn.org/library/sites/library/files/documents/2018-014-En.pdf.

[158] *Ibid*.

[159] *Annual Report & Financial Statements.* 2016. *NCF*, 2016. https://www.ncfnigeria.org/Reports/2016%20NCF%20Annual%20Report.pdf.

[160] Olalekan Adekola and Gordon Mitchell. "The Niger Delta wetlands: Threats to ecosystem services, their importance to dependent communities and possible management measures." *International Journal of Biodiversity Science*, Ecosystem Services & Management, Vol. 7, No. 1 (August 2011): 50-68.

5. LEGAL FRAMEWORK AFFECTING CONSERVATION

5.1 NATIONAL LAWS, POLICIES AND STRATEGIES

The 1999 Constitution makes fundamental provisions for environmental protection and clearly identifies important components of the environment covered by legislation. Section 20 of the Constitution contains objectives to "protect and improve the environment and safeguard the water, air, land, forest and wildlife." Section 16 (2) of the Constitution states that "The State shall direct its policy towards ensuring the promotion of a planned and balanced economic development." Furthermore, Section 17 (2) (d) states that "In furtherance of the social order, exploitation of human or natural resources in any form whatsoever for reasons, other than the goal of the community shall be prevented."[161] Furthermore, several policies and acts governing environmental and biodiversity conservation have been enacted and are in use. The National Policy on Environment (1989) sets the legal basis for all conservation activities by government agencies and affiliate stakeholders in matters of environmental management. It derives its powers from the Constitution with the mandate of ensuring nation-wide environmental protection and conservation of all natural resources for sustainable national development. This policy provides a solid framework for integrating biodiversity considerations into national planning, policy, and decision making.

The mandate to coordinate environmental protection and natural resource conservation is vested in the Federal Ministry of Environment (FMEnv).[162] The federal ministry's mandate consequently cascades to State Ministries of Environment and local government authorities around the country. The national policy is predicated on the Convention on Biological Diversity (CBD), an international legally – binding treaty. Article 6 of the CBD requires that countries prepare their NBSAP to ensure that biodiversity issues are mainstreamed into national planning programs and activities. Consequently, the first Nigerian NBSAP highlighted the values of biodiversity and provided reliable information on its status as well as efforts at biodiversity conservation. A later review focused on development of sets of targets to address Nigeria's Biodiversity challenges in tandem with the objectives of UN 2011-2020 Biodiversity Decade and the 20 Aichi Targets.[163]

Nigeria has enacted legislation to manage environmental issues including waste disposal, impact assessment, and environmental pollution. The Environmental Impact Assessment Act of 1992, is the core legislation that governs environmental impact assessment with respect to proposed projects in Nigeria and flows directly from the provisions of Principle 17 of Rio Declaration.[164]

Two additional important legislative acts include (i) the Harmful Wastes (Special Criminal Provisions) Act Cap 165, and (ii) the Federal Environmental Protection Agency (FEPA) Decree No. 58 of 1988 Cap 131. Similarly, Nigeria has enacted the Forestry Ordinance and the National Parks Act, the Environmental Impact Assessment Act, National Oil Spill and Detection Agency, National Environmental

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[161] Anago Ifeanyi, "Environmental impact assessment as a tool for sustainable development: The Nigerian experience. Proceedings of the FIG XXII International Congress," 19-26 April 2002: 1-13, Washington, D.C. USA.
[162] Onyenekenwa C. Eneh, "Managing Nigeria's Environment: The Unresolved Issues." *Journal of Environmental Science and Technology,* Vol 4. Issue 3 (2011): 250-263. DOI: 10.3923/jest.2011.250.263.
[163] FMEnv. *FRN NBSAP 2016-2020*. CBD. 2015. https://www.cbd.int/doc/world/ng/ng-nbsap-v2-en.pdf.
[164] Anago Ifeanyi, "Environmental impact assessment as a tool for sustainable development: The Nigerian experience. Proceedings of the FIG XXII International Congress," 19-26 April 2002: 1-13, Washington, D.C. USA.

Standards and Regulations Enforcement Agency, amongst others. Most recently, the Biosafety Act, to further strengthen biodiversity conservation in the country, has been instituted but implementation has been weak.

It is noteworthy that some legislation, although well-crafted, has been contentious and ineffectively implemented due to the incongruence between federally enacted laws on biodiversity protection and the powers of the state governors to administer forests within their jurisdiction (i.e., the States). This discrepancy in the legal framework must be resolved to sustainably manage the important biodiversity areas in individual States across Nigeria. In addition, it is critical to advocate for better environmental legislation, to review the current Land Use Act of 1978, and fully eliminate potential areas of conflict between federal and state laws. Under the Land Use Act, the governor is responsible for allocating urban lands to individuals and corporate entities for approved purposes, while similar powers are conferred on local government authorities for lands in non-urban areas. In several instances, it has been reported that state governors have removed the protection status previously conferred on forest reserves in their States by the federal government prior to 1978.

FMEnv coordinates the activities of number of institutions and organizations designated to carry out activities that could facilitate the implementation of the CBD in Nigeria. Key government agencies that are relevant to conservation activities in Nigeria are listed in Table E-1 in Annex E. The FMEnv executes multilevel strategies to integrate biodiversity conservation, livelihood development, waste management, strengthening of local institutions, capacity building, community-based environmental management, gender equality, and development of vulnerable groups interfacing with the natural environment through its agencies and programs.[165] At the state level, the local ministries also ensure protection of biological diversity and general environmental management. Several active private initiatives include botanical/zoological gardens and support for biodiversity programs through research grants.

Some ongoing conservation efforts around the country include the following:

- Great Green Wall Project: an African-led movement to grow an 8,000 kilometers forest belt across the entire width of Africa. Once complete, it will be the largest living structure on the planet (thrice the size of the Great Barrier Reef).
- Elephant Protection Initiative: a protection program to conserve and increase Nigeria's remaining elephant populations by WCS in conjunction with the Nigeria National Park Service.
- National Biosafety Framework (NBF): a program supported by the United Nation Environmental Program – Global Environment Fund (UNEP-GEF) to ensure the safe management of genetically-modified organisms.
- Climate Change Program: A climate change bill awaiting presidential approval will provide access to 60% of the national Ecological Fund for reforestation programs.
- Public-Private-Partnership for Ecotourism: private organizations such as Africa Nature Investors are in partnerships with national parks to develop ecotourism towards protecting biodiversity in hotspots.

[165] FMEnv. *FRN NBSAP 2016-2020*. CBD. 2015. https://www.cbd.int/doc/world/ng/ng-nbsap-v2-en.pdf.

- Bioenergy plantations: some business organizations, such as the Nigerian Charcoal Exporters Association, are planting fast-growing tree species to serve as their production stock and to offset their carbon footprints.
- Conservation Education: non-governmental organizations such as the Nigerian Conservation Foundation (NCF) are working with elementary schools to promote biodiversity-themed instructions and activities among young people.

5.1.1 MANAGEMENT OF LAND-USE AND RELATED CONFLICTS

The reality that Nigeria's population is projected to double to almost 400 million by 2050 has stimulated new economic strategies meant to diversify national income, generate more jobs, increase household income, and promote social stability. The number of people living in urban areas will triple from 94 million to 280 million. As a result of these changes, the demand for livestock products will rise exponentially; projections suggest that poultry meat, beef, and milk consumption will grow by 253%, 117%, and 577%, respectively.[166] Currently, several security and economic issues related to land-use conflicts between farmers and herders have emerged that seem to be intractable. The fundamental challenge with respect to the current model of meat and dairy production is the inefficiency of the system, which stems from its traditional nomadic nature. Herdsmen have grazed their cattle in cultivated areas, resulting in often violent clashes. Some of the factors contributing to these recurrent conflicts between pastoralists and farmers include the declining availability of pasture and grazing land, overgrazing, and mutual ethnic suspicion. Immediate detrimental effects to national security, food security, public safety, as well as economic loss, internal displacement, and biodiversity loss, result from these conflicts.

As a result, the federal government has instituted a National Livestock Transformation Plan (NLTP) to be implemented from 2019-2028. The plan prioritizes investments in the dairy and poultry sectors to commercialize production and reduce gaps in the food supply.[167] Implementation of the NLTP brings private investors, government services and capital, and targeted donor support to stimulate the value chain with a portfolio of tools capable of transforming even marginal landscapes into viable ranches.[168] The NLTP, if well-implemented, may also aid in diffusing the emerging significant link between insecurity and biodiversity loss showing up in different regions of Nigeria.

Many forest reserves, like Kamuku Forest Reserve in Kaduna, and protected areas, like the Yankari Game Reserve, are already reported to be experiencing frequent incursions by armed herdsmen that are desperate to graze their cattle in these areas. The main gains for forests and biodiversity conservation are reduction in new land clearing occasioned by displacement of farmers avoiding attacks from herdsmen, safer forests due to increased routine patrols of reserves and national parks, reduction of biodiversity loss due to reduced presence of pastoralists in forests, and reduced animal-human conflicts or disturbances due to reduction in unnatural animal migrations.

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[166] FAO. *The future of livestock in Nigeria. Opportunities and challenges in the face of uncertainty.* Rome: FAO, 2019.
[167] "NLTP 2019-2028." Association of Food and Agro Processors. *National Economic Council.* 6 February 2019, https://foodprocessorsng.org/national-livestock-transformation-plan-nltp-2019-2028/.
[168] FAO. *The future of livestock in Nigeria. Opportunities and challenges in the face of uncertainty.* Rome: FAO, 2019.

5.2 INTERNATIONAL AGREEMENTS

In addition to its internal regulatory framework, Nigeria has committed to be a responsible partner in global environmental efforts by signing several international and regional agreements, conventions, and protocols. Nigeria is also party to most of the UN Conference of Parties agreements on climate change mitigation. Many of Nigeria's national policies and legislation are based on these international agreements. A significant outcome of Nigeria's participation in the United Nations Conference on Environment and Development was the signing of the Convention on Biological Diversity (CBD). The major goals of the Convention are: (i) the conservation of biodiversity, (ii) sustainable use of the components of biodiversity, and (iii) the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

Other major international/regional agreements to which Nigeria is party are outlined below:[169]

(i) 1968 African Convention on Conservation of Nature and Natural Resources
(ii) 1972 UN Conference on the Human Environment (Stockholm declaration)
(iii) 1976 Vancouver Conference on Human Settlements. (Habitat I)
(iv) 1985 Vienna Convention on protection of the Ozone Layer
(v) 1992 UN Rio Conference on Environment and Development (a suite of five documents): (a) Agenda 21 (an action plan for sustainable development in the 21st century), (b) The Rio Declaration (principles on healthy environment and equitable development), (c) The Convention on Biodiversity, (d) The Convention on Climate Change, and (e) Statement of Forest Principles
(vi) 1993 Lugano convention on civil liability for damage from environmentally detrimental activities
(vii) 1996 Istanbul Conference on Human Settlements (Habitat II) which links quality living with construction and environment, drinking water, etc.
(viii) Kyoto Accord/Kyoto Protocol on global warming and CFCs
(ix) African Charter on Human and Peoples Right (Ratification and Enforcement) Act Cap 10 Article 24

5.2.1 SUPPORT OF BIODIVERSITY CONSERVATION BY NGOS, BILATERAL, AND MULTILATERAL ORGANIZATIONS

Several non-governmental organizations (NGOs) in Nigeria focus on tropical forest and biodiversity conservation. They support the federal government's objectives through advocacy, education, research, lobbying, direct implementation of management plans, and fundraising. NGOs may directly support government projects or formulate their objectives and execute them independently. Prominent NGOs include the Nigerian Conservation Foundation (NCF), the Forestry Association of Nigeria, Nigerian Environment Study/Action Team, WCS, Savannah Conservation, Centre for Environment Renewable Natural Resources Management Research and Development, Environmental Rights Action , Nigeria Field Society, Pandrillus, Africa Nature Investors, and Friends of the Earth.

Many bilateral organizations have implemented highly impactful programs in various parts of the country for several years. Similar to NGOs, they sometimes synergize with government ministries and formulate their objectives and execute them independently (usually through highly accredited NGOs). Prominent bilateral organizations that have been active in conservation in Nigeria include the UK Department for

[169] Onyenekenwa C. Eneh, "Managing Nigeria's Environment: The Unresolved Issues." *Journal of Environmental Science and Technology,* Vol 4. Issue 3 (2011): 250-263. DOI: 10.3923/jest.2011.250.263.

International Development (DFID), the International Institute for Tropical Agriculture (IITA), Japan International Corporation Agency (JICA), and the Canadian International Development agency. Similarly, many multilateral organizations have also been supportive of conservation in Nigeria. They include the World Bank, Economic Community of West African States, International Fund for Agricultural Development, and African Development Bank (AfDB).

5.3 GOVERNMENT AGENCIES

The Federal Ministry of Environment (FMEnv) coordinates the activities of several agencies and institutions that are designated to carry out activities that could facilitate the implementation of the CBD in Nigeria. The creation of FMEnv as a deliberate design by the Federal Government to achieve a well-articulated and efficient outfit that will adequately address and manage environmental issues in Nigeria in a holistic manner that is devoid of duplication and competition among various government agencies. FMEnv executes multilevel strategies to integrate biodiversity conservation, livelihood development, waste management, strengthening of local institutions, capacity building, community-based environmental management, gender equality, and development of vulnerable groups interfacing with the natural environment through its agencies and programs. Several of the agencies are embedded in Federal ministries and, in most cases, cascaded into state and local government authority levels.

The basic operations and responsibilities of key government agencies working to support conservation of biodiversity are outlined in Annex E (Table E-1). Their operations/responsibilities span planning, policy formulation, regulation, infrastructural development, information management, training/advocacy, law enforcement, data collection/management, research, import/export control, and ecological/socioeconomic interventions. Similarly, private initiatives by NGOs and some stakeholders in the public sector have established botanical/zoological gardens while some support biodiversity conservation programs. There are also several research institutes and universities that support government agencies in training, data collection/management and research. A list of key research institutions that interface with the Ministry of Environment is presented in Annex E.

5.4 CONSERVATION INITIATIVES: GAP ANALYSIS

In order to effectively mainstream biodiversity conservation into sustainable development, Nigeria has several ongoing initiatives at various ecological landscapes across the country. The initiatives are directed at implementing its NBSAP in tandem with its commitment to CBD.

5.4.1 CONSERVATION INITIATIVES FOCUSED ON TERRESTRIAL ECOSYSTEMS

ONGOING CONSERVATION INITIATIVES

Nigeria has embarked on a review of biodiversity-related laws through a consultative process involving the Federal Ministry of Justice, the Law Review Commission and the Nigerian Institute for Advanced Legal Studies, the Federal Ministry of Environment, the National Assembly, and other relevant stakeholders. The Federal Government has instructed that a major aspect of the Ecological Fund (the fund specifically instituted by the government to address environmental challenges) be directed towards afforestation programs. Some private organizations, particularly in the petroleum sector, including Chevron and Shell Petroleum Development Company (SPDC), are also incorporating conservation

programs in their operations, even as public agencies are making efforts to mainstream biodiversity conservation in their operations.

A major constraint is the dearth of competent manpower, appropriate technologies, and adequate funding to implement biodiversity programs in Nigeria. In response, the curricula in relevant departments of some universities and institutions of higher learning is being redesigned to improve the professional training in biodiversity conservation in the country.

Other key conservation efforts in Nigeria include: the Great Green Wall Project; the Elephant Protection Initiative; the Local Empowerment and Environmental Management Program; the National Biosafety Framework (NBF); the Climate Change Program; the Public-Private-Partnership for Ecotourism; Establishment of Energy plantations; Conservation Education; and Desertification and Drought Amelioration Department under the FMEnv.

KEY GAPS IN CONSERVATION EFFORTS

In spite of efforts at conserving Nigeria's natural resources, gaps exist. The most immediate needs in conservation are effective legislation, research, adequate human capacity, funding, and impactful interventions.

Much of the biodiversity in Nigeria's terrestrial biomes remains undocumented due to lack of technical capacity and funding. The results from the national biodiversity surveys conducted before the 1980s are the basis for much of the existing conservation infrastructure, but many of the surveys have not been repeated in recent years. Nigeria needs to complete these surveys systematically in order to inventory current biological conditions. Most of the available data are on large mammals and birds, while many plants, small mammals, reptiles, amphibians, fishes, and invertebrates remain unstudied since they receive little research and literature attention. Although Birdlife International has designated several Important Bird Areas (IBAs) in Nigeria, a number of bird species still require urgent attention. [170] For example, vulture populations are in sharp decline and in need of a robust conservation strategy.

Many tree species that have protection status in Nigeria are those that have been long exploited for timber, while several tree species, which are potential sources of medicine, still lack their deserved protection. Future surveys should focus on non-timber forest products for their high potential for food security and poverty alleviation.

There are no current laws in Nigeria to support communities that choose to protect their ancestral lands against overexploitation of natural resources. The federal government needs to create an enabling environment that supports community forestry with both legal and capital incentives to enhance social livelihoods and conserve gene banks in various ecological zones (especially for indigenous species). There is also a need to establish more community biodiversity management associations and facilitate capacity development in relevant skill categories.

[170] FGN. *Nigeria's Fourth National Biodiversity Report.* CBD. 2010. https://www.cbd.int/doc/world/ng/ng-nr-04-en.pdf.

5.4.2 CONSERVATION INITIATIVES FOCUSED ON WETLANDS, MANGROVES, COASTAL AREAS AND FISHERIES

ONGOING CONSERVATION INITIATIVES

There is ongoing effort on public enlightenment and awareness on the need to stop the indiscriminate killing of some marine wildlife species such as dolphins, whales, manatees, and sea turtles, particularly the species that are on the IUCN red list. Nigerian Institute for Oceanography and Marine Research (NIOMR) had been involved in the assessment of marine species found in Nigeria. This assessment has resulted in the provision of detailed information on marine fish diversity and the status of the marine fisheries resources. There is also conservation effort on the rescue, rehabilitation, and release of sea turtles and manatees that are captured by locals. Additional conservation efforts in the Nigeria coastal zone include: the Integrated Management of Invasive Aquatic weeds project; the UNEP Guinea Current Large Marine Ecosystem; and the World Bank funded Fadama Integrated Land Management Project III.

KEY GAPS IN CONSERVATION EFFORTS

There is dire need to halt the massive deforestation and ongoing habitat modification within Nigerian mangroves. Much of the loss of mangroves is due to extraction for charcoal production, construction, and firewood. In Lagos and in other coastal cities, massive areas of wetlands are currently being reclaimed for development projects such as the Dangote Refinery, the Eko Atlantic project, the Lekki Deep Sea Port, and the Lekki Free Trade Zone. Similarly, many artificial islands, lighter terminal ports, jetties, and new residential areas are being created in wetlands in the Lekki-Ajah-Epe Peninsula area.

Climate change is yet to be sufficiently addressed through programmed sustainable actions in Nigeria's coastal regions. The beach barrier that protects sensitive ecosystems like the Lekki lagoon in Lagos State is threatened by sea level rise, dredging, and filling operations.

Another long-standing anthropological conservation problem that still requires decisive actions in Nigeria's coastal waters is chemical pollution from oil and gas producing companies.

There is an urgent need to survey Nigeria's freshwater and marine fish resources. Over 230 species of fish are said to be found in inland waters and many more are found in coastal and marine habitats. But aside from a few economically exploited species, limited information is available on the fauna diversity of most areas.

Similarly, the dynamics of water quality, flow, and seasonality and its impact on dams, flooding, and animal populations require more attention. It is critical to address the threat of invasive species that are rapidly expanding and outcompeting the indigenous or native species.

Appropriate legislation and enforcement are required for monitoring industrial effluents and overexploitation of aquatic species. Legislation and enforcement are also needed to monitor highly demanded non-timber forest products, such as rattans, that are being overharvested through unsustainable techniques.

6. THREATS TO AND DRIVERS OF TROPICAL FOREST AND BIODIVERSITY IN NIGERIA

6.1 DIRECT THREATS TO BIODIVERSITY IN NIGERIA

Per the FAA 118/119 Best Practices Guide, a threat is "a human action or unsustainable use that immediately degrades biodiversity." Following is a discussion of direct threats to forests and biodiversity in Nigeria grouped in four overarching categories:

- Deforestation and habitat degradation, fragmentation and loss;
- Overexploitation or unsustainable use of resources;
- Climate change; and
- Other direct threats.

6.1.1 DEFORESTATION AND HABIT DEGRADATION, FRAGMENTATION, AND LOSS

Contributing approximately 3% of annual GDP, forestry and its associated outputs account for a significant proportion of domestic energy, food, and medicinal supply of the rural and, increasingly, the urban population.[171] Originally covering 20% of the country, close to 96% of Nigeria's original forest cover has been cleared or degraded in some way.[172] By a 2015 estimate from the Chatham House Illegal Logging Portal, less than 10% of the Nigeria remains forested, and only 20,000 hectares of primary forests remain.[173] The 2015 Food and Agriculture Office (FAO) Global Forest Resources Assessment ranked Nigeria fourth highest globally for greatest annual net loss of forest area, with a 5% annual rate of deforestation (410,000 hectares/year) between 2010-2015.[174] Major contributors to current trends in deforestation, habitat degradation, fragmentation, and loss are described below.

AGRICULTURAL EXPANSION AND POOR AGRICULTURAL MANAGEMENT PRACTICES

A continually growing population and the commensurate increase in demand for agricultural outputs and employment opportunities have led to the dramatic expansion of Nigerian agriculture sector. Nigeria is one of the continent's largest producers, consumers, and importers of rice as well as the leading producer of cassava in the world, with about 50 million metric tons annually cultivated from an area of about 3.7 million ha.[175] Key to national food self-sufficiency, the agricultural sector has been able to meet 90% of total demand for agricultural products.[176]

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[171] FGN. *Nigeria's Path to Sustainable Development Through Green Economy, Country Report to the Rio +20 Summit*. 2012. https://sustainabledevelopment.un.org/content/documents/1023nigerianationalreport.pdf.

[172] *Ibid.*

[173] Chatham House. The Royal Institute of International Affairs. (2019). Illegal Logging Portal: Nigeria. https://www.illegal-logging.info/regions/nigeria.

[174] FAO. *Global Forest Resources Assessment 2015. 2nd Ed.* Rome: FAO, 2016. http://www.fao.org/3/a-i4793e.pdf.

[175] "Nigeria at a Glance," FAO in Nigeria, *FAO,* http://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/.

[176] Oji-Okoro Izuchukwu. "Analysis of the Contribution of Agricultural Sector on the Nigerian Economic Development." *World Review of Business Research*, Vol. 1 No. 1 (March 2011):191 – 200. https://www.researchgate.net/publication/264887608_Analysis_of_the_Contribution_of_Agricultural_Sector_on_the_Nigerian_Economic_Development.

Employing roughly two thirds of the Nigerian labor force, agricultural expansion is cited by some studies as the main cause of ongoing forest loss and habitat degradation.[177] From 2000 to 2010, more than 463,360 hectares of forestland were lost, 118,570 hectares of which was converted to cropland.[178] Conversion of community-owned land and state-managed forests for agricultural purposes has increased and resulted in fragmentation and loss of natural habitats and consequent biodiversity loss. Commercial agriculture has also led to forest loss. In some instances, the use of subsidies has increased the profitability of agricultural commodities like palm oil and led to pressure to expand these industries.[179] Rainforests, savannah woodlands, and mangroves are under the greatest threat from agricultural conversion.

The tropical soils of the rainforests and savannah woodlands can support agricultural activities for brief periods of time but require the overapplication of fertilizers or practices for continual harvests.[180] [181] Expansion of crop lands is cited as one of the main threats to the Cross River gorilla population, of Cross River National Park.[182] Lands that are no longer able to support agriculture are then left fallow. A 425% increase in the extent of barren lands and a 50% decrease in the area of undisturbed forest are evidence of land degradation, largely attributable to growing demand for agricultural lands.[183] In addition to biodiversity loss, the effects of land degradation and conversion include desertification, drought, flood, and erosion. In addition to disturbances of inland forests, mangrove forests are also under threat from agricultural expansion, especially as they are not under any known form of resource conservation laws.[184] Continued deforestation of the mangrove forest would eliminate an estimated 5-15% of species in Nigeria by 2020.[185]

UNSUSTAINABLE TIMBER AND ILLEGAL TIMBER INDUSTRY

Iroko, ebony, mahogany, rosewood, and obeche are amongst several high-demand wood species being depleted in Nigeria due to unsustainable practices in the timber industry. While the government has recognized the issue, it has largely failed to put in place effective measures to curb illegal logging, and only 6% of the land area is protected.[186] Timber concessions have been granted in some forest areas, and oil-palm plantations and other monocrop commercial enterprises have been prioritized over forest conservation. Previous governments have tried without much success to prevent further forest loss

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[177] Ken Norris, et al. "Biodiversity in a forest-agriculture mosaic – The changing face of West African rainforests." *Biological Conservation,* Vol. 143 No. 10, (October 2010): 2341-2350, https://doi.org/10.1016/j.biocon.2009.12.032.

[178] Ronnie MacPherson. *Final report of the Land Degradation Neutrality Target Setting Programme*. UNCCD, March 2019. https://www.unccd.int/sites/default/files/relevant-links/2019-04/LDNTSP-EvalReport%20final.pdf.

[179] Oliver Enuoh, and Francis Bisong. "Colonial Forest Policies and Tropical Deforestation: The Case of Cross River State, Nigeria." *Open Journal of Forestry,* Vol 5, (2015): 66-79. DOI: 10.4236/ojf.2015.51008.

[180] Stakeholder Consultations with JICA. 13 September 2019.

[181] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[182] Andrew Dunn, Richard Bergl, et. al. *Revised Regional Action Plan for the Conservation of the Cross-River Gorilla: 2014-2019*. New York: IUCN/SSC Primate Specialist Group & Wildlife Conservation Society.

[183] FGN. *Nigeria's Path to Sustainable Development Through Green Economy, Country Report to the Rio +20 Summit*. 2012. https://sustainabledevelopment.un.org/content/documents/1023nigerianationalreport.pdf.

[184] Prince Mmom and Samuel Arokoyu. "Mangrove Forest Depletion, Biodiversity Loss and Traditional Resources Management Practices in the Niger Delta, Nigeria." *Research Journal of Applied Sciences, Engineering and Technology.* (2010): 28-34,

[185] *Ibid*.

[186] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

through log export tariffs and selective bans, so as to promote agro-forestry and community-based conservation schemes and also encourage the establishment of plantations and reforestation of logged areas. International demand for kosso, and other high dollar value tropical forest tree species has hastened the depletion of the country's forests; accelerated desertification in rural areas; and contributed to a deforestation rate of between 4-5%, annually.[187]

In producing lumber for local markets, loggers are often indiscriminate in tree felling. As larger trees have been cut down and left unreplaced, smaller and less-sturdy species are harvested for sale. A popular method of onsite conversion of logs into lumber is chainsaw milling.[188] This method provides local timber markets with cheap lumber quickly. While the advent of quicker and more mobile timber harvesting has enabled more economic opportunities for local people, this method of harvesting is associated with poor timber quality, corruption, and other illegalities. Regulating and controlling the practice is a challenge, and as stakeholder consultations revealed, tree felling activities inside protected areas are much easier to carry out given the mobility of these chainsaw milling operations.[189] Although the National Park Service has largely been successful in curtailing illegal logging within National Parks, controlling over-logging in buffer areas is an ongoing challenge.[190]

MAJOR INFRASTRUCTURE AND ENERGY DEVELOPMENT PROJECTS

Significant infrastructure and energy projects are underway or planned in Nigeria that will impact terrestrial and marine biodiversity, including within protected areas. These projects include hydropower, road construction, and oil refinery infrastructure. Infrastructure needs, driven by the demands of development, threaten biodiversity directly through habitat loss and indirectly through habitat fragmentation, degradation, and increased access to previously undisturbed ecosystems. The unsystematic development of roads, for example, fragments landscapes and also leads to greater access to timber, non-timber forest products, and bushmeat.[191] Major infrastructure development corridors underway or planned include the following:

1. **Mambila Hydroelectric Power Plant**: Planned to be Nigeria's largest hydroelectric facility, with 3,050-megawatt capacity, this plant is being developed on the Dongo River in Taraba State.[192] After nearly 30 years of delays, the Chinese Export Import (Exim) Bank is funding 85% of the estimated $5.8 billion project cost, while the remaining 15% funding will come from the Federal Government of Nigeria.[193]
2. **Zungeru Hydroelectric Power Plant**: This 700-megawatt plant is being built on the upper/middle reaches of Kaduna River in Niger State. While construction began in May 2013,

[187] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.
[188] *Ibid*.
[189] *Ibid*.
[190] Stakeholder consultations, periodic report 1.
[191] Stakeholder Consultation WCS.
[192] USAID. *Climate Risk Profile: Nigeria*. February 2019. https://www.climatelinks.org/sites/default/files/asset/document/2019_USAID-ATLAS-Nigeria-Climate-Risk-Profile.pdf.
[193] "Mambilla Hydropower Project," NS Energy, *NS Energy,* https://www.nsenergybusiness.com/projects/mambilla-hydropower-project-nigeria/.

legal and financial challenges related to an ecological settlement have delayed the projects commissioning to 2021.[194]

3. **Kashimbila Hydroelectric Power Plant**: Constructed on the Katsina-Ala River in Taraba State, this plant has been completed and this 40-megawatt capacity plant was awaiting commissioning as of August 31, 2019.[195]
4. **Cross River Super Highway:** Originally planned to span 260 kilometers (162 miles) with six lanes and a buffer zone linking Calabar to Benue State, the highway would have run through the center of Cross River National Park.[196] This national park is home to forest elephants, drills, Nigeria-Cameroon chimpanzees, and Cross River gorillas. Based on the advocacy from communities and NGOs, the highway's plan has since been redrawn to skirt the fringes of the national park but still crosses a variety of forest reserve areas. Ground was broken on the project in 2015, but an EIA was not produced on the project until late 2016 to early 2017.[197] Reparation payments to communities did not begin until December 2018 and the final payments have yet to be given to some communities.[198] The source of funding for this project remains undisclosed and information from contacts in Nigeria indicate that there is a federal injunction on construction, the anticipated duration of which is unknown.[199]
5. **Belemaoil Floating Crude Oil Export Terminal**: Authorization for this project was given in May 2019 for construction off the coast of the Niger Delta.[200]
6. **Dangote Oil Refinery**: Under construction and scheduled for competition at the end of 2020, this $12 billion oil refinery will be the largest existing refinery in the world. The refinery is being built on 2,500 ha of swampland on the outskirts of Lagos and includes the construction of a port, jetty, roads to the project, as well as energy plants to power it.[201]

Additional infrastructure projects include the rehabilitation of 10 roads across the country including the Umuahia-Ikot Ekpene road, Calabar-Oban-Ekang road, Ado-Ekiti –Igede-Aramoko-Itawure road, Funtua-Dandume-Kaduna State border road, and Makurdi-Gboko-Katsina-Ala road.[202] Approved in May of 2019, the rehabilitation of these roads is slated to cost an estimated $471 million.[203] Work on these roads is part of the Government of Nigeria's Economic Recovery and Growth Plan.

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[194] "Zungeru Hydropower Project," Power Technology, *Power Technology,* https://www.power-technology.com/projects/zungeru-hydropower-project/.

[195] News Agency of Nigeria, "Kashimbila power project ready for commissioning – minister," *Energy Central,* 31 August 2019, https://www.energycentral.com/news/kashimbila-power-project-ready-commissioning-%E2%80%93-minister.

[196] Rafeeat Aliyu, "Cross River Superhighway Pushes Forth Despite Pushback," *Heinrick Boll Stiftung*, 15 April 2019, https://ng.boell.org/en/2019/04/15/cross-river-superhighway-pushes-forth-despite-pushback.

[197] *Ibid.*

[198] John C. Cannon, "Cross River superhighway changes course in Nigeria" *Mongabay,* 28 April 2017, https://news.mongabay.com/2017/04/cross-river-superhighway-changes-course-in-nigeria/.

[199] Katherine Kaetzer-Hodson, MS Word Comment to author, 19 November 2019.

[200] Tsvetana Paraskova, "Nigeria Approves New Crude Oil Export Terminal In Niger Delta," *OilPrice.com,* 28 May 2019, https://oilprice.com/Latest-Energy-News/World-News/Nigeria-Approves-New-Crude-Oil-Export-Terminal-In-Niger-Delta.html.

[201] Frankie Edozien, "In Nigeria, Plans for the World's Largest Refinery," *The New York Times*, 9 October 2018, https://www.nytimes.com/2018/10/09/business/energy-environment/in-nigeria-plans-for-the-worlds-largest-refinery.html.

[202] Teresia Njoroge, "Nigeria Approves US $471 Million for Construction of 10 Roads," *Construction Review Online*, 10 May 2019, https://constructionreviewonline.com/2019/05/nigeria-approves-us-471m-for-construction-of-10-roads/.

[203] *Ibid.*

CHARCOAL AND WOOD FUEL PRODUCTION

Wood fuel and charcoal are used for both household and commercial needs, with roughly 70% of Nigerian households dependent on fuel wood as their primary source of energy.[204] Demand for these energy sources is higher in the north and in urban cities where the poor cannot afford other energy alternatives.[205] Although Nigeria is endowed with large oil, gas, hydropower, and solar resources, daily production remains at only 30% of installed capacity, leading to insufficient supply and leaving approximately 93 million people without access to electricity.[206] Lack of electrical power leads to increase in wood use and deforestation. Deforestation of protected area buffer zones has been identified as a specific challenge by park rangers in the Yankari Game Reserve. Habitat encroachment onto protected areas by many local communities has been identified as an area of primary concern.[207]

LAND USE CHANGE FROM NEW SETTLEMENT DEVELOPMENT AND EXISTING SETTLEMENT EXPANSION

Data on land use changes in Nigeria is sparse and many gaps exist. According to a land use mapping project, which studied the changes in land use cover in Nigeria between 2001 and 2009, the savanna was being reduced at the rate of 4% annually while the forest was being reduced at the rate of about 9% annually.[208] The causes of these land use changes from this study are speculative but include growing agriculture activities as cited above, as well as the growth of urban sprawl and new settlement establishment and expansion.

Land cover change maps show that continued urban sprawl expansion poses a sizable threat to land currently occupied by forest, low density residential areas, and agricultural lands. [209] Lagos as an example, is one of the fastest growing urban centers in the world and has proved challenging to manage with orthodox planning techniques. According to one land-use change study, measuring the growth of the city between 1984 – 2002, the built-up urban area of Lagos increased by 35.5% and forest and agriculture land included in the study decreased by 57.8%.[210] On the periphery of cities, agricultural lands are slowly being added to urban areas to accommodate the rapidly increasing population. [211] In addition to the pressure urban sprawl puts on the natural environment, the 49.7% of Nigerians that continue to reside in rural areas largely depend on the subsistence farming and natural resource extraction for their livelihoods. With one of the highest global population growth rates of 2.6%, growing demand for land for settlement expansion poses a substantial threat to forests and biodiversity.

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[204] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.
[205] *Ibid*.
[206] USAID. *Climate Risk Profile: Nigeria*. February 2019. https://www.climatelinks.org/sites/default/files/asset/document/2019_USAID-ATLAS-Nigeria-Climate-Risk-Profile.pdf.
[207] Stakeholder consultation Yankari Game Reserve Consultation. September 2019.
[208] Innocent Abbas, Olalekan Bello, and Hannatu Abdullahi, "Mapping and analyzing the land use–land cover of Nigeria between 2001 and 2009." *MOJ Eco Environ Science* Vol. 3 Issue 3 (June 2018):197–205. DOI: 10.15406/mojes.2018.03.00087
[209] *Ibid*.
[210] M. Adepoju, A. Millington, and K. Tansey, "Land Use/Land Cover Change Detection in Metropolitan Lagos (Nigeria): 1984-2002." ASPRS 2006 Annual Conference, 1-5 May 2006, Reno, Nevada, http://www.asprs.org/a/publications/proceedings/reno2006/0002.pdf.
[211] Joy Atu, Offiong Raphael Ayama, and Eja Eja, "Urban Sprawl Effects on Biodiversity in Peripheral Agricultural Lands in Calabar, Nigeria." *Journal of Environment and Earth Science*, Vol. 3, No. 7 (2013). https://www.iiste.org/Journals/index.php/JEES/article/view/6408.

EXTRACTIVE INDUSTRIES INCLUDING MINING, SAND DREDGING AND OIL PRODUCTION

Historically, coal, tin, and bauxite were the primary products of mining in the Jos Plateau and Enugu mines. However, there has been a collapse of these larger-scale mining operations due to the withdrawal of foreign investment in favor of oil and gas in the 1960s, the falling price of tin globally, and the depletion of the surface deposits of tin. Despite the collapse of large-scale mining operations, legal and illegal artisanal and small-scale operations in the region continue. Local mining operations and processing have led to major economic development in these areas but have had overwhelmingly negative impacts on nearby biological and hydrological ecosystems.[212] As an example, seismic activities through massive dynamiting for geological excavation have had serious effects on the nation's aquatic environment.[213]

In the late 1960s and early 1970s, development began for significant reserves of oil and natural gas found in the Niger Delta, which, by some accounts, are now responsible for 90% of Nigeria's national income. [214] The environmental effects of crude oil and natural gas exploration and extraction are numerous. Exploration and construction of the oil infrastructure alone has caused significant degradation of the Niger Delta mangrove forest.[215] Oil and gas workers' migration to the delta area and the road construction associated with oil refinery development are both sources of pressure on natural resources. Clearing of tropical forests and fragmentation of habitat for oil and gas facility development disturbs wildlife and reduces breeding.[216] According to National Oil Spill Detection Response Agency, 1,159 oil spills, totaling approximately 54,972 barrels of oil, were spilled in Nigeria between 2017–2019.[217] Oil spills from pipeline leakages and ruptures, and accidental discharges from tanks and refineries are also a common cause of loss of biodiversity around the Niger Delta.[218] The occurrence of oil spills on land is often accompanied by fire outbreaks that kill vegetation and create a crust over the land, making remediation and re-vegetation very difficult.[219] Due to lack of gas infrastructure, Nigeria flares approximately 75% of the gas it produces. Gas flares expose nearby vegetation and wildlife to gas deposits and unusually high temperatures.[220]

UNSUSTAINABLE HARVEST OF NON-TIMBER FOREST PRODUCTS

Nigerian tropical forests contain a wealth of non-timber resources that play a significant role in the rural economy. About 150 indigenous woody plants have been identified as producing food for human and livestock consumption, and many other plants are used for medicinal purposes to cure diseases such as hypertension, diabetes, sickle cell anemia, and bronchial asthma.[221] Unregulated and unsustainable

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[212] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.
[213] *Ibid*.
[214] *Ibid*.
[215] Prince Mmom and Samuel Arokoyu. "Mangrove Forest Depletion, Biodiversity Loss and Traditional Resources Management Practices in the Niger Delta, Nigeria." *Research Journal of Applied Sciences, Engineering and Technology.* (2010): 28-34,
[216] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.
[217] "Nigerian Oil Spill Monitor." (2019). https://oilspillmonitor.ng/
[218] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.
[219] UNEP. *Environmental Assessment of Ogoniland.* Nairobi: UNEP, August 2011. https://wedocs.unep.org/bitstream/handle/20.500.11822/25282/ogoniland_chapter1_UNEP_OEA.pdf?sequence=1&isAllowed=y.
[220] *Ibid*.
[221] FGN. *Nigeria's Path to Sustainable Development Through Green Economy, Country Report to the Rio +20 Summit.* 2012. https://sustainabledevelopment.un.org/content/documents/1023nigerianationalreport.pdf.

harvesting due to increasing human pressure have reduced the availability of most wild forest products. Many species in high demand (e.g., plants or animals used for medicinal or spiritual purposes, consumed, or commoditized, see Section 6.2.7 below) are not domesticated, and increasing demand for the products has put pressure on national parks and forest reserves where resources are still available.[222] Consultations with park authorities at Cross River National Park noted unchecked illegal extraction of most natural resources within the park boundaries as one of many causes leading to the decline of biodiversity in protected areas.[223] With rural populations reliant on the extraction of natural resources for food, fuel, and medicine, continued and uncontrolled consumption of nontimber forest products, especially given the population growth rate, will quickly lead to the exhaustion of these resources.

Pterocarpus erinaceus, commonly referred to as African rosewood or "kosso", is now the most illegally traded wildlife product in the world, in both value and volume. Kosso was added to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 2016. However, there has not been strict control of kosso trade; the aggregated value of seizures of rosewood between 2005 and 2014 represents more than all seizures related to elephants, big cats, rhinoceros, pangolins, parrots, and turtles combined. In 2013, rosewood exports from West Africa were negligible; by 2015, however, the region had become China's largest volume supplier of rosewood logs. Between January 2014 and June 2017, an average of 40 shipping containers of logs, or approximately 2,800 trees, were exported to China daily. As kosso has become less available, some evidence indicates exporters sourcing from Boko Haram controlled areas are working with the terrorist organization to obtain the valuable timber, according to the Environmental Investigation Agency 2017 investigation. The preference for large, well-established trees in the logging industry, coupled with poor replacement rates, has led to increased felling of young rosewood trees and the availability of less genetically robust specimens from which new rosewood trees can be sourced.

6.1.2 OVEREXPLOITATION OR UNSUSTAINABLE USE OF RESOURCES

WILDLIFE POACHING, TRAFFICKING OF HIGH-VALUE SPECIES, AND BUSH- AND SEA-MEAT HUNTING

Poaching, trafficking, and subsistence hunting remain significant threats to Nigerian biodiversity. Intense hunting, poaching, and bush burning have led to the eradication of species including the giant eland (*Taurotragus derbianus*), the giraffe (*Giraffa amelopardalis*), black rhino (*Diceros bicornis*), cheetah (*Acinonyx jubatus*), and the pygmy hippopotamus (*Choeropsis liberiensis*) in Nigeria.[224] Animals at continued risk from poaching, trafficking, and bushmeat consumption include, but are not limited to, the Cross River gorilla and other primates, the pangolin, the African grey parrot (*Psittacus eritharcus)*, three critically endangered species of vulture,[225] elephants, lions and other large carnivores, and Ungulates.[226] [227] The scale of local consumption of wildlife bushmeat is unknown in most areas, however it has increased as human

[222] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.
[223] Stakeholder consultation with Nachamada, Duguri & Mohammed, 17 September 2019. Yankari Game Reserve & Bauchi Town.
[224] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.
[225] The hooded vulture (*Necrosyrtes monachus*), white-backed vulture (*Gyps africanus*), and Ruppell's griffon vulture (*G. rueppellii*).
[226] USFWS, "FY 2018 Summary of Projects, Combating Wildlife Trafficking Program," 2018: 3, https://www.fws.gov/international/pdf/project-summaries-cwt-2018.pdf.
[227] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

populations have grown and as a consequence intense hunting pressure has caused a decline in the population of many bushmeat species.[228]

Ongoing habitat loss and forest fragmentation leading to isolation have made the Cross River gorilla particularly vulnerable to poaching.[229] Given the limited number of remaining individuals in the species, each gorilla lost has a dramatic effect on the reduction of the diversity of the remaining gene pool.[230] Illegal trade in pangolin scales associated with Nigeria has risen, according to the CITES Secretariat. Volumes of illegal trade in pangolin scales seized in Nigeria or in other countries after they left Nigeria, is up from 2,000 kg in 2015, to 7,658 kg in 2017, to 23,987 kg in the seven-month period between 1 January and 31 July 2018.[231] Occasionally linked with the illegal pangolin scale trade, Nigeria continues to be affected by illegal trade in elephant ivory.[232] As with the range of Cross River gorillas, elephants occupy 5% of the terrestrial land of Nigeria, with 3% of that range protected.[233] Rangers in the Yankari Game reserve reporting an increase in elephant population, which supports the belief that most of the ivory trade through Nigeria originates in Central Africa.[234] [235] Ivory tusks are the most sought after elephant product, but elephant meat and skin are also traded.[236] Finally, despite increasing enforcement in National Environmental Standards and Regulations Enforcement Agency (NESREA) endangered species protections, the African grey parrot continues to be harvested in large numbers for sale to Asian and Mediterranean markets.[237]

Vulnerable marine species include the hawksbill sea turtle and the globally endangered leatherback sea turtle, green sea turtle, and olive ridley sea turtle that nest along the Akassa coast of Southern Nigeria.[238] All four species are the subject of poaching. During nesting seasons, coastal communities who rely on fishing, hunting, and natural resource extraction from the mangroves as their main form of economic activities, vigorously hunt sea turtles and collect their eggs for consumption and sale.[239]

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[228] *Ibid*.

[229] Andrew Dunn, Richard Bergl, et. al. *Revised Regional Action Plan for the Conservation of the Cross-River Gorilla: 2014-2019*. New York: IUCN/SSC Primate Specialist Group & Wildlife Conservation Society.

[230] *Ibid*.

[231] CITES. Interpretation and Implementation Matters General Compliance and Enforcement Compliance Matters Application of Article XIII in Nigeria. Seventieth meeting of the Standing Committee Rosa Khutor, Sochi, Russian Federation, 1-5 October 2018. https://cites.org/sites/default/files/eng/com/sc/70/E-SC70-27-03-05.pdf.

[232] *Ibid*.

[233] *Ibid*.

[234] Stakeholder Consultation with Geoffery Nachamada, Chief Sarki Duguri, and Dr. Issa Mohammed. 16 September 2019. Cauchi Town & Yankari Game Reserve, Bauchi Nigeria.

[235] CITES. Interpretation and Implementation Matters General Compliance and Enforcement Compliance Matters Application of Article XIII in Nigeria. Seventieth meeting of the Standing Committee Rosa Khutor, Sochi, Russian Federation, 1-5 October 2018. https://cites.org/sites/default/files/eng/com/sc/70/E-SC70-27-03-05.pdf.

[236] FMEnv DOF. *National Ivory Action Plan for Nigeria*. https://cites.org/sites/default/files/common/prog/niaps/Nigeria_NIAP.pdf.

[237] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[238] "Tropical Research & Conservation Centre," Omogolo Wildlife Trust, https://omogolowildlife.org/projects/sea-turtles-nigeria.

[239] *Ibid*.

LIVESTOCK ENCROACHMENT AND OVERGRAZING

Estimates of the population of livestock in Nigeria vary based on the sampling method. The 2011 National Agricultural Sample Survey estimated 19.5 million cattle, 145 million chickens, 72.5 million goats, and 41.3 million sheep made up the Nigerian livestock sector.[240] Driven by higher consumer demand, the livestock sub-sector has been growing at a rate of 12.7%, nearly double the rate of growth of the agricultural sector.[241] Commensurate to the increase in livestock, the area needed to graze cattle continues to grow annually, with 90% of Nigerian cattle concentrated to the Northern semi-arid zones, areas heavily subject to overgrazing and a shortage of fodder.[242] Long regarded at the largest constraint on cattle production within the Nigerian Middle Belt, populations of the tsetse fly, the carrier of trypanosomiasis, have been reduced through deforestation and the removal of wildlife.[243] The resultant evolution of milder forms of the disease and the development of some trypanosomiasis-tolerant zebu cattle populations has enabled the expansion of cattle herding territory.[244]

Some projections of population increase show the population of Nigeria doubling from 2015 population estimates to 400 million people by 2050.[245] With the rising population, the demand for meat and dairy products will also continue to rise with some projections suggesting that poultry meat, beef, and milk consumption will grow by 253%, 117%, and 577%, respectively.[246] The growing population of Nigeria, the increasing demand for meat and dairy, the corresponding growth in livestock populations, and the reduction in rainfall in the arid and semi-arid north have resulted in soil erosion, and desertification, particularly in the region north of latitude 100N.[247] In 2011, estimates indicated the loss of 867,000 hectares of range land and crop land to desertification each year.[248] Pressure on available grazing land has led herdsman to graze their livestock in protected areas and agricultural lands. Interviews with staff in the Bauchi Reserve have indicated that this is among the largest threats to biodiversity conservation in this protected area.[249] Worsening conflicts between pastoralist and farmers as a result of increasing competition for grazing and agricultural lands have since become deadly, killing 1,300 people since January 2018.[250] Growing demand for meat and dairy, increasing heard sizes, and continual degradation of pasture lands have driven worsening desertification, fueled growing social conflicts, forced infringement into protected areas, and is an indirect driver of rural to urban migration.[251]

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[240] Premium Times, "Nigeria releases census of goats, sheep, pigs, other livestock in country." *Premium Times,* 2 June 2016, https://www.premiumtimesng.com/news/top-news/204577-nigeria-releases-census-goats-sheep-pigs-livestocks-country.html.
[241] The World Bank. *Project Information Document/Integrated Safeguards Data Sheet.* 17 July 2017. http://documents.worldbank.org/curated/en/479121500403272629/pdf/ITM00184-P160865-07-18-2017-1500403268591.pdf.
[242] FMEnv. *FRN NBSAP 2016-2020.* CBD. 2015. https://www.cbd.int/doc/world/ng/ng-nbsap-v2-en.pdf.
[243] D. Bourn, W. Wint, R. Blench, & E. Woolley, "Nigerian Livestock Resources Survey." FAO. http://www.fao.org/livestock/agap/frg/FEEDback/War/t1300b/t1300b0g.htm.
[244] *Ibid*.
[245] FAO. *The future of livestock in Nigeria. Opportunities and challenges in the face of uncertainty.* Rome: FAO, 2019.
[246] *Ibid*.
[247] FMEnv. *FRN NBSAP 2016-2020.* CBD. 2015. https://www.cbd.int/doc/world/ng/ng-nbsap-v2-en.pdf.
[248] EPI, "World on the Edge by the number of growing goat herds signal global grassland decline." *EPI*, 2011, http://www.earth-policy.org/mobile/releases/highlights14.
[249] Stakeholder consultation. Bauchi Reserve, Nigeria. September 2019.
[250] International Crisis Group. "Stopping Nigeria's Spiraling Farmer-Herder Violence." *Africa Report* No. 262, 26 July 2018. https://d2071andvip0wj.cloudfront.net/262-stopping-nigerias-spiralling-farmer-herder-violence.pdf.
[251] FAO. *The future of livestock in Nigeria. Opportunities and challenges in the face of uncertainty.* Rome: FAO, 2019.

EXPLOITATION OF FISH STOCKS & ILLEGAL FISHING

Increased commercialization, lack of fisheries regulations enforcement, and the introduction of destructive fishing technology have led to severe overfishing of Nigeria's aquatic ecosystems. The use of illegal fishing methods poses a serious threat to the long-term sustainability of inland and marine fisheries, endangering the livelihoods of thousands of Nigerians and viability of these aquatic ecosystems. Despite the passage of the Inland Fisheries Decree of 1992 and the development of strict states' fisheries edicts thereafter, many artisanal fisheries in Nigeria rely on the use of destructive fishing gear and methods including small mesh-nets, gill nets, beach seines and other drag nets.[252] In some communities, the use of bed nets and other small nets for fishing have been observed in use in order to catch small fish.[253] On Lake Kainji, foreign fishermen utilizing gill nets and beach seines to catch juvenile fish have been reported.[254] Other unsustainable and highly destructive fishing practices include fishing with dynamite and chemical toxins and the use of grass or wood pen enclosures for trap fishing.[255] Although regulations on the size of legal catches and restrictions on the types of fishing gear used exists, lack of enforcement mechanisms create little incentive for fishermen not to abide by restrictions.

In addition to the use of illegal fishing techniques by artisanal fishers, illegal, unreported, and unregulated (IUU) fishing in coastal waterways is an ongoing transnational issue for many West Africa Countries. West African waters are estimated to have some of the highest levels of IUU fishing in the world, representing between a third and a half of the regions' catch.[256] [257] The activity of IUU fishing in coastal waterways by Chinese fishing vessels reportedly costs Nigeria alone $70 million annually.[258] Unchecked illegal fishing activities, pollutants from coastal urban areas and oil spills, overexploitation of mangrove forests that form critical spawning ground and nurseries for juvenile fish are several of the challenges reducing the likelihood of species rebounding and creating hardships for legal fishers.[259] Evidence suggests that given rising fuel prices and declining livelihoods, some legal fishers are now more inclined to engage in IUU fishing themselves.[260]

Recent efforts to manage IUU fishing include the acquisition of several dedicated vessels by the Nigerian navy in early 2019 to monitor the 200 nautical mile exclusive economic zone.[261] The establishment of

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[252] A.A. Eyo & Y. B. Ahmed, "Management of Inland Capture Fisheries and Challenges to Fish Production in Nigeria." *Fisheries Society of Nigeria,* (2015): 624-636, http://aquaticcommons.org/id/eprint/4088.

[253] Cadmus. Stakeholder consultations, periodic report 1. 9 – 13 September 2019.

[254] R.A. Okaeme, A. N. Omorinkoba, & R.L. Bwala, "Illegal Fishing of Inland Water Bodies of Nigeria: Kainji Experience." *Continental J. Fisheries and Aquatic Science*, Vol. 6 No.1 (2012): 47-58.

[255] *Ibid*.

[256] Teale Phelps, Tuesday Reitano, & Wietse van der Werf, *The Illegal Fishing and Organized Crime Nexus: Illegal Fishing as Transnational Organized Crime.* The Global Initiative Against Transnational Organized Crime and The Black Fish, April 2015.

[257] Alfonso Daniels, et. al. *Western Africa's Missing Fish. The Impacts of Illegal, Unreported, and Unregulated Fishing and Under-Reporting Catches by Forieng Fleets.* June 2016. https://www.odi.org/sites/odi.org.uk/files/resource-documents/10665.pdf.

[258] Chiemlie Ezeobi. "Nigeria: How Nigeria Loses $70m to Illegal Fishing by Chinese Vessels," *AllAfrica*, 7 March 2018, https://allafrica.com/stories/201803070060.html.

[259] Ifesinachi Okafor-Yarwood, "Nigeria's depleting fish stocks may pose a threat to regional security," *The Conversation*, 7 December 2018, https://theconversation.com/nigerias-depleting-fish-stocks-may-pose-a-threat-to-regional-security-105168.

[260] Teale Phelps, Tuesday Reitano, & Wietse van der Werf, *The Illegal Fishing and Organized Crime Nexus: Illegal Fishing as Transnational Organized Crime.* The Global Initiative Against Transnational Organized Crime and The Black Fish, April 2015.

[261] Chiemlie Ezeobi. "Nigeria: How Nigeria Loses $70m to Illegal Fishing by Chinese Vessels," *AllAfrica*, 7 March 2018, https://allafrica.com/stories/201803070060.html.

the West Africa Task Force was created to bring together the six member countries of the Fisheries Committee for the West Central Gulf of Guinea (FCWC) – Benin, Côte d'Ivoire, Ghana, Liberia, Nigeria and Togo – to stop the trade in illegally caught fish.[262] The success of these initiatives has yet to be evaluated.

6.1.3 CLIMATE CHANGE

Climate change causes further degradation of Nigerian ecosystems. With different climate models predicting varying degrees of severity, the extent to which climate change will impact biodiversity depends on multiple factors. Many models indicate severe consequences for biodiversity, including some scenarios that indicate mass extinction of vulnerable species is imminent.[263] There is evidence suggesting that climate change will surpass habitat destruction as the greatest global threat to biodiversity over the next few decades.[264]

Climate change is already affecting ecosystems and biodiversity in Nigeria, and impacts are projected to continue and increase in severity. Climate change is predicted to lead to shifting climate zones, the loss of arable land, increased desertification, and potential sea level rise of approximately one meter by 2040.[265] Nigeria experienced an increase in average annual temperature of 0.8°C between 1960-2006, with temperature increasing at an accelerated rate since 1980.[266] Recent scenario analysis by the Climate Systems Analysis Group at the University of Cape Town suggests warmer temperatures, with southern Nigeria warming by an estimated 2 °C and the north by 2.2 °C by 2065. The same analysis notes an inverse relationship between rainfall and temperature, noting that average daily rainfall in the north is expected to decrease by 0.2mm/day whereas the rainfall is predicted to increase by 0.4mm/day in the south.[267] Intra-annual variability of rainfall has also become more pronounced in recent years.[268]

Flooding and drought are both predicted to be exacerbated by climate change. Already a reoccurring hazard, floods caused primarily by heavy and high-intensity rainfall, have become more frequent in Nigeria over the last few decades.[269] In coastal areas, floods will be intensified by rising sea levels. The most flood-prone regions of Nigeria are the low-lying coastal areas in the south, the floodplains of the Niger River and other major rivers, and the low-lying areas around Lake Chad. Projected increases in extreme precipitation and sea level rise have the potential to further exacerbate flood risks to these and

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[262] FCWC, "Fisheries Committee for the West Central Gulf of Guinea. Nigeria's Fight Against Illegal Fishing Improves through Inter-Agency Cooperation," *FCWC*, 15 May 2018, https://fcwc-fish.org/nigerias-fight-against-illegal-fishing-improves-through-inter-agency-cooperation/.

[263] C. Bellard, et. al. "Impacts of Climate Change on the Future of Biodiversity." *Ecology Letters*, Vol. 15 No. 4 (2012): 365-377. https://www.ncbi.nlm.nih.gov/pubmed/22257223.

[264] *Ibid*.

[265] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[266] FRN. *Nigeria's Second National Communication Under the United Nations Framework Convention on Climate Change*. (2014). https://unfccc.int/sites/default/files/resource/nganc2.pdf.

[267] FGN. *Nigeria's Path to Sustainable Development Through Green Economy, Country Report to the Rio +20 Summit*. 2012. https://sustainabledevelopment.un.org/content/documents/1023nigerianationalreport.pdf.

[268] "Nigeria," Climate Change Knowledge Portal, *The World Bank,* https://climateknowledgeportal.worldbank.org/country/nigeria.

[269] *Ibid*.

other areas.[270] The savanna areas of northern Nigeria are already experiencing regular drought and desertification due to rainfall variability and anthropogenic activities such as deforestation and urbanization.[271] Several important and indigenous plant and animal species, specifically those used for medicinal purposes, have become less abundant or endangered due to desertification.[272] Further rainfall variability and decreases in the length of the rainfall season in Northern Nigeria, coupled with increasing temperatures due to climate change, are expected to exacerbate drought and desertification.[273]

With an estimated 70% of the workforce dependent on climate-sensitive industries (e.g., agriculture, forestry, extraction) climate change threatens to exacerbate Nigeria's vulnerability to extreme weather events, limit economic growth in certain sectors and regions, and cause irreparable harm to biodiversity conservation efforts.[274] Regions of Nigeria where the effects of climate change may include the greatest losses in economic productivity include the Niger Delta and Lagos.[275] Limitations on economic activities due to climate change will also have implications for biodiversity and forestry. The agricultural sector, for example, will face desertification of prime arable land, crop failure and reduced yield, and in coastal regions, increased soil erosion due to heavy rainfall events, and the intrusion of salt water into freshwater aquifers.[276] The resulting indirect effects of climate change on biodiversity will include increasing demand on ecosystem services from populations that are no longer able to rely on agriculture for their income; this further diminishes the availability of natural resources for household income and survival.[277] Predictions note direct impacts of climate change on forest growth and indirect climate related impacts to forests from increasing demands for fuel, timber, and non-forest products by populations adjusting to climate change.[278]

Without implementing any climate change adaption strategies, predictions estimate potential GDP losses of between 2% and 11% by 2020, and losses of 6% to 30% of potential GDP by 2050.[279] The total cost would total between ₦15 trillion (US$100 billion) and ₦69 trillion (US$460 billion) dollars over the course of the next 30 years.[280]

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[270] FRN. *Nigeria's Second National Communication Under the United Nations Framework Convention on Climate Change*. (2014). https://unfccc.int/sites/default/files/resource/nganc2.pdf.
[271] *Ibid*.
[272] *Ibid*.
[273] WMO: WCPD. *Climate change and desertification.* https://library.wmo.int/doc_num.php?explnum_id=5047.
[274] "Nigeria," Climate Change Knowledge Portal, *The World Bank,* https://climateknowledgeportal.worldbank.org/country/nigeria.
[275] FGN. *Nigeria's Path to Sustainable Development Through Green Economy, Country Report to the Rio +20 Summit*. 2012. https://sustainabledevelopment.un.org/content/documents/1023nigerianationalreport.pdf.
[276] USAID. *Climate Risk Profile: Nigeria*. February 2019. https://www.climatelinks.org/sites/default/files/asset/document/2019_USAID-ATLAS-Nigeria-Climate-Risk-Profile.pdf.
[277] BNRCC Project. *NASPA-CCN.* FMEnvSCCU, November 2011. http://csdevnet.org/wp-content/uploads/NATIONAL-ADAPTATION-STRATEGY-AND-PLAN-OF-ACTION.pdf.
[278] *Ibid*.
[279] *Ibid*.
[280] *Ibid*.

6.1.4 OTHER DIRECT THREATS

INVASIVE SPECIES

Approximately twenty-five invasive alien plant species have been identified in Nigeria, common among them include the nypa palm (*Nypa fruticans*), water hyacinth (*Eichhornia crassipes*) and typha grass (*Typha latifolia*).[281] Nypa palm was introduced into Nigeria in 1906 from Singapore Botanic Gardens, as a method of coastal erosion control. The species has since become a major issue for many of the coastal ecosystems of Nigeria, especially native mangroves since nypa palm causes the reduction in estuarine habitat and the corresponding decline in native biodiversity.[282] Riverine communities have been impacted by the water hyacinth, another aggressive invasive plant species.[283] By some estimates, the water hyacinth has threatened approximately a third of freshwater fish supplies.[284] Badagry Creek, the Yewa Lagoon, Ologe Lagoon, the Lagos Lagoon, and the waterways of the riverine areas of Okitipupa have all been hard hit by the water hyacinth.

POLLUTION AND SOLID WASTE MANAGEMENT

Pollution from industrialization, urban development, and challenges associated with solid waste management continue to be factors which negatively impact the health of Nigeria's terrestrial and aquatic ecosystems. As of 2015, *Nigeria's Fifth National Biodiversity Report* found that increasing urban pollutants, pesticides, agrochemical use, and heavy metals from mining operations threaten biodiversity in peri-urban and rural areas affecting land and water quality.[285] Heavy metals and persistent organic pollutants from industrial pollution are of concern given that they accumulate over time. In Rivers State, and other oil industry-heavy states, especially along southern coastal Nigeria, terrestrial oil spills have led to fires and permanent dead zones. Pollution of swamp lands, intertidal creeks, and mangroves surrounding oil and gas plants is a growing concern. Oil pollution in the latter two ecosystems has had an extensive impact on the recovery of fish species given their use as nurseries for juvenile fish and other sea life.[286] Compounding these pollutants is the lack of institutional and policy arrangements to tackle these issues.

6.2 DRIVERS OF THREATS

A driver, as defined by the USAID FAA 118/119 Best Practice Guide, is "a constraint, opportunity or other important variable that positively or negatively influences direct threats." There are many interrelated factors driving the threats identified in Section 6.1, but the most significant and influential drivers In Nigeria Include the following.

- Rapid Population Growth And Urbanization
- Poverty And Lack Of Alternative Livelihoods
- Corruption

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[281] Temitope I. Borokini, "Invasive Alien Plant Species in Nigeria and their Effects on Biodiversity Conservation," *Tropical Conservation Science*, Vol. 4 No. 1 (2011): 103-110. https://doi.org/10.1177/194008291100400110.

[282] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[283] *Ibid*.

[284] *Ibid*.

[285] Stakeholder consultations with Federal Ministry of Water Resources. 13 September 2019.

[286] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

- Inadequate Management Capacity, Interagency Coordination, And Budget
- Insufficient Data Collection And Management To Inform Decision Making And Planning
- Conflict, Insecurity And Banditry
- Domestic Demand For Natural Resource Goods And Lack Of Environmental And Biodiversity Awareness
- International Demands For Natural Resource Products

Each of these drivers is described below.

6.2.1 RAPID POPULATION GROWTH AND URBANIZATION

Nigeria is currently the most populous country on the African continent and is experiencing one of the highest global growth rates at 2.6%.[287] From a population of 53,506,196 in 1968 to 195,874,740 in 2018, Nigeria's population has more than tripled in the last 50 years.[288] Based on current population predictions, the population will reach 262,977,000 in 2030 and 401,315,000 in 2050, more than doubling the 2018 population.[289] In addition to exponential growth in population, life expectancy for Nigerians in the last ten years has improved significantly. In 2017, life expectancy at birth for Nigerian men was 53.9 years and 54.7 for women, up from 48.6 and 50.1 years, respectively, in 2007.[290] High population growth rates, coupled with increasing life expectancy lead to increased demand for land, energy, agricultural products for consumption, and other necessary goods and services. The needs of Nigeria's growing population increasingly come into conflict with biodiversity conservation efforts, and drive demand for many natural resource products.

As Nigeria's population has grown, the country has also experienced increasing urbanization and uncontrolled urban sprawl, with towns and cities growing between 5% and 10% annually.[291] Patterns of urbanization in Nigeria are distinct from other African nations south of the Sahara. Unlike other African countries, rapid development of urban centers is occurring across many large urban centers, and not concentrated in only one city.[292] As a function of high population growth, increasing rural-urban migration, internal displacement, and security concerns, Nigeria is now home to twenty-five cities with populations over 500,000 and approximately eleven cities with populations over 1 million people.[293] [294]

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[287] "World Bank Data Set: Population growth (annual %) – Nigeria," The World Bank, (2018). https://data.worldbank.org/indicator/SP.POP. GROW?locations=NG.

[288] *Ibid*.

[289] "World Population Prospects 2019," United Nations, 2019, https://population.un.org/wpp/DataQuery/.

[290] "Life expectancy at birth, male (years) – Nigeria," The World Bank, 2017, https://data.worldbank.org/indicator/SP.DYN.LE00.MA.IN? locations=NG.

[291] Alhaji A. Aliyu, & Lawal Amadu, "Urbanization, cities, and health: The challenges to Nigeria - A review." *Annals of African medicine*, Vol. 16 No. 4 (December 2017):149–158. DOI: 10.4103/aam.aam_1_17.

[292] Arc. John L.S. Alkali, "Planning Sustainable Urban Growth in Nigeria: Challenges and Strategies. Conference on Planning Sustainable Urban Growth and Sustainable Architecture," held at the ECOSOC Chambers, United Nations Headquarters, NY, USA, 6 June 2005, https://www.un.org/en/ecosoc/meetings/2005/docs/Alkali.pdf.

[293] "World Urban Areas." 15 Ed. *Demographia*. (2019). http://www.demographia.com/db-worldua.pdf.

[294] Arc. John L.S. Alkali, "Planning Sustainable Urban Growth in Nigeria: Challenges and Strategies. Conference on Planning Sustainable Urban Growth and Sustainable Architecture," held at the ECOSOC Chambers, United Nations Headquarters, NY, USA, 6 June 2005, https://www.un.org/en/ecosoc/meetings/2005/docs/Alkali.pdf.

According to the *Africapolis* project, these urban areas are Lagos, Kano, Ibadan, Aba, Benin City, Port Harcourt, Uyo, Kaduna, Nsukka, Onitsha, and Abuja.[295] Lagos, the largest city in Nigeria, is home to an estimated 20 million people, spread over 1,000 square kilometers.[296] Some demographers anticipate Lagos' projected population to reach 61 million to 100 million by 2100.[297] Just as the total population of Nigeria has nearly tripled from 1968 to 2018, the urban population as a percentage of total population in the same time period has increased by some estimates from 17.3% to 50.3% and continues to increase.[298]

6.2.2 POVERTY AND LACK OF ALTERNATIVE LIVELIHOODS

Explosive population growth and rapid urbanization have not only exacerbated development challenges related to human health and the environment but are also two factors strongly correlated to persistent poverty, another driver of biodiversity and tropical forest loss. Recent estimates (UNDP Multidimensional Poverty Index 2019) list incidence of poverty in Nigeria as 51.4% and intensity of poverty as 56.6%.[299] By a similar measure, the Human Development Index notes that 71.7% of all employed Nigerians can be categorized as working poor, defined as persons with purchasing power parity of $3.10 a day or less.[300] According to 2010 National Bureau of Statistic data, northwestern and northeastern Nigeria experience the highest levels of poverty in the country, at 77.7% and 76.3%, respectively.[301]

Many factors are relevant to understanding rising incidence of poverty in Nigeria, despite strong economic growth. Nigerian dependence on oil revenues to the detriment of agriculture is one factor.[302] Little diversification of economic opportunities and the widening gap between the wealthy and the poor are symptoms of oil revenue dependence.[303] Other factors exacerbating persistent poverty include unemployment, reliance on the informal sector for employment, diversion of development funds to non-development projects, ongoing conflict and conflict-related internal displacement, environmental degradation, and lack of educational opportunities.[304] Combined with structural deficiencies (non-development of infrastructural facilities, lack of enabling environment for infant industries, unreliable

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[295] "World Urban Areas." 15 Ed. *Demographia*. (2019). http://www.demographia.com/db-worldua.pdf.
[296] John Vidal, "The 100 million city: is 21st century urbanisation out of control?" *The Guardian,* 19 March 2018. https://www.theguardian.com/cities/2018/mar/19/urban-explosion-kinshasa-el-alto-growth-mexico-city-bangalore-lagos.
[297] Daniel Hoornweg & Kevin Pope, "Population predictions for the world's largest cities in the 21st century." *Environment and Urbanization*, Vol. 29 No. 1 (2016):195-216. DOI: https://doi.org/10.1177/0956247816663557.
[298] "Urban population (% of total population) – Nigeria." World Bank. (2018), https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?end=2018&locations=NG&start=1968.
[299] Where incidence measures the number of persons experiencing poverty, and intensity measures the severity of inequality, *Global Multidimensional Poverty Index*. UNDP. (2019). http://hdr.undp.org/sites/default/files/mpi_2019_publication.pdf.
[300] "Human Development Reports, Nigeria," UNDP, 2019. http://hdr.undp.org/en/countries/profiles/NGA.
[301] "Nigerians Living in Poverty Rise to Nearly 61%," *BBC*, 13 February 2012, https://www.bbc.com/news/world-africa-17015873.
[302] Obasesam Okoi, "The Paradox of Nigeria's Oil Dependency," *AfricaPortal*, 21 January 2019, https://www.africaportal.org/features/paradox-nigerias-oil-dependency/.
[303] Benjamin Omoniyi, "An examination of the causes of poverty on economic growth in Nigeria," *Africa's Public Service Delivery and Performance Review,* Vol. 6 No. 1 (12 September 2018):175. https://doi.org/10.4102/apsdpr.v6i1.175.
[304] *Ibid*.

power supply, and the depreciation of the Nigerian currency (naira)), persistent poverty is predicted to worsen as population growth continues.[305]

Poverty in both rural and urban areas drives demand for cheap forms of energy, including wood fuel and charcoal. In rural areas, lack of alternative livelihoods and minimal awareness about sustainable management practices related to agriculture and pastoralism have led to a positive feedback loop whereby the poor are forced to rely on the exploitation of natural resources for their livelihoods. In doing so, the rural poor overuse and harm the foundation of their survival. Stakeholder consultations revealed that need for alternative livelihoods is especially acute bordering national park areas.[306] Many of the working poor are within the agriculture industry, which formally employs roughly 36.6% of Nigerians.[307] Traditional agricultural practices often necessitate natural resource degradation using fire-fallow methods given nutrient-poor tropical soils lead to declining yields.[308] Lack of alternative livelihoods demonstrate the dependence of economic advancement on natural resources, and the link between poverty and ongoing biodiversity loss.

6.2.3 CORRUPTION

Corruption is a significant challenge throughout all levels of federal, state, and local government organizations in Nigeria, affecting not only branches of government devoted to environmental conservation and management. By some estimates, more than $380 billion of public funds have been stolen or wasted by various government officials since independence in 1960.[309] The Ecological Fund, as described in section 4.4.1, was recently audited for the first time since its establishment in 1981. The audit, paired with other investigations into misuse of funds, revealed ₦432 billion (over $2.5 billion in 2015) have been embezzled from the fund between 2007 and 2015 alone.[310] Earmarked as an environmental remediation mechanism, politicians, civil servants, and contractors are all credited for conniving to steal from the Fund.[311]

Politicians receiving bribes and kickbacks have turned a blind eye to illegal logging activities, or aided the de-reservation of protected areas to profit from extractive industries including oil and gas development.[312] The deforestation of the Gashaka-Gumti National Park, Nigeria's largest and most ecologically diverse forest preserve, is but one example of a casualty of corruption as illegal loggers raided the forest for valuable timber to sell.[313] Illegal logging payoffs do not end with federal- and state-

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[305] *Ibid*.

[306] Stakeholder consultation Yankari Game Reserve, and Cross River National Park. September 2019.

[307] "Employment in agriculture (% of total employment) (modeled ILO estimate) – Nigeria," World Bank, 2019. https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=NG.

[308] *Ibid*.

[309] Tina Søreide & Ivar Kolstad, "Corruption in Natural Resource Management: Implications for Policy Makers." *Resources Policy*. Vol. 34 (2019): 214-226. DOI: 10.1016/j.resourpol.2009.05.001.

[310] Matthew T. Page. *A New Taxonomy for Corruption in Nigeria*. The Carnegie Endowment for International Peace, July 2018. https://carnegieendowment.org/files/CP_338_Page_Nigeria_FINAL.pdf.

[311] *Ibid*.

[312] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[313] Matthew T. Page. *A New Taxonomy for Corruption in Nigeria*. The Carnegie Endowment for International Peace, July 2018. https://carnegieendowment.org/files/CP_338_Page_Nigeria_FINAL.pdf.

level administrators, but are also extended to export officials as well. From January 2014 until June 2017, the logging and sale of over 2,800 Nigerian rosewood trees, led to one of the largest violations of the CITES Convention in history.[314] This illegal trade, facilitated through corruption, is a significant ongoing threat to the health of remaining Nigerian forests.[315]

In addition to the forestry sector, corruption and inefficient park management amongst national parks rangers has enabled a higher incidence of poaching.[316] Lack of alternative livelihoods in communities surrounding protected areas coupled with a low and inconsistent arrest rate and jail time and enforced collection of official fines, have enabled poaching to continue largely undeterred in many protected areas.[317] Lack of training and proper protection puts rangers at risk and has led to high ranger fatalities. Low education and lack of incentives for rangers in the ranger corps and reserve management have spurred corruption and consequent environmental degradation, according to the stakeholders from the Yankari Game Reserve.[318] Lack of public awareness of biodiversity related laws and low enforcement capacity have led to flagrant violations of existing laws.[319] Transnational shipments of illegal wildlife and wildlife products seized in violation of CITES have demonstrated involvement of organized criminal groups and corruption on the part of Nigerian officials in facilitating this illicit trade.[320] It is likely that in addition to the illegal goods sourced from Nigeria, Nigeria is also used by criminal networks as a hub in West and Central Africa for the trafficking of elephant ivory, pangolin scales, and other species illegally harvested in neighboring countries.[321]

Since 2017, Nigeria has consistently scored a 27 of 100 on Transparency International's Corruption Perception Index (CPI).[322] The Index reports, however, that the Buhari administration has taken a number of positive steps since the 2015 election. Efforts within the government to reduce corruption include the establishment of a presidential advisory committee against corruption, the improvement of the anti-corruption legal and policy framework in areas like public procurement and asset declaration, and the development of a national anti-corruption strategy, among others.[323] These efforts have yet to improve Nigeria's CPI score and their effect on reducing corruption related to natural resource management have yet to yield practicable results; however, it may be an indication that Nigeria is making positive strides toward the needed government reforms to impact this driver of biodiversity loss.

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[314] "Immediate Suspension: Global Wildlife Treaty Bans Massive Illegal Timber Trade from Nigeria." Environmental Investigation Agency. press release, 1 November 2018. https://eia-global.org/press-releases/20181101-immediate-suspension.

[315] *Ibid*.

[316] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[317] D. E. Jacob et al. "Wildlife Poaching in Nigerian National Parks: A Case Study of Cross River National Park." *International Journal of Mol. Ecology and Conservation*. Vol.5, No.4 (2015): 1-7. DOI: 10.5376/ijmec.2015.05.0004.

[318] Stakeholder consultation with Nachamada, Duguri & Mohammed, 17 September 2019. Yankari Game Reserve & Bauchi Town.

[319] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[320] CITES. Interpretation and Implementation Matters General Compliance and Enforcement Compliance Matters Application of Article XIII in Nigeria. Seventieth meeting of the Standing Committee Rosa Khutor, Sochi, Russian Federation, 1-5 October 2018. https://cites.org/sites/default/files/eng/com/sc/70/E-SC70-27-03-05.pdf.

[321] *Ibid*.

[322] Transparency International, Corruption Perception Index, Nigeria. (2018). https://www.transparency.org/news/feature/cpi2018-subsaharan-africa-regional-analysis.

[323] *Ibid*.

6.2.4 INADEQUATE MANAGEMENT CAPACITY, INTERAGENCY COORDINATION, AND BUDGET

Nigeria's Fifth National Biodiversity Report (2015) notes that conservation policies do not yet reflect the reality that "biodiversity and natural resources are an essential element of the survival of millions of Nigerians."[324] Although a policy framework for biological diversity conservation and protections for forestry exist, few mechanisms for enforcement have been codified, and much of the existing legislation is outdated. As an example, no intelligence-driven wildlife-trafficking investigations have or are being conducted by NESREA or the CITES Management Authority, nor does the National Central Bureau of International Criminal Police Organization (known as INTERPOL) in Nigeria have an environmental or wildlife crime officer.[325] Policy review of biodiversity-related issues is slow and generally left out of strategic national planning.[326] Compounded by corruption, additional drivers of loss of biodiversity and tropical forests in Nigeria are inadequate management capacity, lack of interagency cooperation, and lack of sufficient budget.

These gaps in institutional capacity are especially stark amongst government entities and officials charged with the oversight of protected areas and enforcement of laws against trafficking and trade of endangered species. Stakeholder consultations with park rangers at the Yankari Game Reserve revealed gaps in the provision of equipment including uniforms, weapons, and maintenance of vehicles and scant maintenance of roads within the reserve as challenges to effective reserve management and oversight.[327] Stakeholders also discussed lack of benefits, low pay, poor housing, inadequate access to health care as ongoing challenges of working in protected areas management.[328] Many state-run reserves and wildlife conservation departments exist legally but lack funding, management plans, or personnel.[329] NGOs play a substantial role in supporting ranger training and funding for wildlife conservation patrols. The NPS and WCS, for example, have entered into a memorandum of understanding whereby WCS provides technical assistance, staff training, conservation education, and research to support conservation outcomes.[330] The sustainability of these initiatives is uncertain given government institutions often struggle to provide in kind support to organizations receiving assistance from NGOs.

Existing mechanisms for inter-agency cooperation are limited, and existing coordination mechanisms need reinforcement. Gaps in CITES enforcement capabilities are an example of weak existing inter-agency cooperation between Customs, NESREA, INTERPOL, and the CITES Management Authority.[331] In their *Understanding Threats to West African Biodiversity and Linkages to Wildlife Trafficking Report*, the

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[324] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[325] M. Balinga, USAID/West Africa Biodiversity and Climate Change (WA BiCC). Understanding Threats to West African Biodiversity and Linkages to Wildlife Trafficking: Nigeria Assessment Field report. (2018). 2nd Labone Link, North Labone, Accra.

[326] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

[327] Stakeholder Consultations, Yankari Game Reserve, Bauchi, Nigeria. 17 September 2019.

[328] *Ibid*.

[329] Hassan Abdulaziz, Foziah Johar, M. Rafee Majid, & N. I. Medugu. "Protected area management in Nigeria: A review." *Jurnal Teknologi,* Vol. 77 (January 2015): 31-40. DOI: 10.11113/jt.v77.6526.

[330] "Wild Places, Cross River National Park (Oban Division)," WCS Nigeria, https://nigeria.wcs.org/Wild-Places/Cross-River-NP-Oban.aspx.

[331] Balinga, M. (December 2018). USAID/West Africa Biodiversity and Climate Change (WA BiCC). Understanding Threats to West African Biodiversity and Linkages to Wildlife Trafficking: Nigeria Assessment Field report. 2nd Labone Link, North Labone, Accra.

West Africa Biodiversity and Climate Change program funded by USAID noted the general lack of knowledge about CITES amongst enforcement staff at the Murtala Muhammed International Airport and at the Lagos Sea Ports. Enforcement staff stated that capacity building and awareness-raising trainings were needed to increase the success of search and seizure of illicit wildlife goods. They concluded that "combating of wildlife trafficking is, at best, only a medium priority in Nigeria."[332]

6.2.5 INSUFFICIENT DATA COLLECTION AND MANAGEMENT TO INFORM DECISION MAKING AND PLANNING

Limited data are available to assess the status of biodiversity and forestry resources in Nigeria, which limits the government's ability to effectively legislate, regulate, and plan for effective and sustainable resource use. Capacity to collect data related to emerging biodiversity issues, which is an important part of planning for the National Biodiversity and Strategy Action Plan is a core capacity issue that the Government of Nigeria has identified.[333] Additional gaps in forestry and biodiversity data identified by the Nigerian Government include the following:[334] [335] [336]

- Accurate data on land use changes, urban expansion, and geographic information systems data for land use mapping;
- Low quality of national data in respect of the three indicators for assessing land degradation, including land use/cover, land productivity and soil organic carbon availability; and
- Absence of recent estimates related to the level of sustainable harvest of in demand timber species, lack of clear criteria for the determination of the sustainability of wood harvesting, and no established annual export quota for restricted species established at the federal level.

NIOMR, the Nigerian Freshwater Fisheries Research Institute, and the Forestry Research Institute of Nigeria (FRIN) are formally tasked with the collection, curation, and publication of data related to fisheries stocks and wildlife counts. Both organizations, however, face budget limitations and inadequate funding without support from international organizations, resulting in outdated and deficient data. Despite gaps in systematic environmental data collection and management, the Biodiversity Clearing House was developed, which is a site dedicated to housing data and reports related to Nigeria's progress related to the Convention on Biological Diversity. The Biodiversity Clearing House is a step toward more effective information management.

6.2.6 CONFLICT, INSECURITY AND BANDITRY

Conflict is both a symptom and a driver of biodiversity loss and unsustainable natural resource extraction, as well as a contributor to insecurity and population displacement. In the first half of 2019

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[332] *Ibid*.

[333] FMEnv. *FRN NBSAP 2016-2020*. CBD. 2015. https://www.cbd.int/doc/world/ng/ng-nbsap-v2-en.pdf.

[334] *Ibid*.

[335] Ronnie MacPherson. *Final report of the Land Degradation Neutrality Target Setting Programme*. UNCCD, March 2019. https://www.unccd.int/sites/default/files/relevant-links/2019-04/LDNTSP-EvalReport%20final.pdf.

[336] CITES. Interpretation and Implementation Matters General Compliance and Enforcement Compliance Matters Application of Article XIII in Nigeria. Seventieth meeting of the Standing Committee Rosa Khutor, Sochi, Russian Federation, 1-5 October 2018. https://cites.org/sites/default/files/eng/com/sc/70/E-SC70-27-03-05.pdf.

alone, about 142,000 people have been internally displaced in Nigeria, 140,000 of which are attributable to ongoing political instability.[337] Ongoing conflicts include Boko Haram, a militant Islamist group active in the northeast since 2013, ongoing violence between pastoralist and farmer conflict in the Middle Belt region, and emerging insecurity linked to banditry and violence in several states in the northwest.

As a driver of biodiversity loss, ongoing insurgent groups including Boko Haram often rely on illicit trade in natural resource products (e.g., timber, wildlife) for revenue. The exact sources of the organization's funding are unknown, illegal natural resource extraction, inclusive of artisanal oil drilling, logging, and trade in endangered species are suspected sources of Boko Haram's funding. Implicated in these economic activities are a variety of direct impacts to Nigerian biodiversity.

Regional insecurity, caused by acts of violence unrelated to the Boko Haram insurgency, has led to the displacement of thousands of people, which then impacts tropical forests and biodiversity through changes in land use. Worsening internal displacement from northern territories is resulting in shifting land use patterns, the development of new settlements, and changing the patterns of demand and land use for agricultural and natural resource products. These direct threats to biodiversity, discussed below, are pressing concerns given Nigeria's growing population and predicted future limitations on natural resource recovery due to climate change. Nigeria alone accounts for 79.7% of all internally displaced persons displaced by Boko Haram in the Lake Chad Basin Region, or 2,018,513 Nigerians as of September 30, 2019.[338] Growing banditry and violence in the Middle Belt region and northwestern Nigeria have displaced and will continue to displace hundreds of thousands more, sharpening ethnic, regional, and religious polarization. The expansion of zones of banditry and violence are contributing to environmental degradation and loss of biodiversity through growing land use changes and use of natural resources as a source of income for illicit activities.[339]

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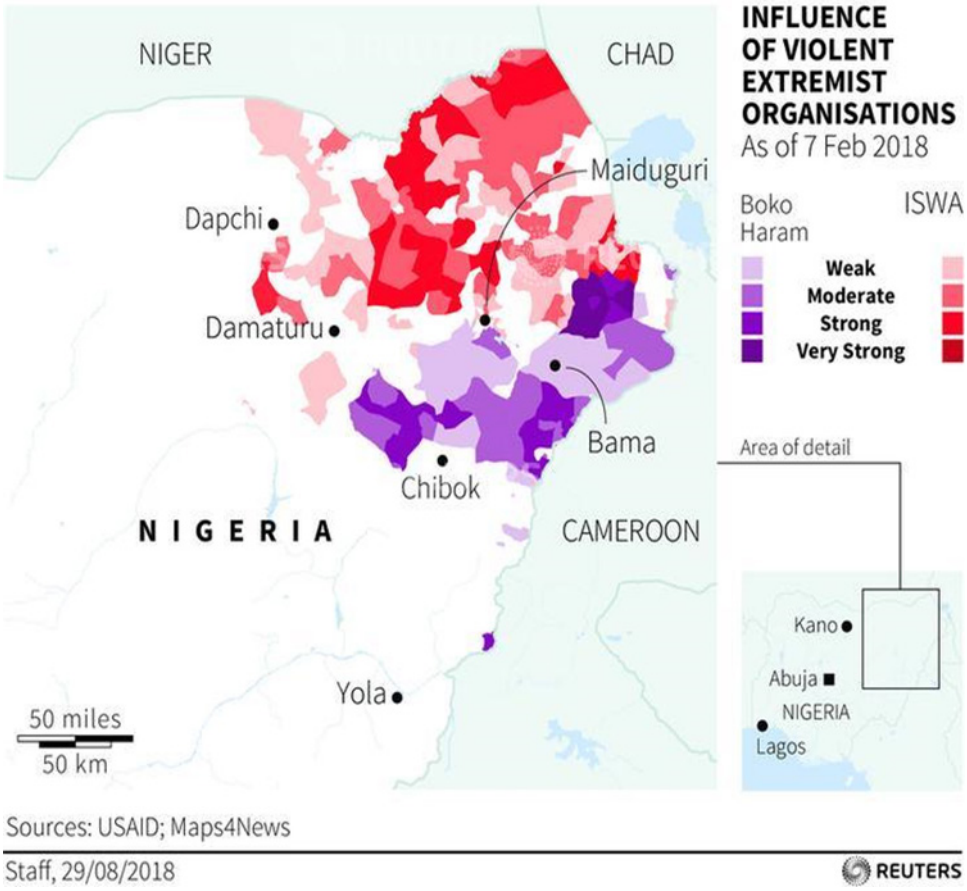
[337] The remaining 2,000 were caused by displacement.
"Nigeria, Overview," Internal Displacement Monitoring Centre, 2019. http://www.internal-displacement.org/countries/nigeria.

[338] "Statistics related to Nigerian refugees refer to those in three main asylum countries: Cameroon, Chad, and Niger," UNHCR, 30 September 2019, https://data2.unhcr.org/en/situations/nigeriasituation#_ga=2.127130121.507587016.1571340286-865989447.1569484145.

[339] International Crisis Group. "Stopping Nigeria's Spiraling Farmer-Herder Violence." *Africa Report No. 262*, 26 July 2018. https://d2071andvip0wj.cloudfront.net/262-stopping-nigerias-spiralling-farmer-herder-violence.pdf.

FIGURE 9. ISLAMIST INSURGENCIES IN NIGERIA



Growing violence and regional instability are also symptomatic of greater competition for limited natural resources and land. Poor land use planning has also led to inter- and intra-communal conflicts, further impoverishing rural communities and perpetuating the cycle of resource and biodiversity loss. Nigeria has a lengthening list of natural resource access and use conflicts including the Jos crisis, the Tiv/Jukun Crisis of Benue and Taraba States, Fulani Herdsmen/Tiv crises of Benue, and the Aguleri/Umuleri crisis in eastern Nigeria.[340] While not exclusively caused by conflict over resource availability, secondary and tertiary causes of farmer and pastoralist conflict are predicted to worsen as desertification, soil erosion, and droughts continue.[341]

6.2.7 DOMESTIC DEMAND FOR NATURAL RESOURCE GOODS AND LACK OF ENVIRONMENTAL AND BIODIVERSITY AWARENESS

Natural resource goods, including bushmeat for consumption, charcoal and fuel wood for cooking and energy use, plants and animals for use in traditional medicine, are in high demand in Nigeria. Driven by a growing population, poverty, and lack of awareness around issues of sustainable use of natural

[340] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.
[341] "Environmental cooperation as a pathway to resolve Nigeria's deadly farmer-herder conflicts," UNEP, 4 October 2018. https://www.unenvironment.org/news-and-stories/story/environmental-cooperation-pathway-resolve-nigerias-deadly-farmer-herder

resources, programming to address domestic demand as a driver of biodiversity loss can be challenging given the underlying cultural and economic reasons for continued exploitation.

Commonly consumed species of bushmeat in Nigeria include many species of small mammals, including grasscutters, pangolin, giant rats, squirrels and bats, and large mammals including bushbucks and duikers.[342] The consumption of bushmeat in Nigeria declined considerably in 2014 as a result of linkages between the Ebola outbreak and the consumption of certain species of fruit bats and the resulting success of a government campaign to curb the bushmeat trade.[343] The industry has since rebounded, and roadside sale and popular bushmeat stalls in Lagos and Port Harcourt have reopened. [344] Although precise estimates on bushmeat consumption and total production are not available, it is well documented that bushmeat is the most cost effective and often preferred animal protein in both rural and urban diets.[345]

Bushmeat, coupled with the demand for traditional medical remedies are the two most notable drivers in demand for animal products in local markets. Suppliers of traditional medicine have been observed in the majority of large towns across West Africa, indicating that the network of traders throughout Nigeria is extensive.[346] Both plant-based and animal-based remedies are available for sale from traditional apothecaries, the species used in these medicines vary substantially by region. A study on traditional medicinal plants of Nigeria in 2016 concluded more than 325 species of plants from 95 families are frequently used in the treatment of common diseases.[347]

A study conducted by TRAFFIC in 1999 identified 45 different animal species for sale across five southwestern Nigerian towns near Lagos. Common market offerings in this study included the Gorilla, Serval (*Leptailurus serval)*, White-bellied Pangolin (*Manis tricuspis)* and Chimpanzee (*Pan troglodytes),* Hooded Vulture (*Necrosyrtes monachus)*, and the Senegal Chameleon (*Chamaeleo senegalensis)*.[348] Nineteen of the 45 species for sale were threatened and listed in CITES, five of which were listed in Appendix I (species for which hunting of, capture of, or trade is illegal).[349] The illegal trade of vulture parts is an example of belief-based practices as the leading cause of a species' decline in West Africa.[350] In places where wildlife commodities are now only available in protected areas, incursions into these areas are increasing. Along with the unsustainable harvest of medicinal plants and animals come the loss

[342] "Chapter 2 - Direct contribution of wildlife to food security," FAO, 1995, http://www.fao.org/3/w7540e/w7540e04.htm.
[343] Luca M. Luiselli. "How an Ebola campaign in Nigeria discouraged bushmeat consumption," *The Conversation,* 30 October 2016, https://theconversation.com/how-an-ebola-campaign-in-nigeria-discouraged-bushmeat-consumption-67733.
[344] Hamza Mohamed, "Nigeria bushmeat industry rebounds after Ebola outbreak," *Al Jazeera*, 31 May 2018, https://www.aljazeera.com/indepth/features/nigeria-bushmeat-industry-rebounds-ebola-outbreak-180329072812588.html.
[345] "Chapter 2 - Direct contribution of wildlife to food security," FAO, 1995. http://www.fao.org/3/w7540e/w7540e04.htm.
[346] O.A. Sodeinde & D.A. Soewu, "Pilot Study of the Traditional Medicine Trade in Nigeria." *TRAFFIC Bulletin*, Vol. 18 No. 1 (September 1999): 35-40. https://www.traffic.org/site/assets/files/2960/traffic_pub_bulletin_18_1.pdf#page=39.
[347] Monier Abd El-Ghani, "Traditional medicinal plants of Nigeria: an overview." *Agriculture and Biology Journal of North America*. Vol. 7 (2016): 220-247. https://www.traffic.org/site/assets/files/2960/traffic_pub_bulletin_18_1.pdf#page=39.
[348] O.A. Sodeinde & D.A. Soewu, "Pilot Study of the Traditional Medicine Trade in Nigeria." *TRAFFIC Bulletin*, Vol. 18 No. 1 (September 1999): 35-40. https://www.traffic.org/site/assets/files/2960/traffic_pub_bulletin_18_1.pdf#page=39.
[349] *Ibid*.
[350] FGN. *Nigeria's Fifth National Biodiversity Report.* CBD, 2015. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

of associated plants, insects and fungi, that require specific hosts to meet their own ecological requirements for survival.[351]

Hunting for traditional medicinal plants and animals irrespective of sustainability is emblematic of another driver, lack of environmental and biodiversity awareness. In recent interviews, stakeholders identified needing to find a way to increase the acceptability of conservation by the communities as a challenge.[352] Animosity, conflict, and lack of support for management of the reserve by villages and traditional leaders immediately adjacent to the reserve and in Bauchi State are worsened by lack of understanding related to the importance of natural resource preservation.[353] Communities around Yankari reportedly view the game reserve as a barrier to gainful economic opportunities.[354] Rangers and park managers in both Yankari Game Reserve and in Cross River National Park have been threatened and killed by communities surrounding protected areas.[355] Similar constraints have been identified as a factor in insufficient uptake of sustainable fisheries management practices in inland fisheries. Results from a study conducted in Jebba Lake Basin, as an example, showed that over 57% of fishermen had never used a sustainable fishing practice (e.g., gill nets and drift nets with large openings, hook and line).[356]

6.2.8 INTERNATIONAL DEMANDS FOR NATURAL RESOURCE PRODUCTS

International demand for Nigeria's natural resources ranges from oil and natural gas to the illicit trade in rare and endangered wildlife species and timber. Historically, oil and gas sector revenues have dominated Nigeria's GDP accounting for over 95% of export earnings and about 85% of government revenue between 2011 and 2012.[357] According to data from Lloyd's List Intelligence (APEX Tanker Data), Nigeria exported approximately 2 million barrels of crude oil and oil condensate in 2015.[358] Europe and India were Nigeria's largest importers of oil, making up 41% and 20% of all exports in 2015 respectively.[359] Despite changing international demand for oil and natural gas, the environmental price of international oil demand on ecosystem health and biodiversity conservation in the Niger Delta continues to be high. Oil theft, aging oil infrastructure and poor maintenance have led to oil spills poisoning the soil and water in the fragile delta ecosystem, and natural gas flaring has contributed to worsening air pollution.

High international demand for endangered species of wildlife and timber are another major driver of Nigerian biodiversity loss. International demand has driven the illegal trade in elephant ivory, pangolin

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[351] *Ibid*.
[352] Stakeholder consultation with Nachamada, Duguri & Mohammed, 17 September 2019. Yankari Game Reserve & Bauchi Town.
[353] *Ibid*.
[354] *Ibid*.
[355] *Ibid*.
[356] G.O. Nwabeze & A.P. Erie. "Artisanal Fishers' Use of Sustainable Fisheries Management Practices in the Jebba Lake Basin, Nigeria." *Journal of Agricultural Extension*, Vol. 17 No.1 (June 2013): 123-134. http://dx.doi.org/10.4314/jae.v17i1.12.
[357] L.N. Chete, J.O. Adeoti, F. M. Adeyinka, & O. Ogundele. "Industrial development and growth in Nigeria: Lessons and challenges." Learning to Compete Working Paper No. 8. 2016. https://www.brookings.edu/wp-content/uploads/2016/07/L2C_WP8_Chete-et-al-1.pdf.
[358] "Country Analysis Brief: Nigeria," U.S. Energy Information Administration, 6 May 2016, https://www.eia.gov/beta/international/analysis.php?iso=NGA.
[359] *Ibid.*

scales, and other rare and endangered species' products. Reports of an escalation in the illegal trade in pangolin linked to Nigeria point to the use of Nigeria as both a source and a transit country for international wildlife trafficking syndicates with the main destination countries appearing to be China and Laos.[360] Demand for timber products such as Nigerian "kosso" or rosewood also come from predominantly Asian markets including China and Vietnam. While an investigation into the Nigerian rosewood trade has largely been able to confirm the authenticity of export permits issued by Nigeria to Vietnam, export permits issued to China have been issued illegally in staggering numbers.[361] A CITES convention meeting held in October 2018 attributed the depletion in Nigerian kosso in all but Taraba, Adamawa and Borno States, to a combination of "lax provincial regulations, loopholes in existing laws and the lack of sustainable forestry policies at the state level which have been exploited by national and foreign actors involved in the timber trade to export timber that is obtained in accordance with national laws but not in accordance with the Convention."[362]

[360] *Ibid*.

[361] CITES. Interpretation and Implementation Matters General Compliance and Enforcement Compliance Matters Application of Article XIII in Nigeria. Seventieth meeting of the Standing Committee Rosa Khutor, Sochi, Russian Federation, 1-5 October 2018. https://cites.org/sites/default/files/eng/com/sc/70/E-SC70-27-03-05.pdf.

[362] *Ibid*.

7. ACTIONS NECESSARY TO CONSERVE AND PROTECT TROPICAL FORESTS AND BIODIVERSITY

Table 10 describes the actions necessary to conserve and protect tropical forests and biodiversity in Nigeria. The actions represent the range of actions the analysis team believes are necessary to implement sound conservation and management of Nigeria's tropical forest and biodiversity. (They are not exhaustive but describe the range of potential actions necessary). This Analysis does not identify a particular actor (neither USAID nor other actors in Nigeria) to implement these actions. Rather, these actions are evaluated in the "extent to which" analysis conducted in Section 8 and inform the programming recommendations for USAID/Nigeria developed in Section 9.

TABLE 9. ACTIONS NECESSARY, DRIVERS ADDRESSED, AND LINKED THREATS ACCORDING TO TIER OF PRIORITY

ACTIONS NECESSARY	DRIVER(S) ADDRESSED	LINKED THREATS
TIER 1: HIGHEST PRIORITY		
Action 1: Support financial incentives for the conservation of tropical forests and biodiversity		
• Work with the federal and state governments, and the Nigerian National Park Service (NNPS) to promote and develop public-private partnerships with non-governmental organizations (NGOs), including community-based organizations, or private investors to manage national parks and other protected areas in key biodiversity areas. • Provide technical assistance and capacity development to states with key biodiversity hotspots engaged in implementation of the REDD+ program in Nigeria. • Promote the valuation of ecosystem services (e.g., irrigation, drinking water, and habitat for viewing charismatic wildlife) by linking agribusiness, public services, and tourism to forest conservation in priority watersheds. • Provide technical assistance to the Nigerian Tourism Board and the NNPS to develop ecotourism initiatives, and to publicize key biodiversity hotspots within Nigeria, regionally and globally. • Support the creation of innovative financing for biodiversity and forest conservation	• Inadequate management capacity, interagency coordination, and budget • Conflict, insecurity and banditry • Domestic demand for natural resource goods and lack of environmental and biodiversity awareness	• Agricultural expansion and poor agricultural management practices • Charcoal and wood fuel production • The illegal timber industry • Wildlife poaching, trafficking of high-value species, and bush- and sea-meat

TABLE 9. ACTIONS NECESSARY, DRIVERS ADDRESSED, AND LINKED THREATS ACCORDING TO TIER OF PRIORITY		
ACTIONS NECESSARY	DRIVER(S) ADDRESSED	LINKED THREATS
(e.g., national and state trust funds for forest conservation).	• International demand for natural resource products	hunting • Livestock encroachment and overgrazing
Action 2: Support food security initiatives aligned with biodiversity and forestry conservation geographies and targets		
• Promote livelihood activities in and around selected protected areas. Provide technical assistance to identify and support key value chains, e.g., honey, bush mango, and cocoa. These livelihoods could include the harvest and processing of non-timber forest products, as well as support on sustainable practices in traditional livelihoods like small-scale agriculture and fishing/aquaculture. • Promote development of small and medium enterprises (SMEs) which address the identified value chain (e.g., aquaculture or poultry enterprise to provide alternative protein to bush meat, as well as alternative livelihoods to poaching). • Provide technical assistance to review potential techniques to decrease herder-farmer conflict and grazing in and around protected areas (e.g., re-establishment of stock routes and grazing reserves for transhumance). • Promote agroforestry in and around the buffer zone of protected areas by providing technical assistance, equipment, and inputs. • Develop sustainable fisheries programs including support for co-management, use rights, capacity and effort-reduction strategies; improved science-informed decision making; and building the political will and public support to rebuild the marine fisheries sector.	• Poverty and lack of alternative livelihoods • Conflict, insecurity and banditry • Domestic demand for natural resource goods and lack of environmental and biodiversity awareness • International demand for natural resource products	• Agricultural expansion and poor agricultural management practices • Land use change from new settlement development and existing settlement expansion • Charcoal and wood fuel production • Wildlife poaching, trafficking of high-value species, and bush- and sea-meat hunting • Livestock encroachment and overgrazing

TABLE 9. ACTIONS NECESSARY, DRIVERS ADDRESSED, AND LINKED THREATS ACCORDING TO TIER OF PRIORITY		
ACTIONS NECESSARY	DRIVER(S) ADDRESSED	LINKED THREATS
Action 3: Improve access to alternative energy sources and energy-efficient infrastructure		

• Promote entrepreneurs and research on energy sources and energy-efficient technology to provide inexpensive access in urban and peri urban areas:
  ○ Renewable energy alternatives (e.g., solar PV, wind, biogas, micro-hydropower); and
  ○ Cleaner and efficient burning systems (e.g., fuel efficient stoves).
• Provide microfinancing or subsidies for alternatives to wood fuel (e.g., natural gas or propane) to reduce financial barriers to subsistence farmers and traders.
• Facilitate establishment of woodlots for sustainable fuelwood supply in urban and peri urban areas (especially in semi-arid to arid areas experiencing desertification).
• Upgrade and expand the electricity generation, transmission and distribution infrastructure to provide low cost, reliable access to adequate power in urban and peri-urban areas.
• Provide mini-grid solar systems for electric power for isolated rural locations.
	• Rapid population growth and urbanization
	• Poverty and lack of alternative livelihoods
	• Domestic demand for natural resource goods and lack of environmental and biodiversity awareness
		• Land use change from new settlement development and existing settlement expansion
		• Charcoal and wood fuel production
		• Wildlife poaching, trafficking of high-value species, and bush- and sea-meat hunting
		• Climate change

Action 4: Engage national and local population in biodiversity and forest conservation		
• Develop and implement strategic messaging on value of biodiversity/forest conservation through Social and Behavioral Change programming. • Incorporate environmental awareness, and education at all levels of formal educational institutions. • Support environmental awareness programs in non-formal learning centers and after school programs. • Coordinate with educational and religious institutions to conduct outreach on biodiversity and forest conservation. • Support CSOs and NGOs to promote national environmental advocacy through media platforms and influencers.	• Rapid population growth and urbanization • Poverty and lack of alternative livelihoods • Corruption • Conflict, insecurity and banditry • Domestic demand for natural resource goods and lack of	• Land use change from new settlement development and existing settlement expansion • Charcoal and wood fuel production • The illegal timber industry • Major infrastructure and energy

TABLE 9. ACTIONS NECESSARY, DRIVERS ADDRESSED, AND LINKED THREATS ACCORDING TO TIER OF PRIORITY		
ACTIONS NECESSARY	DRIVER(S) ADDRESSED	LINKED THREATS
• Provide support to existing media outlets on environmental journalism, exploring linkages between inadequate enforcement of key natural resources, resource degradation, and impacts on individuals at the community level.	environmental and biodiversity awareness • International demand for natural resource products	development projects impacting ecologically important areas • Wildlife poaching, trafficking of high-value species, and bush- and sea-meat hunting • Exploitation of fish stocks & illegal fishing
TIER 2 - HIGH PRIORITY ACTIONS		
Action 5: Strengthen and enforce national and international laws and regulations on illegal logging, wildlife trafficking and illegal fisheries		
• Develop collaboration platforms for federal ministries and state governments involved in natural resource management (NRM) to perform a comprehensive evaluation of existing NRM policies in order to recommend actions to integrate NRM policies and regulations. • Support the evaluation of existing policies and judicial frameworks, and development of new laws, policies, and regulations to reduce illegal wildlife and timber trafficking. • Complete a comprehensive evaluation of the value chain of the timber sector from the allocation of forest rights to the export of forest products, and reform policies and regulations in order to strengthen forest governance and effectively dissuade and combat illegal logging and related trade. • Support the Government of Nigeria (GON) to develop and implement a system to comply with international trade requirements (For example, compliance with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Nigeria is currently prohibited from trade of CITES-listed West African rosewood (*Pterocarpus erinaceus*). • Provide technical assistance and support to the GON fiscal authorities to account for the	• Corruption • Inadequate management capacity, interagency coordination, and budget • Insufficient data collection and management to inform decision making and planning • Domestic demand for natural resource goods and lack of environmental and	• Charcoal and wood fuel production • The illegal timber industry • Extractive industries including mining and oil production • Major infrastructure and energy development projects impacting ecologically important areas • Wildlife poaching, trafficking of high-value species, and

TABLE 9. ACTIONS NECESSARY, DRIVERS ADDRESSED, AND LINKED THREATS ACCORDING TO TIER OF PRIORITY		
ACTIONS NECESSARY	DRIVER(S) ADDRESSED	LINKED THREATS
value of logging exports and to prevent tax evasion. ● Provide training and up to date equipment to customs agents for enhanced identification of timber (e.g., West African rosewood) and wildlife species (e.g., pangolin and ivory).	biodiversity awareness ● International demand for natural resource products	bush- and sea-meat hunting ● Livestock encroachment and overgrazing ● Exploitation of fish stocks & illegal fishing
Action 6: Strengthen the capacity of government and civil society to manage natural resources		
● Fund training for officials from law enforcement and the legal system to improve their ability to oversee compliance, manage fisheries scientifically, and improve coastal planning and management. ● Formalize community-based natural resource management by supporting the development of the national legal framework for community-managed forests, fisheries, rangelands, and protected areas. ● Support CSOs and investigative journalists in improved reporting on illegal practices in and around protected areas. ● Support training for local fishing associations to strengthen their administrative, organizational, and financial-management skills; improved patrolling and inspection helps prevent illegal fishing in fisheries management areas. ● Support the use of technology including spatial monitoring, such as web-based information sharing and mobile phone apps, to track and report on illegal activity (e.g., logging or poaching). ● Support real-time monitoring and technology (e.g., SMART GPS, to provide more efficient ranger patrols). ● Review and revise the curriculum and training for natural resource management practitioners at secondary and tertiary education institutions to emphasize conservation management practices.	● Corruption ● Inadequate management capacity, interagency coordination, and budget ● Conflict, insecurity and banditry ● Domestic demand for natural resource goods and lack of environmental and biodiversity awareness ● International demand for natural resource products	● All linked threats

TABLE 9. ACTIONS NECESSARY, DRIVERS ADDRESSED, AND LINKED THREATS ACCORDING TO TIER OF PRIORITY		
ACTIONS NECESSARY	DRIVER(S) ADDRESSED	LINKED THREATS
• Promote research opportunities for graduate students and staff to improve capacity to properly monitor, manage, and conserve natural resources and ecosystem health and to increase key data on biodiversity and forests.		
Action 7: Develop and implement integrated resource management plans that empower women and youth and emphasize biodiversity conservation		
• Promote primary schools for girls in communities in and around protected areas, with appropriate awareness to the religious and cultural context, in exchange for local support or contribution to conservation of biodiversity and forests. • Support family planning services that directly address population growth threats, and indirectly protect biodiversity and conserve forests. • Develop program to train and employ disadvantaged women (e.g., unemployed single mothers, widows, survivors of sexual and physical abuse) to act as rangers in protected areas. • Design program integrating agroforestry and afforestation at primary schools, based on conservation clubs, fruit tree nurseries with boreholes at schools, student management of trees at homesteads, with rewards (e.g., scholarships) for students. • Work with communities to reduce destructive fishing practices, protect local marine ecosystems and improve access to reproductive health and family planning services (women gain access to family planning services, and the communities work to conserve the ecosystems they depend on for food security and livelihoods). • Support outreach to communities in and around protected areas: a. environmental awareness training for village leaders and traditional leaders; b. expansion of wildlife guardian program to more villages surrounding the reserve; and c. expansion of the existing limited primary school outreach program to allow more students to make trips into the reserve.	• Poverty and lack of alternative livelihoods • Corruption • Inadequate management capacity, interagency coordination, and budget • Conflict, insecurity and banditry • Domestic demand for natural resource goods and lack of environmental and biodiversity awareness	• Agricultural expansion and poor agricultural management practices • Land use change from new settlement development and existing settlement expansion • Charcoal and wood fuel production • Wildlife poaching, trafficking of high-value species, and bush- and sea-meat hunting • Livestock encroachment and overgrazing • Exploitation of fish stocks & illegal fishing

TABLE 9. ACTIONS NECESSARY, DRIVERS ADDRESSED, AND LINKED THREATS ACCORDING TO TIER OF PRIORITY		
ACTIONS NECESSARY	DRIVER(S) ADDRESSED	LINKED THREATS
TIER 3 - ADDITIONAL NECESSARY ACTIONS		
Action 8: Direct environmental remediation or restoration		

• Wetland restoration, remediation, and clean-up including, but not limited to, mangrove areas in partnership with major oil producers and civil authorities.
• Support for afforestation programs at the regional, state and local level, including
  ○ Forest enrichment or afforestation initiatives with species that have been overharvested/ overexploited within an ecoregion to help restore biodiversity and ecosystem health; and
  ○ Research into which native species will be appropriate for restoration efforts in areas subject to desertification
	• Rapid population growth and urbanization
	• Inadequate management capacity, interagency coordination, and budget
	• International demand for natural resource products
		• Agricultural expansion and poor agricultural management practices;
		• Major infrastructure and energy development projects impacting ecologically important areas
		• Livestock encroachment and overgrazing
		• Climate change
		• Pollution

8. EXTENT TO WHICH THE ACTIONS PROPOSED FOR SUPPORT BY THE AGENCY MEET THE ACTIONS NECESSARY

This section characterizes the Analysis Team's findings regarding the "extent to which" the actions proposed, or are already under implementation by USAID/Nigeria, support the 'actions necessary' as defined in Section 7. Nigeria is not currently classified as a Tier 1 or 2 biodiversity country under USAID guidelines; therefore, it does not receive biodiversity funding.

USAID/Nigeria currently supports programs in health, democracy and governance, agriculture, education, energy and infrastructure, with investments largest for global health programs. Section 1.2 provides a summary of the DOs and IRs addressed in the current CDCS. The map below (Figure 10) shows the sector and geographic dispersion for current USAID/Nigeria activities. Table 11 summarizes the extent to which USAID contributes towards actions necessary (based on the current CDCS).

FIGURE 10. USAID/NIGERIA ACTIVITIES BY STATE

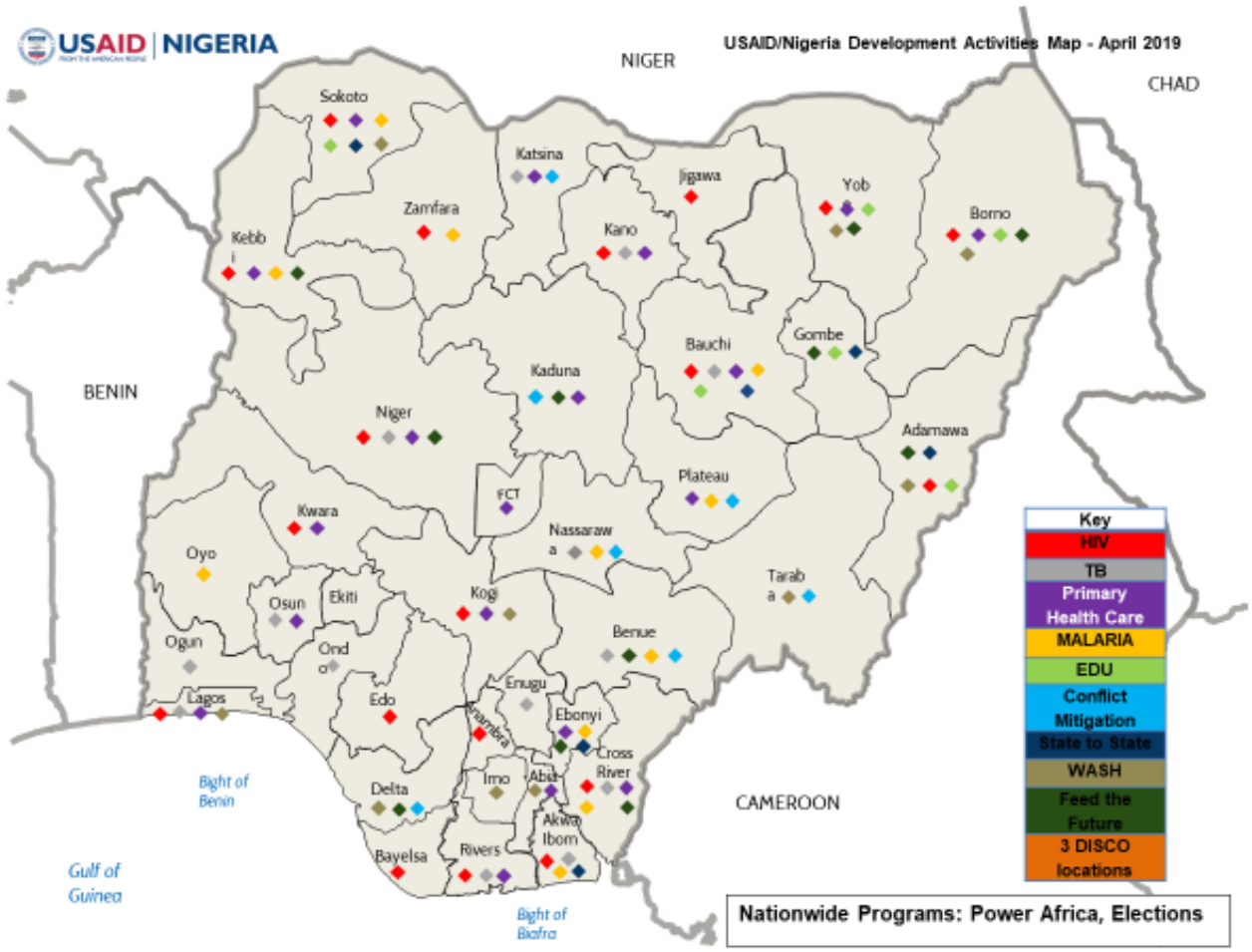

TABLE 10. EXTENT TO WHICH THE CURRENT OR PLANNED STRATEGY AND PROGRAMMING CONTRIBUTE TOWARD NECESSARY ACTIONS	
ACTION NECESSARY	EXTENT TO WHICH USAID CONTRIBUTES TOWARD ACTIONS NECESSARY (BASED ON CURRENT CDCS)
ACTION 1: Support financial incentives for the conservation of tropical forests and biodiversity	Under its CDCS, the Mission does not currently address threats to biodiversity and tropical forests. Nigeria is not currently classified as a Tier 1 or 2 biodiversity country under USAID guidelines; therefore, it does not receive biodiversity funding.
ACTION 2: Support food security initiatives aligned with biodiversity and forestry conservation geographies and targets	Under DO1: IR 1.1, USAID/Nigeria aims to increase agricultural productivity and the resilience of vulnerable households and communities. The Mission also aims to increase efforts to involve more women in agricultural land ownership. Improvements in nutrition are measured through demographic and health surveys. DO1 includes components to improve resiliency, which allows households to adapt to dynamic conditions and help ensure longer-term, sustainable livelihoods. In alignment with Feed the Future's pro-poor goals, the Mission aims to help farmers who are not well-equipped to participate in the local economy to strengthen their resilience and build the architecture for inclusive rural economies. Under DO1: IR1 the Mission is also supporting sustainable agricultural projects. For instance, the Nigeria Agriculture and Food Security Policy Support activity focuses on 1) interventions to enhance skills, provide training, and build institutional capacity; 2) interventions to promote policy driven collaborative research and analysis; and 3) activities to promote evidence-based policy process and impact through improved dialogue, engagement and outreach strategy. In addition, the two-year Feed the Future Nigeria Integrated Agriculture Activity targets families in Adamawa and Borno states of northeastern Nigeria started in July 2019. It seeks to support vulnerable populations to engage in basic farming activities that will improve food security, increase agricultural incomes and improve resilience among smallholder farmers and their families. The Activity will work with a coalition of partners to facilitate improved agro-inputs and extension advisory services to serve vulnerable populations, strengthen the institutions that form the market system and the networks that serve smallholder farmers who have been disenfranchised by conflict, and facilitate the engagement of youth and women in commercial agribusiness activities. Another example is the three-year Water for Agriculture Activity awarded on July 15, 2019 which aims to increase agricultural productivity and income generation among smallholder farmers. It is designed to provide adequate and sustainable water supply to vulnerable populations for both farming and livestock in selected crisis-affected communities in three states of Borno, Yobe and Adamawa, in Northeastern Nigeria. This Activity will ultimately improve livelihood opportunities by increasing water access points and improving the

TABLE 10. EXTENT TO WHICH THE CURRENT OR PLANNED STRATEGY AND PROGRAMMING CONTRIBUTE TOWARD NECESSARY ACTIONS	
ACTION NECESSARY	EXTENT TO WHICH USAID CONTRIBUTES TOWARD ACTIONS NECESSARY (BASED ON CURRENT CDCS)
	capacity of local governments and communities to govern and manage water infrastructure and water resources. Other USAID/Nigeria-related food security programs include: • Feed the Future Nigeria Agribusiness Investment • Feed the Future Nigeria and Nestlé Maize Quality Improvement Partnership (Nestlé) • Partnership for Inclusive Agricultural Transformation in Africa However, the Mission does not currently have specific biodiversity and forest conservation targets, nor does it have integrated projects (e.g., across family planning, food security, and economic growth) that address biodiversity protection.
ACTION 3: Improve access to alternative energy sources and energy-efficient infrastructure	Under DO1: IR 1.3., the Mission aims to increase access to reliable and affordable energy. In addition, DO2 promotes the use of renewable energy activities in agribusiness and by small- and medium-sized enterprises. However, the Mission does not currently directly address threats to forests posed by the overuse of biomass for energy.
ACTION 4: Engage national and local population in biodiversity and forest conservation	The Mission does not currently directly engage the national and local population directly in biodiversity and forest conservation. However, under DO1: IR1.1, some agricultural value chain project indirectly supports biodiversity and forest conservation. Agricultural intensification through technology generation and deployment is a key approach limiting agricultural expansion into new lands. Activities focus on transfer/dissemination of available improved varieties (e.g., disease and pest resistant, high yielding, drought tolerant, varieties with agro-processors and market-preferred quality traits) of target crops; sustainable soil and water management practices (e.g., drip irrigation, improved fallows, inorganic and organic fertilizer application, integrated pest management techniques, small irrigation technologies and management).

TABLE 10. EXTENT TO WHICH THE CURRENT OR PLANNED STRATEGY AND PROGRAMMING CONTRIBUTE TOWARD NECESSARY ACTIONS	
ACTION NECESSARY	EXTENT TO WHICH USAID CONTRIBUTES TOWARD ACTIONS NECESSARY (BASED ON CURRENT CDCS)
ACTION 5: Strengthen and enforce national and international laws and regulations on illegal logging, wildlife trafficking and illegal fisheries	Under a USAID agreement, the West Africa Biodiversity and Climate Change (WA BiCC) project conducts assessments of counter wildlife trafficking needs and capacity, however, USAID/Nigeria does not manage this project. The Mission does not currently directly address threats to forests posed by illegal logging. Under DO1, the Mission is promoting livelihood and income generating opportunities through small-scale aquaculture. However, the Mission does not currently directly address threats to fisheries posed by IUU fishing.
ACTION 6: Strengthen the capacity of government and civil society to manage natural resources	Under DO3 (Strengthened Good Governance), the Mission emphasizes increased government accountability and responsiveness, including increased transparency, heightened capacity of CSOs, and strengthened conflict mitigation efforts. However, the Mission does not currently work to limit threats to natural resources by increasing enforcement of laws and policies.
ACTION 7: Develop and implement integrated resource management plans that empower women and youth and emphasize biodiversity conservation	In its CDCS, the Mission places an emphasis on increasing the engagement of youth and women in civil society (e.g., DO3: IR 3 supports CSOs to engage marginalized populations such as youth, women, and people with disabilities); however, the Mission does not currently implement activities that involve these populations in biodiversity conservation.
ACTION 8: Direct environmental remediation or restoration	The Mission does not currently support activities to focused on environmental remediation, ecosystem restoration, or afforestation.

9. RECOMMENDATIONS FOR USAID/NIGERIA

Table 12 describes numerous programming recommendations for USAID's consideration in fulfilling the actions necessary detailed in this analysis. These recommendations are organized by technical area of focus, including a series of cross-sectoral or integrated recommendations. USAID programming is dictated by U.S. congressional earmarks, which necessarily informs and at times constrains the opportunities to integrate tropical forest and biodiversity conservation into all technical programming areas.

Recommendations in Table 12 are made based upon the Analysis Team's understanding of any such constraints and framed in a manner practicable for the Mission, understanding that factors beyond the conservation of tropical forests and biodiversity will likewise inform final programming decisions.

Table 12 organizes recommendations into the following three categories:

- **Readily Actionable**: *Working within the boundaries of programs to improve the extent to which USAID is meeting the actions necessary to reduce threats;*
- **Strategic Opportunity**: *Adapting programs to improve the extent to which USAID is meeting the actions necessary to reduce threats; and*
- **For Future Consideration**: *Designing long-term activities with an explicit objective of reducing priority drivers of threats or otherwise contributing to biodiversity conservation.*

TABLE 11. RECOMMENDATIONS AND OPPORTUNITIES FOR USAID PROGRAMMING		
RECOMMENDATIONS		
READILY ACTIONABLE	STRATEGIC OPPORTUNITY	FOR FUTURE CONSIDERATION
PROGRAM OFFICE – BIODIVERSITY CONSERVATION FOCUSED – CROSS CUTTING		
● Implement biodiversity and forest conservation programming at hotspots in Nigeria, focusing on habitat with flagship flora and fauna: ○ Cross River landscape in Cross River watershed – mahogany, gorilla, and chimpanzee (highest biodiversity pool in West Africa) ○ Gashaka-Gumti Landscape and Benue River watershed – rosewood, forest buffalo, and chimpanzee ○ Yankari Game Reserve in Gaji River watershed – forest elephants and rosewood ● Provide capacity development and infrastructure for ranger patrols, support to local communities, and other key interventions.	● Work to expand protected areas; assist with development of a marine protected area. ● Increase community-based management of natural resources. ● Hire community members to track and report on threatened species (e.g., gorillas). ● Fund additional biodiversity research and data collection. ● Support research for data on marine biodiversity/ecosystem function ● Efficient tracking of rangers using GPS based "SMART" trackers or mobile devices for more effective coverage ● Promote sustainable charcoal use (e.g., consider biocoal, which is made of agricultural waste and not trees). ● To help protect fish spawning areas, focus on mangrove and coastal forest preservation.	● Increase participatory resource-use planning (e.g., fisheries and marine use, forestry, wildlife conservation, mangrove preservation). ● Increase CITES knowledge and wildlife law enforcement training; Support the identification of protected species; collect and share intelligence and enforcement data. ● Develop mechanisms to reduce illegal logging. For example, train communities to help track and record species and density. ● Provide training on equipment for both NPS rangers (e.g., uniform, tents, vehicles, cameras, drones, parachutes, communication devices, etc.) and customs officers (e.g., additional x-ray scanners, cargo scanners and metal detectors at airports and seaports).

TABLE 11. RECOMMENDATIONS AND OPPORTUNITIES FOR USAID PROGRAMMING		
RECOMMENDATIONS		
READILY ACTIONABLE	STRATEGIC OPPORTUNITY	FOR FUTURE CONSIDERATION
ECONOMIC GROWTH AND ENVIRONMENT		
• Provide technical assistance as part of agricultural programming that conserves forests in the upper portions of key watersheds to protect and maintain water flow downstream in FTF zones of influence (e.g., forest conservation in upper watershed of Cross River basin for downstream rice intensification projects in the Ebonyi State). • Provide technical assistance in Water Sanitation and Hygiene (WASH) programming in support of the conservation of forests in the upper portions of key watersheds to protect water quality for downstream potable water withdrawal (e.g., protect forests in Upper Benue River basin to support improved services for Taraba Surface Water Board through E-WASH program). • Promote alternative livelihood activities in and around selected protected areas e.g., Sustainable Practices in Agriculture	• Provide technical assistance to develop techniques to decrease herder-farmer conflict and grazing in protected areas like Yankari Game Reserve, e.g., re-establishment of stock routes and grazing reserves for transhumance. (This example could be planned in collaboration with Peace Democracy and Governance (PDG) and integrated with activities like the existing "Engaging Communities for Peace in Nigeria" activity in the North East). • Promote development of SMEs that integrate aquaculture or poultry enterprise development into FTF programming (to provide alternative protein to bush meat and alternative livelihoods). • Promote entrepreneurs and research on alternative energy sources and energy-efficient technology: ○ Renewable energy alternatives (e.g., solar	• Develop sustainable management fisheries program: Support for co-management, use rights, capacity and effort-reduction strategies; improved science-informed decision making; and building the political will and public support necessary to make difficult decisions and change the behavior needed to rebuild Nigeria's marine fisheries sector. • Support innovative programs for payment for ecosystem services in protected areas linked to the same key watersheds e.g., REDD+ in Cross River State, and ecotourism in Gashaka-Gumti National Park. • Develop climate change alleviation programming in Northwest Nigeria including technical assistance to towns and cities to develop climate smart infrastructure and to farmers to adopt climate smart agriculture to reduce shock from drought and flooding. • Develop climate smart agriculture programming to reduce the shock of droughts and floods on farmers, and integrate technical support to managers of protected areas to patrol the regional forests and woodlands to

TABLE 11. RECOMMENDATIONS AND OPPORTUNITIES FOR USAID PROGRAMMING		
RECOMMENDATIONS		
READILY ACTIONABLE	STRATEGIC OPPORTUNITY	FOR FUTURE CONSIDERATION
for Critical Environments (SPACE) near Cross River NP. Provide technical assistance to identify and support key sustainable value chains, e.g., honey, bush mango, cocoa, including market access for such products.	photovoltaic) ○ Cleaner and efficient burning systems (e.g., fuel efficient stoves) ○ Microgrids, and micro hydropower projects	prevent criminals and insurgents from using them as enclaves in the Adamawa, Borno, Gombe, and Yobe states. ● Facilitate establishment of woodlots for sustainable fuelwood supply (especially in semi-arid to arid parts of the country already experiencing desertification).
PEACE AND DEMOCRATIC GOVERNANCE		
● Support CSOs and NGOs to promote environmental advocacy through media platforms and influencers: ○ Popular entertainers serving as brand ambassadors (e.g., Tita Da.Fire for threatened vultures for NCF) ○ Radio and TV biodiversity-themed programs ○ Produce biodiversity-themed music, documentaries, dramas and jingles ● Support CSOs to increase public oversight of management of protected areas by federal and state governments, and enforcement of laws to counter	● Provide technical assistance to state governments to review and revise, existing policies on protected area management and enforcement of hunting/logging regulations. ● Work with EGE to provide technical assistance to review potential techniques to decrease herder-farmer conflict and grazing in protected areas like Yankari Game Reserve, e.g., re-establishment of stock routes and grazing reserves for transhumance. (This example could be integrated with activities like the existing "Engaging Communities for Peace in Nigeria" activity in the North East).	● Work with the HPN and HIV/AIDS/TB offices on strategic messaging on the value of biodiversity/forest conservation via Social and Behavioral Change mechanism.

TABLE 11. RECOMMENDATIONS AND OPPORTUNITIES FOR USAID PROGRAMMING		
RECOMMENDATIONS		
READILY ACTIONABLE	STRATEGIC OPPORTUNITY	FOR FUTURE CONSIDERATION
illegal extraction activities (e.g., illegal logging, illegal wildlife trade). ● Provide technical assistance and support to existing media outlets on environmental journalism, exploring linkages between inadequate enforcement of key natural resources, resource degradation, and impacts on individuals at the community level.	● Provide technical assistance to federal and state governments on laws and policies to encourage conservation rather than exploitation of forest products, e.g., remove tariffs on the import of timber products.	
HEALTH, POPULATION, NUTRITION, AND HIV/AIDS/TB		
● Promote environmentally friendly behaviors in health programming, in collaboration with EGE including: ○ Renewable energy alternatives ○ Cleaner and efficient burning systems (e.g., bio gel stoves) ○ Recycling principles and proper waste management. ● Emphasize family planning efforts, provide nutritional information about non-bushmeat protein alternatives, and promote the health benefits of clean cookstoves. ● Design programming for nutrition for	● Leverage technical assistance to health clinics, such as through the existing Integrated Health Program (IHP) activity, in and around protected areas and areas of high biodiversity (e.g., in and around Yankari Game Reserve and Cross River National Park) in exchange for local protection/ conservation in these areas. ● Ensure dissemination of bed nets includes sensitization on proper use/ discourages unsafe and environmentally harmful uses (e.g.,	● Develop program to train and employ disadvantaged women (e.g., unemployed single mothers, widows, survivors of sexual and physical abuse) to act as rangers in protected areas (similar to the International Anti-Poaching Foundation [IAPF] Akashinga project in Zimbabwe). ● Work with communities to reduce destructive fishing practices, protect local marine ecosystems and improve access to reproductive health and family planning services. (Women gain access to family planning services, and the communities work to conserve the ecosystems they depend on

TABLE 11. RECOMMENDATIONS AND OPPORTUNITIES FOR USAID PROGRAMMING		
RECOMMENDATIONS		
READILY ACTIONABLE	STRATEGIC OPPORTUNITY	FOR FUTURE CONSIDERATION
families (i.e., vulnerable populations) dependent on the forest for protein and income, to plan for loss of forest products (as forests are degraded). • Integrate strategic messaging on value of biodiversity/forest conservation in Social and Behavioral Change programming (e.g., change in health seeking behavior as in the existing Breakthrough Action Nigeria (BA/N) activity).	fishing) in U.S. President's Malaria Initiative activities.	for food security and livelihoods).
EDUCATION		
• Support environmental awareness programs in non-formal learning centers, integrated in activities like the Addressing Education in the Northeast Nigeria (AENN) activity. • Develop supplemental reading materials with environmental themes and local folklore to reinforce conservation values. • Support creation of environmental clubs in primary and secondary schools. • Provide technical assistance for	• Promote primary schools for girls in communities in and around protected areas, with appropriate awareness to the religious and cultural context, in exchange for local support/contribution to conservation of biodiversity/forests. • Coordinate with educational and religious institutions to conduct outreach on biodiversity and forest conservation. Pay for education in return for biodiversity tracking and reporting. • Develop and implement program for	• Design program integrating agroforestry/afforestation at schools in North East, based on conservation clubs, fruit tree nurseries with boreholes at schools, student management of trees at homesteads, with rewards (e.g., scholarships) for students. (This program could be integrated, for example in the existing Post Conflict Activity to Counter Violent Extremism (PCA-CVE) in the Borno State). • Develop capacities of environmental science teachers at all levels of education (especially tertiary institutions) such as colleges of forestry and universities.

TABLE 11. RECOMMENDATIONS AND OPPORTUNITIES FOR USAID PROGRAMMING		
RECOMMENDATIONS		
READILY ACTIONABLE	STRATEGIC OPPORTUNITY	FOR FUTURE CONSIDERATION
curriculum review and development of biodiversity-themed educational materials to promote conservation and environmental stewardship.	students, from elementary to secondary school, to complete field work in protected areas at a national scale (e.g., residential program for University of Calabar students observed in the Cross River National Park).	

ANNEXES

ANNEX A: SCOPE OF WORK (SOW)

JUNE 10, 2019

I. BACKGROUND

As part of the documentation for the 2020-2025 Country Development Cooperation Strategy (CDCS), USAID/Nigeria is required by Sections 118 and 119 of the Foreign Assistance Act (FAA118/119), as amended, to prepare an analysis of tropical forests and biodiversity in Nigeria. By mandating FAA 118/119 analysis (hereafter referred to as "the analysis"), the U.S. Congress is recognizing the fundamental role that tropical forest and biodiversity play in supporting countries as they progress along the journey to self-reliance. The analysis will examine the country-level forest and biodiversity conservation needs and the extent to which USAID/Nigeria is currently addressing the identified needs for forest and biodiversity conservation. The report recommendations will help the mission identify ways to strengthen host country commitment and capacity to biodiversity conservation. The analysis will assist in strengthening the mission's role in biodiversity conservation by integrating biodiversity and tropical forest conservation in the CDCS.

1.1 SUMMARY OF RELEVANT PARTS OF FAA SECTIONS 118 AND 119

FAA Sections 118 and 119, as amended, require that USAID missions address the following:

1) FAA Sec 118 Tropical Forests

COUNTRY ANALYSIS REQUIREMENTS. Each country development strategy, statement, or other country plan prepared by the Agency for International Development shall include an analysis of:

1) The actions necessary in that country to achieve conservation and sustainable management of tropical forests, and 2) The extent to which the actions proposed for support by the Agency meet the needs thus identified.

2) FAA Sec 119 Endangered Species

COUNTRY ANALYSIS REQUIREMENTS. Each country development strategy, statement, or other country plan prepared by the Agency for International Development shall include an analysis of:

1) The actions necessary in that country to conserve biological diversity, and 2) The extent to which the actions proposed for support by the Agency meet the needs thus identified.

The FAA 118/119 analysis for USAID/Nigeria must adequately respond to the two questions for country strategies, also known as "actions necessary" and "extent to which."

1.2 PURPOSE

The primary purpose of this task is to conduct an analysis of tropical forest and biodiversity in compliance with Sections 118 and 119 of the FAA of 1961, as amended, and ADS guidelines. The analysis will inform USAID/Nigeria in the development and implementation of its CDCS. USAID's approach to development requires that the Agency examine cross-sector linkages and opportunities to ensure a

robust development hypothesis. Biodiversity conservation is a critical component in achieving self-reliance and should be considered in mission strategic approaches to improve development outcomes. The analysis therefore can define opportunities to integrate tropical forest and biodiversity conservation into priority development sectors to support the journey to self-reliance.

While the analysis should not be used as a climate-risk assessment, climate change is a global concern, and as such, the analysis will evaluate the threat to the country's tropical forest and biodiversity from climate change. The analysis team should review mission reports on climate change and consider the overlap between the analysis and USAID commissioned, country-specific climate analyses. The team should also review other sources of climate information available such as the World Bank Climate Change Knowledge Portal and the United Nations Climate Change website.

The analysis will identify new developments that should be taken into consideration at a programmatic level. This country, in addition to having one of the highest rural population growth rates and deforestation rates in Africa, is also considered to be significantly vulnerable to climate change fluctuations (droughts, floods). As the mission's next generation CDCS will continue to focus on ending extreme poverty, evidence-based programming decisions must include consideration of issues that include climate change, food security, water, governance and global health, all of which will be informed by this analysis.

A number of relevant developments have occurred in the country that requires further scrutiny, notably the initiation of oil drilling and associated infrastructure development in the region and the designation of the country among the "Gang of Eight" worst-offending countries in the illegal ivory trade. Demand for charcoal, encroachment of agriculture and human settlements onto forested and protected areas, and mining continue to degrade the country's already dwindling forests. Moreover, the country's rapid population growth and related needs to provide food, energy, income, and social services to its bulging youth demographic further strain the country's natural resources and ecosystem services.

1.3 MISSION PROGRAM

USAID/Nigeria has a Country Development Cooperation Strategy (CDCS) developed in 2015 and runs till 2020. The Strategy has its goal as "Reduced Extreme Poverty in a More Stable, Democratic Nigeria". The CDCS helps to ensure that USAID programs coordinate with other U.S. Government agencies and donors to support the Journey to Self-Reliance in a stable and democratic context. This assessment will provide analysis to inform the identification of key, multi-dimensional and cross-cutting complementary development objectives, as well as assist in the prioritization and coordination of USAID/Nigeria and other donor resources for greatest development impact and sustainability. Notably, it will highlight opportunities to build linkages between natural resource and environmental conservation and priority development themes identified in the current as well as future CDCS, the U.S. Government Mission in Nigeria identified priority goals, the Government of Nigeria Economic Growth and Recovery Plan and other current and future plans.

The USAID/Nigeria portfolio under the current strategy is divided into the following three Development Objectives:

- DO 1: Broadened and inclusive growth

- DO 2: A healthier, more educated population in targeted states
- DO 3: Strengthened good governance

There are five technical teams, namely Economic Growth and Environment (EGE), Health Population and Nutrition (HPN), Peace Democracy and Governance (PDG), Education (EDU) and HIV/AIDS/TB; programming in different sectors of Agriculture, Power, Water Sanitation and Hygiene (WASH), Health, Governance, Education and combating infectious diseases, among other actions, to meet the development objectives.

II. STATEMENT OF WORK

To achieve the above-stated purpose, the analysis team, under the direction of the Team Leader, will proceed as described in this section. As described herein, the analysis is based on synthesis and analysis of existing information, coupled with key stakeholder consultations and site visits to ground-truth information. The analysis will not generate original primary data. The analysis team will evaluate the status of tropical forests and biodiversity in Nigeria. The focus of all activities undertaken will be twofold: A) Identify actions necessary to conserve tropical forests and biodiversity and the extent to which the mission meets the actions, and B) Develop recommendations that will guide the mission in updating the extent to which focused conservation initiatives and other actions could be integrated into the new country strategy. Among the actions that might be identified, the team could explore those related to: (1) sustainably managing targeted forest landscapes, (2) mitigating threats to biodiversity in targeted landscapes, in particular agricultural interventions ; (3) establishing policy and regulatory environments for sustainable forest and biodiversity conservation; and (4) strengthening local and regional capacity to monitor forest cover change, greenhouse gas emissions, and biodiversity. To accomplish this task, the analysis team will perform the activities in Sections 2.1 and 2.2:

2.1 PRE - FIELD WORK ACTIONS

1. The mission will provide a list with the names of mission wide activities, the implementing partners and geographic locations, in addition to any material describing mission projects of activities. This will help the team examine potential cross/multi-sector linkages and prepare questions for the mission-wide in-brief meetings. A list of key documents to be reviewed by the analysis team will also be provided.

2.1.1 DESK – BASED DATA COLLECTION AND ANALYSIS

1. Gather and begin to analyze existing information to identify tropical forest and biodiversity status, key biodiversity issues, stakeholders, policy and institutional frameworks and gaps in the available information. Reports and other documentation to be reviewed include previous 118/119 analyses, current CDCS and project documents, information available online (websites of government ministries) on biodiversity conservation (and tropical forest conservation), project reports and evaluations, the NBSAP and the National State of the Environment Report (NSOER). Key references include the Mission web site at www.usaid.gov/nigeria.

2.1.2 PLANNING AND LOGISTICAL PREPARATIONS

Note: The activities described in this Section may occur prior to, or in parallel with, activities described in Section 2.1.1.

1. **Organize weekly planning meetings with the mission.** The team should plan weekly calls with the activity manager ahead of in-country arrival to support planning and logistic preparations such as site visits, lodging and in-country travel, key informants, work plan development, key informant interview protocols, and political or other sensitivities. See Section 2.2 for further details and topics for the pre-field work meetings.

2. **Plan site visits**. In coordination with the mission, begin planning site visits based on the mission's recommendations and on the team's preliminary review of key topics and information gaps. Site visits allow information gathering from key informants, and direct observation, and supplement information gathered from consultations, literature review and other second-hand sources. Site visit locations should be finalized at least two (2) weeks prior to in-country fieldwork to allow the consultant to complete necessary logistical preparations. The team will conduct no fewer than three priority site visits, which would supplement the understanding of USAID's program, or of biodiversity issues that arise in interviews and literature or would confirm information in previous assessments. One visit shall include the Cross River rain forests and its National Park. The site(s) for the second and third (or more) field visits will be determined by the team during the assessment in consultation with USAID.

3. **Develop and submit draft work plan.** 10-12 days after the start of the period of performance, the consultant will submit a draft work plan (Deliverable 1). The draft work plan will include a schedule of tasks and milestones, proposed assessment methods, tools and a discussion of information gaps. The draft work plan will also include a preliminary:
    a. List of the type of information to be obtained through further desk research and through consultations; and
    b. Mapping of key people to engage throughout the analysis process. This may include US-based (predominantly Washington D.C.) stakeholders; mission staff, including the program office, all sector technical staff, and the deputy and mission director; implementing partners; and other key in-country stakeholders (e.g., organizations, government bodies, the private sector and individuals knowledgeable about and/or implementing projects on environment, biodiversity and tropical forest conservation and other sectors relevant to tropical forest and biodiversity conservation, such as agriculture, economic growth, health, climate change and governance).
    c. Itinerary for in-country consultations and site visits, based upon information made available by the mission regarding geographies of existing programming, areas of known concern and areas being considered for future programming.
    d. Key informant interview guides to be used for stakeholder consultations.

e. Report outline based on the outline attached to the SOW (refer to Annex B: Analysis Report Annotated Outline in the FAA 118/119 Best Practices Guide), with differences noted and explained.
f. Schedule for written progress reports to, or calls with, the activity manager starting on day 7 and (weekly or every two weeks) thereafter during the pre-field and field segments. If calls are chosen, they will be documented with written call notes provided to the USAID Activity Manager.

4. Revise work plan. Following receipt of mission comments and suggestions on the draft work plan, the team will revise the work plan and submit a revised version 2-5 days before the start of the field work.

Note: Logistical details and planning for site visits can only be finalized once sites are agreed upon; if insufficient time is afforded the consultant to research and collaborate with the mission, the work plan will include only general information on site visits.

2.2 MISSION AND FIELD CONSULTATIONS AND SITE VISITS

Note: see section 5 "Role of USAID Mission" for role of the USAID activity manager in supporting the in-country program described in this section.

After arrival in-country, in coordination with the activity manager, the analysis team will:

1. **Conduct in-brief meetings** with the front office and program office representatives and/or a working group that is formed for the purpose of coordinating the analysis to:
    - Orient the attendees to the overarching objective of the 118/119 analysis, the methodology to be used (i.e., approach the analysis team will take to conduct the analysis and recommendations for potential biodiversity linkages with other sectors), and the agreed upon itinerary per the approved work plan. Ideally this will have already been circulated within the mission prior to the team's arrival in country.
    - Review with the mission the approach to the assignment and learn specific mission areas of interest or concerns regarding the planned itinerary and consultations.
    - Learn of any sensitivities related to the exercise (e.g., political constraints, mission challenges in working with the host country government or other generalized in-country implementation challenges) that could refine the analysis team's consultations and strategic or programming recommendations (i.e., the potential for raising expectations and the need to be clear about the purpose of the analysis).
    - Identify any additional organizations to be contacted and site visits to be planned, including advice and protocol on approaching USAID partners and host country organizations with respect to the assignment.

2. **Meet with the program office at USAID to:**
    - Understand the mission's planned timeline for new CDCS development.

- Gain an understanding of the status of the new CDCS development/results framework and anticipated changes to overarching strategic goals and/or development objectives, to the extent they are known at the time of fieldwork.

3. **Meet (separately) with all mission technical teams namely; Economic Growth and Environment (EGE), Peace Democracy and Governance (PDG), Health Population and Nutrition (HPN), Education (EDU) and HIV/AIDS/TB to**:
    - Understand current programming (geographic areas of focus, earmarks and related mandates or constraints) and the ways in which it may have supported or contributed to actions necessary to conserve forests and biodiversity.
    - Learn about planned or potential future programming or strategic orientation.

4. **Meet with stakeholders and undertake site visits identified in the work plan.**

5. **Conduct exit briefing:** Prior to departure, conduct an exit briefing with the mission, including mission management, program office and all technical teams, to provide them with an overview of the analysis and preliminary report findings (Deliverable 2).

2.3 PREPARATION OF THE FAA 118/119 ANALYSIS

1. **Prepare and submit draft report** (Deliverable 3). The analysis team will analyze the information gathered and will prepare a draft analysis report in accordance with the outline attached to the SOW and responsive to the legislative requirements listed in Section 1.1 above. The report will:

    A. Follow the outline and include the information recommended in Annex B of the SOW.
    B. Be between 50 – 90 pages depending on complexity of the analysis (excluding annexes) and submitted for review by USAID.
    C. Copy edited, formatted and comply with USAID branding requirements

2. **Submit revised report** (Deliverable 4). The mission review period for draft reports will be 10 days. The mission should send the analysis report to the relevant regional bureau and pillar bureau staff in Washington for their review and concurrence.

    Following receipt of USAID comments on the draft report, the analysis team will prepare and submit a final analysis within 10 days that incorporates USAID comments.

III. SCHEDULE AND LOGISTICS

The assignment is expected to last 5-6 months from the date of contract signing to submission of the final deliverable. This includes 5-6 weeks of preparations, approximately 2-3 weeks of in-country field work, 3 weeks to produce the draft report following in-country work, 3 weeks for USAID review of the draft report, and 3-4 weeks to produce the final report.

TABLE A- 1. WEEKLY ACTIVITIES AND MILESTONES		
Week	**Activity/Milestone**	**Comments**
Week 1 through 6	Preparation	Collecting and analyzing documents and logistics
Week 3 through 6	Washington and Regional Mission consultations	Conducted in person or by phone usually by the Team Leader/Other International Consultant
Week 7 through 8	In-Country Consultations and Site Visits, Including PowerPoint presentation for out-briefing	Out-briefing with USAID marks the end of in-country period
Week 9 through 11	Report writing	Draft report submitted
Week12 through 14	USAID review draft report	Mission and Washington review draft report
Week 15 through 18	Finalizing the report	Final report submitted

IV. DELIVERABLES

The following are the deliverables for this task:

Deliverable 1. Draft work plan and schedule submitted within 12 working days of the team lead's period of performance. The work plan will address all elements specified in 2.1.2.

Deliverable 2. Exit briefing, and associated media such as PowerPoint, hand-outs, maps etc., prior to the analysis team's departure from the country or at a time requested by the mission if the team is locally based.

Deliverable 3. Draft FAA 118/119 analysis report, conforming to all requirements specified in section 2.3 submitted 25 working days after the conclusion of in-country work.

Deliverable 4. Final report incorporating all comments, conforming to all requirements specified in section 2.3 submitted within 10 working days of the receipt of all USAID review comments on the draft analysis.

V. ROLE OF THE USAID MISSION

USAID acknowledges that substantial mission engagement is required in support of the analysis team. To this end, the mission is responsible for arranging the following prior to the analysis team's arrival in-country:

- In-briefing meetings with technical offices, including notifying relevant mission offices (as elaborated Section in 2.1.2, above) and ensuring their direct participation. When key offices are not able to participate, the mission will look to include appropriate alternatives that may participate on their behalf.
- Time for the exit-brief presentation.
- Separate, scheduled meetings with the front and program office.

Such support includes providing the analysis team with the following:

- A list of key USAID documents (mission wide activity descriptions, reports and evaluations) to review with links or copies of the documents;
- A list of USAID programs for each technical team with brief descriptions of technical remit, A/COR (and contact info), implementing partner (and key point of contact) and maps, ideally a country map showing the geographic location of all programs;
- A list of key and/or recommended stakeholders (with contact information);
- Assistance to the team in making initial contact to arrange interviews, particularly to host country government stakeholders for whom USAID mission outreach is often required;
- Preparation of letters of introduction, as needed;
- Candidate site visits or key criteria to support analysis team identification of potential site visits;
- A list of relevant donor projects as available;
- Logistics support for site visits, i.e., suggestions for lodging, in-country air travel, rental car agencies and logistics specialists; and
- Review and feedback on the draft analysis report.

To ensure continued coordination with the mission over the course of the in-country work, the analysis team will submit progress reports once a week or once every two weeks to the activity manager which discusses progress, challenges and issues, and key findings to-date. (See list of deliverables in Section 4.)

VI. STAFFING AND ESTIMATED EFFORT

The analysis team shall include a Team Leader, with the following qualifications:

- Post-graduate qualifications (master's level degree or higher) in biology, ecology, zoology, forestry, ecosystem conservation, political economy, political ecology, environmental policy, environmental planning, or a closely related field;
- Knowledge of USAID's strategic planning process both broadly and as related to tropical forests and biodiversity;
- Expertise in assessing environmental threats;
- Experience in the geographical region and the specific country;
- Experience coordinating analyses and leading teams;
- Exceptional organizational, analytical, writing and presentation skills; and
- Fluent in English and preferably the language spoken in the analysis country.

Including Team Leader, the exact team composition shall be proposed by the consultant for approval by the mission and should ensure appropriate coverage across the below technical areas, tailored to the types of programming and environmental conditions prevalent in the specific country or region of focus.

- Post-graduate qualifications (master's level degree or higher) in biology, ecology, zoology, forestry, ecosystem conservation
- Agricultural, governance, health or other non-environment sector specialist who will focus on linkages between tropical forests, biodiversity and other key technical sectors; and
- Aquatic resources specialist and, if in a marine environment, one with marine expertise.
- Environmental political economist, or political ecologist, that understands the human dimensions of conservation and natural resources management and diverse conservation and management problems including, but not limited to, water, governance, fisheries management, wildlife management, agriculture, economic growth, extractive industries, protected areas, and the scale of the issue, from local, to regional to global.
- GIS expertise or access to GIS expertise to help identify, use and analyze geospatial data and maps.

Note: Where the consultant is a firm, cost-effective utilization of home office staff, including junior staff, for logistics, research/analysis/writing and report production support are expected.

The levels of effort (LOE) requirements for this task are included in the attached ECOS Activity Specification.

SOW ANNEX A: FAA 118/119 ANALYSIS REPORT OUTLINE

Cover Page
Acknowledgements
Front Material
Executive Summary

I. Introduction
    1.1 Purpose
    1.2 Brief Description of the USAID Program
    1.3 Methodology

II. Country Context
    2.1 Location and Country Context
    2.2 Biophysical Setting

III. Status of the Country's Biodiversity (and Tropical Forests)
    3.1 Major Ecosystem Types and Status
    3.2 Status of Tropical Forests
    3.3 Species Diversity and Status
    3.4 Genetic Diversity
    3.6 Status and Management of Key Natural Resources Outside Protected Areas

IV. Value and Economic Potential
    4.1 Value of Biodiversity
    4.2 Ecosystem Goods and Services

V. Legal Framework Affecting Conservation
    5.1 National Laws, Policies and Strategies
    5.2 International Agreements
    5.3 Government Agencies
    5.4 Conservation Initiatives: Gap Analysis

VI. Threats to Biodiversity (including Tropical Forests)
    6.1 Direct Threats to Biodiversity
    6.2 Drivers of Threats

VII. Actions Necessary to Conserve Biodiversity (including Tropical Forests)

VIII. Extent to Which the Mission Meets the Identified Actions Needed

IX. Recommendations
    9.1 Recommendations Based on Actions Necessary to Conserve Biodiversity (including Tropical Forests)
    9.2 Other Opportunities

X. Annexes

ANNEX B: FAA 118/119 ANALYSIS REPORT ANNOTATED OUTLINE

The purpose of this template is to improve the consistency with which FAA 118/119 analyses (hereafter referred to as "the analysis") are conducted across the U.S. Agency for International Development (USAID) by standardizing the sections of the report and the type and quality of information included in an analysis. The annotated outline should be used by teams conducting an analysis and USAID staff developing the scope of work (SOW) and reviewing the FAA 118/119 analysis.

The annotated outline describes and gives examples of the types of information that should be included in each section of an analysis. It should be used in conjunction with the FAA 118/119 Best Practices Guide, which describes how to prepare for and conduct an analysis. Excluding the executive summary, annexes, tables and figures, the analysis should be 20 to 35 pages. The number of pages (a range or top limit) should be specified in the SOW. Analysis reports should include the following sections.

ACKNOWLEDGMENTS

If the work was contracted out, list the contract name and number and the prime contractor and subcontractors. If the work was done by a USAID team, list the participating offices. List the team members and any additional affiliations that they may have. Identify the USAID mission activity manager

and the contracting officer's representative. Acknowledge the assistance received from USAID staff in setting up, carrying out the analysis and reviewing drafts.

FRONT MATERIAL

Add a table of contents, list of tables, list of figures and list of acronyms.

EXECUTIVE SUMMARY

The executive summary should not exceed four pages. The purpose of the analysis, directly from the SOW, should be included in the executive summary and the two legal requirements of the analysis should be restated. The executive summary should highlight the critical biodiversity in the country and demonstrate why the country's biodiversity is important to conserve. A summary of key threats, actions necessary, the extent to which USAID is addressing the necessary actions and key recommendations (bullet format is acceptable) should be included.

I. INTRODUCTION

(Not to exceed two pages)

1.1 PURPOSE

The purpose should:

1. Summarize or reproduce the purpose and objectives as described in the SOW;

2. Identify the type of analysis being conducted (FAA 119 or FAA 118/119);

3. Provide information on the previous analysis (year prepared and reason a new analysis is being conducted); and

4. Describe the role of the analysis in USAID strategic planning and the timing of the analysis in relation to the Country Development Cooperation Strategy (CDCS) development.

1.2 BRIEF DESCRIPTION OF THE USAID PROGRAM

Briefly describe the current USAID CDCS down to Development Objectives (DO) and Intermediate Results (IR) levels, and provide as much information as possible about the upcoming CDCS.

1.3 METHODOLOGY

In this section describe:

1. The composition of the analysis team (names, their roles/positions and a short bio-sketch should be included in an annex);

2. The tasks involved in information gathering, including document review, meetings with USAID teams and other stakeholder consultations and how they will be consulted, e.g., focus groups, informant

interviews, and surveys, should be included in an annex that lists stakeholders consulted and documents referenced/reviewed; and

3. Site visits; refer to an annex (if included) on site visit case studies or site visit details (see SOW for site visit best practices).

II. COUNTRY CONTEXT

(Not to exceed two paragraphs)

In most, if not all, cases, the information in this section is available in existing country-specific reports and documents. Therefore, this section should focus only on what is useful and necessary for understanding subsequent sections on the threats/drivers, the analysis of the actions needed and the

recommendations. This section should provide links to the relevant online documents and include only brief digests of the highly relevant or important information.

2.1 LOCATION AND COUNTRY CONTEXT

Briefly describe the country context. Unless important for subsequent analyses, there is no need to include information on government, climate, soils, geology, cultural or socioeconomic aspects. Specifically include:

1. Country location (include a map); and

2. Aspects of the social, cultural, governance and economic context, as they may affect biodiversity conservation or as biodiversity conservation may affect those factors. For example, if cultural aspects have no effect on or are not important in understanding biodiversity conservation, there is no need to describe the cultural context.

2.2 BIOPHYSICAL SETTING

Describe the main geological features, water bodies and other biophysical aspects that shape the country's biodiversity resources.

III. STATUS OF THE COUNTRY'S BIODIVERSITY (AND TROPICAL FORESTS)

(Not to exceed five pages; supporting maps and tables may be included as annexes)

This section focuses on analysis of the available biodiversity information. It should present summarized information on the biodiversity situation and, where possible, refer and/or provide links to more detailed documents.

3.1 MAJOR ECOSYSTEM TYPES AND STATUS

This section briefly covers:

1. The types, distribution and status of the country's main ecosystems based on the most current, reliable information available;

2. It should include the terrestrial and aquatic, including, if present, coastal and marine, ecosystems; and

3. Types and distribution of tropical forest ecosystems should be included, but for FAA 118/119 analyses (versus FAA 119 analyses only), details will be in Section 3.2, Status of Tropical Forests.

4. Climate change effects on biodiversity and tropical forests.

Tables and figures are useful to illustrate distribution and status in a concise format. In this section, include maps of main ecosystems in the country; forested areas and land uses; protected areas, including forest reserves and main aquatic resources.

3.2 STATUS OF TROPICAL FORESTS

In countries with tropical forests, a separate section on status and management of tropical forests should be included that briefly:

1. Describes forests inside and outside of protected areas; and

2. Describes efforts at documenting trends in forest cover and the reliability of and gaps in the data. (This is often a fairly technical analysis.)

3.3 SPECIES DIVERSITY AND STATUS

In this section:

1. Briefly discuss terrestrial and aquatic species diversity, endemism and endangered species;

2. Provide analysis of the available information, such as whether the data are reliable and complete;

3. Evaluate the pressure on endangered species; and

4. Highlight endangered species of particular social, economic, scientific or environmental importance and their habitat.

3.4 GENETIC DIVERSITY

This section should include summary information on:

1. Conservation of economically important species and germplasm, including landraces and wild relatives of agriculturally important crops and livestock (Note: missions should keep in mind that there are restrictions on USAID biodiversity funds for conservation of genetic diversity); and

2. Populations of wild species of economic or ecological importance (such as trees used for timber).

3.5 STATUS AND MANAGEMENT OF PROTECTED AREAS

This section includes a brief description of the country's protected area system:

1. The country classification (which may be based on the International Union for Conservation of Nature (IUCN) categorization or may be a country-specific system); and

2. Economic potential of the protected area system, including productive assets, ecosystem services and conservation enterprise opportunities.

This section (or an annex) should include an overview table and maps of the status and management of the protected area system. The information to provide in tables and maps depends on requirements in the SOW and may include:

1. All declared and proposed protected areas (national parks, private parks, wildlife reserves and refuges, forest reserves, sanctuaries, hunting preserves, Ramsar Convention on wetlands sites, etc.);

2. The institution responsible for the protection and management of each protected area;

3. The date of establishment of each protected area;

4. Area of coverage;

5. Ecosystems contained in each protected area; and

6. Protected area management plan status.

3.6 STATUS AND MANAGEMENT OF KEY NATURAL RESOURCES OUTSIDE PROTECTED AREAS

This section should briefly describe the status and management of critical biodiversity outside of protected areas and should include a table that, depending on the SOW requirements, describes:

1. Land cover or land-use type (e.g., wetlands/freshwater sources, major catchment areas, agricultural ecosystems, etc.);

2. Institution(s) responsible for management; and

3. Economic potential.

IV. VALUE AND ECONOMIC POTENTIAL

(Not to exceed two pages)

4.1 VALUE OF BIODIVERSITY

In this section discuss:

1. Any existing efforts to place economic values on the country's biodiversity; and

2. Key results of natural resource valuations, such as how natural resources valuation efforts are being used.

4.2 ECOSYSTEM GOODS AND SERVICES

In this section, attention should be given to ecosystem services and the commercial and noncommercial benefits they provide, including the links between ecosystem services and the country's biodiversity and tropical forests. These services include but are not limited to provisioning food and materials, improving the quality and moderating the quantity of water, providing wildlife habitat and spawning and nursery habitats for fisheries, enhancing climate resilience, mitigating storms and floods, buffering pollutants, providing greater resilience for communities and ecosystems, and supporting a wide array of cultural benefits, recreational opportunities and aesthetic values.

V. LEGAL FRAMEWORK AFFECTING CONSERVATION

(Not to exceed two pages)

This section should discuss the policies, laws and governmental institutions that affect the sustainable management and conservation of biodiversity and forests. The analysis should cover the effectiveness of the legal framework and effectiveness of and challenges faced by the institutions. This section should contribute to the understanding of the biodiversity situation and to the 118/119 analysis. Only descriptions of key biodiversity policies, regulations and institutions should be included in this section. An annex or links should be provided with additional information.

5.1 NATIONAL LAWS, POLICIES AND STRATEGIES

The focus of this section should be on policies and legislation related to forestry and biodiversity (including protected areas and threatened and endangered species). If included (see SOW), other sectors that affect biodiversity conservation, such as water, land use, agriculture, environmental impact analysis and climate change, should be placed in an annex. Rather than simply defining the policies and legislation that pertain to conservation, this section should:

1. Analyze their effectiveness;
2. Describe gaps in the legal framework;
3. Identify any needs for harmonization;
4. Discuss particularly successful policies and laws;
5. Discuss government capacity to implement the legal framework; and
6. Describe other constraints to implementation.

The status of the National Biodiversity Strategic Action Plans should be discussed in this section. A table format is a concise method of providing the required information.

5.2 INTERNATIONAL AGREEMENTS

This section is a list of international agreements, treaties and conventions of which the country is a member that are specifically related to forests and biodiversity. It should also include a brief analysis of the country's capacity to implement treaty/convention agreements, in particular, the Convention on International Trade in Endangered Species (CITES), the Convention on Biological Diversity, the Convention on the Conservation of Migratory Species of Wild Animals and other conservation-related international agreements.

5.3 GOVERNMENT AGENCIES

This section lists the key government institutions related to conservation and should provide an analysis of:

1. Responsibilities;
2. Effectiveness;
3. Challenges;
4. Institutional overlap; and
5. Collaboration.

Using a table format that lists institutions and mandates with a brief analysis of each institution is one method of communicating the information for this section. Alternatively, a table listing institution and mandate can be used, followed by an overall analysis of the effectiveness of the institutional framework for conservation.

5.4 CONSERVATION INITIATIVES: GAP ANALYSIS

The SOW will describe specific requirements for this section, which may include:

1. Current and, if possible, planned conservation efforts in the country, implemented by the government, non-governmental organizations, other donors and the private sector;
2. A brief explanation of the scope of the activities, for example, the geographic focus and the goals and objectives of the efforts;
3. Available conservation outcomes resulting from efforts; and
4. Funding levels.

The discussion should highlight the gaps in support (funding and in-kind contributions) and point out the conservation needs that lack support (technical, management, financial capacity). Key lessons learned and success stories should be highlighted.

Use a table to present the information in a succinct manner. The table should list the implementer, the funder if other than the implementer, the title and purpose of the initiative and if possible and if required

in the SOW, a brief evaluation of effectiveness. Describe in the text how effectiveness was evaluated. Include USAID and other U.S. Government conservation initiatives in the table.

VI. THREATS TO BIODIVERSITY (INCLUDING TROPICAL FORESTS)

(Not to exceed seven pages)

Sections 6.1 and 6.2 should discuss the direct threats to biodiversity and the indirect threats or drivers of the threats. Each direct threat may have several drivers. Enough information should be provided about the threats and drivers to give the reader a clear understanding of what is causing the degradation or loss to biodiversity in the country. The section should state how the threats and drivers were identified (stakeholder consultations, field visits, review of documentation, etc.). The National Biodiversity Strategic Action Plan is a good starting place to obtain information on the main threats and their underlying causes. The team should analyze all of the information and reach their own conclusions.

6.1 DIRECT THREATS TO BIODIVERSITY

A direct threat to biodiversity is a human action or unsustainable use that immediately degrades biodiversity (e.g., unsustainable logging, overfishing or mineral extraction). Through extensive consultations, the Conservation Measures Partnership developed a classification of threats to biodiversity (http://cmp-openstandards.org/tools/threats-and-actions-taxonomies/). Major categories of threats include:

1. Unsustainable agricultural and aquaculture (e.g., expansion for crops, aquaculture or livestock ranching, or poor farming and fishing practices);

2. Unsustainable biological resource use/overexploitation (e.g., for timber, fish, non-timber forest products, illegal hunting and fishing);

3. Unsound infrastructure development/urbanization;

4. Climate change (and related stressors such as changes in precipitation and sea level);

5. Pollution;

6. Invasive alien species; and

7. Mining and energy production.

Direct threats should be prioritized, from most important to least important, and a description of the prioritization methodology should be included.

6.2 DRIVERS OF THREATS

This section should discuss the drivers that give rise to the identified threats. A driver is a constraint, opportunity or other important variable that positively or negatively influences direct threats. A constraint is a factor that contributes to direct threats and is often an entry point for conservation actions (e.g., logging policies or demand for fish or illegal wildlife products). An opportunity is a factor that potentially has a positive effect on biodiversity interests, directly or indirectly, and can often serve

as an entry point for conservation (e.g., demand for sustainably harvested timber or market requirements for legally caught fish). Drivers are commonly referred to as indirect threats, factors or forces that influence the direct threats. Major categories of drivers include:

1. Institutional arrangements (e.g., lack of secure tenure, lack of adequate regulations, weak institutions, weak policies or perverse subsidies, such as fuel subsidies for fishing vessels);

2. Economic factors (e.g., international demand for timber, fish, wildlife products, biofuels, palm oil, or lack of economic incentives for conservation);

3. Inadequate technical capacity, such as access to information, tools and/or technologies; untrained staff; poor use of evidence in decision-making and weak monitoring and evaluation;

4. Inadequate management capacity (e.g., lack of individual or institutional management protocols, including those related to enforcement, stakeholder involvement and multi-institutional collaboration); and

5. Socio-political factors (e.g., special interest influences, lack of constituencies for conservation, political instability, crises and other situations of instability such as armed conflict).

TABLE A- 2. DEFINITIONS AND EXAMPLES OF DRIVERS AND THREATS TO BIODIVERSITY

	Drivers	**Threats**
Definition	A driver is a constraint, opportunity or other important variable that positively or negatively influences direct threats.	A direct threat to biodiversity is a human action or unsustainable use that immediately degrades biodiversity.
Categories	• Institutional arrangements • Economic factors • Capacity • Sociopolitical factors • Cultural or religious factors • Scientific and technological factors	• Habitat loss • Over-exploitation and unsustainable use • Unsound infrastructure • Climate change • Pollution and nutrient load • Invasive alien species
Examples	• Increased international demand for palm oil; inadequate land use policies, tenure, regulations or management • Increased demand for seafood; open access policies; lack of marine tenure and co-management • International demand for wildlife products; inadequate enforcement; lack of constituencies for conservation	• Deforestation resulting from agricultural expansion • Overfishing • Wildlife poaching • Artisanal gold mining leading to mercury pollution and deforestation • Invasive lionfish populations in the Caribbean

TABLE A- 2. DEFINITIONS AND EXAMPLES OF DRIVERS AND THREATS TO BIODIVERSITY		
	Drivers	**Threats**
	• Market price of gold; inadequate regulations and management • Unregulated use of wild species for pet trade; inadequate regulation of invasive species in trade; insufficient resources for management	

VII. ACTIONS NECESSARY TO CONSERVE BIODIVERSITY (INCLUDING TROPICAL FORESTS)

(Not to exceed four pages)

"Actions necessary to conserve biodiversity" should address the drivers of the direct threats. "Actions necessary" may be derived from the National Biodiversity Strategic Action Plan or other government documents, from the team's consultations, document review and/or site visits. The FAA 118/119 analysis team should reach its own conclusions on "actions necessary" and describe in the report how the "actions necessary" were developed. A concise method of presenting this information is illustrated below.

TABLE A- 3. ACTIONS NECESSARY LINKED TO DRIVERS AND DIRECT THREATS		
Drivers	**Links to Direct Threats**	**Actions Necessary**
Corruption and weak enforcement of laws, policies and agreements related to natural resources.	• Overharvesting • Poaching • Unsustainable cutting practices • Habitat conversion	Strengthen commitment to transparent governance including enforcement at national and local levels and strengthen capacity for monitoring, compliance and enforcement of natural resource laws and policies (incl. rule of law and justice); actively pursue co-management opportunities at local levels; in fisheries, improve policies/laws that will foster co-management approaches. Strengthen local civil society to support policy and regulation enforcement and anti-corruption advocacy.
Inadequate capacity at national and local levels for development planning and management of natural resources.	• Conversion, degradation, loss • Overharvesting • Mining • Infrastructure development	Enhance capacity by trainings for environmental management planning, monitoring and the access and use of information (especially geospatial where available). Strengthen the capacity of local institutions and community-based organizations responsible for the management of natural resources.

TABLE A- 3. ACTIONS NECESSARY LINKED TO DRIVERS AND DIRECT THREATS		
Drivers	**Links to Direct Threats**	**Actions Necessary**
Insufficient resources for biodiversity conservation and tropical forest management	• Poaching • Overharvesting • Pollution • Invasive species	Enhance sustainable financing for conservation from the public (through increased revenue and support) and private sectors (e.g., transparent fees, licensing and payment for ecosystem services).
Weak/non-existent data coupled with poor monitoring practices; uncoordinated analyses and research systems needed for understanding resources; priority setting; effective policy/decision-making.	• Overharvesting • Mining • Unsustainable cutting practices • Pollution • Conversion, degradation, loss	Promote applied research to inform policy and management practices; establish pilot (and then permanent) norms and standards for monitoring; support decision-making; and enhance dissemination of existing information.
Development plans and priorities (medium and long term) that do not adequately consider ecosystem services (forests/mangroves, watersheds, estuaries and biodiversity).	• Conversion, degradation, loss • Infrastructure development • Mining • Climate change	Build capacity and promote integrated spatial planning with other sectors at all levels, including engagement with the Ministry of National Planning/Development and Finance; include biodiversity, climate change, energy and food security; establish incentive system to encourage stakeholders (local level and provincial) to conserve/protect natural resources.
Lack of secure land tenure around forested areas; illegal and irregular land allocations; lack of marine tenure and secure access to fishing grounds, including customary rights	• Conversion, degradation, loss • Illegal logging, illegal fishing • Overharvesting	Improve land, marine and natural resource tenure security; increase capacity for research and advocacy on tenure and resource access-related issues and regulations to support government, civil society organizations and citizens.

VIII. EXTENT TO WHICH THE MISSION MEETS THE IDENTIFIED ACTIONS NEEDED

(Not to exceed four pages)

The analysis report should describe how the mission's current CDCS and/or planned CDCS and activities are contributing to the Congressional intent of fostering sustainable management and conservation of tropical forests and biodiversity.

The analysis team will describe how the mission's current CDCS and/or planned CDCS and activities are meeting the "extent to which" in the analysis report. Based on the analysis report, the mission will examine the extent to which the planned program areas in the new CDCS can support conservation of

tropical forest and biodiversity. The table below provides mission-wide examples of how missions are, or are not, currently meeting actions necessary.

TABLE A- 4. ACTIONS NECESSARY AND "EXTENT TO WHICH"

	Actions necessary to achieve conservation of tropical forest and biodiversity	**Extent to which** the current DO or IR contributes toward sustainable management and conservation of tropical forests and biodiversity
Examples	Promote a watershed approach to water use, management and the determination of "production" that recognizes the contribution of wildlife and healthy ecosystems to "water security," food security and nutrition and resilience.	The DO integrates a watershed and agro-ecological approach to food security within the Feed the Future activities to enhance sustainability and resilience and reduce threats to biodiversity.
	Promote strong, transparent, effective and accountable institutions and management arrangements over forests, fisheries and other biodiversity resources.	The DO integrates biodiversity and forest issues into their governance activity as a way to strengthen institutions and rule of law around issues that are relevant to the livelihoods of some of the poorest and most vulnerable populations.
	Reduce the potential for mosquito nets to be misused as fishing nets, as the fine nets can easily destroy fish populations.	The mission does not currently address threats to fisheries posed by mosquito net fishing.
	Include marine fisheries as a component of major food value chains to help safeguard a large source of protein and protect key marine habitats.	The mission does not currently consider threats to marine fisheries or coastal habitat.
	Increase conservation of natural wetlands	The mission does not currently address threats to wetlands from land conversion.

IX. RECOMMENDATIONS

(Not to exceed five pages)

Recommendations emerge from the analysis of the "actions necessary" and the "extent to which" the mission's current strategy and activities are meeting the actions necessary. The recommendations will guide the mission process of developing the extent to which the new CDCS will respond to the identified actions necessary.

9.1 RECOMMENDATIONS BASED ON ACTIONS NECESSARY TO CONSERVE BIODIVERSITY (INCLUDING TROPICAL FORESTS)

This section should present a table (see below) and narrative describing the recommendations derived from the "actions necessary" and "extent to which" analyses. The recommendations in this section should:

1. Strengthen the "extent to which" the mission addresses the "actions necessary";

2. Consider USAID's development portfolio in the country;

3. Consider USAID's comparative advantage;

4. Consider where USAID is likely to have the greatest impact; and

5. Take into account the gap analysis (who is doing what in biodiversity and tropical forest conservation and the relevant areas that lack information or action). The recommendations should describe the relevant biodiversity and tropical forest conservation issues that lack information and/or the actions necessary to address those issues.

The analysis team should develop recommendations that actively integrate biodiversity conservation into health, food security, economic growth, governance or other sector programming. Table 5 provides examples of different ways recommendations can be incorporated into sectors.

TABLE A- 5. RECOMMENDATIONS

	Recommendations		
Sector	**Opportunistic:** Working within the boundaries of programs to improve the extent to which the mission is meeting the actions necessary to reduce threats.	**Proactive:** Adapting programs to improve the extent to which the mission is meeting the actions necessary to reduce threats	**Direct Threat Reduction**: Designing with an explicit objective of reducing threats or otherwise contributing to biodiversity conservation.
Democracy and Governance	Identify opportunities to engage on human rights issues related to water quality, land allocation and compensation or other topics with high public interest.	Include actions that strengthen justice sector awareness and investigation capacity for prosecution of illegal activities that threaten biodiversity.	Build capacity for effective enforcement and prosecution through provision of financial or technical assistance to improve the capacity of government agencies to enforce wildlife laws and prosecute wildlife criminals
Health		Include a mosquito net recycling project that creates incentives for returning nets, integrates appropriate safeguards and includes outreach about net distribution programs to reduce the use of bed nets as fishing nets.	

TABLE A- 5. RECOMMENDATIONS			
Agriculture/ Economic Growth	Integrate a watershed and agro-ecological approach to food security within agriculture sector activities to enhance sustainability and resilience and reduce threats to biodiversity.	Include marine fisheries as a value chain to improve management and governance of coastal zones.	Improve capacity for collaborative management of resources adjacent to biodiversity priority areas, including support for national laws and policies.

9.2 OTHER OPPORTUNITIES

The analysis team may recommend additional opportunities based on their consultations during the analysis. These may be based on particular threats the analysis team identifies from USAID's program (CDCS) and, where mitigation could be integrated into program components, items that USAID should address to ensure sustainability of its portfolio or other opportunities the analysis team identifies during consultations.

SUGGESTED ANNEXES TO INCLUDED IN THE REPORT

ANNEX A: SCOPE OF WORK

ANNEX B: BIO-SKETCHES

ANNEX C: REFERENCES/DOCUMENTS CONSULTED

ANNEX D: LIST OF INDIVIDUALS CONSULTED

ANNEX E: ADDITIONAL MAPS, GRAPHICS AND TABLES

OPTIONAL ANNEXES:

- Key Changes and Updates from the Previous FAA 118/119
- Lessons Learned from the Previous FAA 118/119
- Additional Threatened and Endangered Species Information
- Site Visit Details/Case Studies
- Sector Specific Reviews

ANNEX C: TEMPLATE FOR FINAL 118/119 ANALYSIS REPORT SUBMISSION

Brief Description: The USAID/Nigeria Mission submits the attached FAA 118/119 analysis for Africa Bureau approval in preparation for the development of the new CDCS strategy.

This analysis addresses the actions necessary in the country to achieve conservation and sustainable management of tropical forests and to conserve biological diversity and the extent to which the actions proposed for support by the Agency meet the needs thus identified.

Mission activity manager overseeing FAA 118/119 analysis preparation:

Preparation date: mm/dd/yyyy

The mission requests approval for the report:

Mission Management:

_____ Date_____

Mission Program Office:

_____ Date_____

Mission Environment Office:

_____ Date_____

Regional Bureau:

_____ Date_____

ANNEX B: BIOGRAPHICAL INFORMATION ON REPORT AUTHORS

James Jolley (Team Leader) – Team lead, international development expert and water engineer. James is a senior environmental engineer at Cadmus with 30+ years' experience in water resources engineering, WASH, and environmental assessment. In early 2019, Mr. Jolley was co-leader on the USAID/Cambodia FAA 118/119 analysis. In the summer of 2018, he directed the USAID/CARPE FAA 118/119 analysis in 5 countries in the Congo River Basin. Over the last 5 years, Mr. Jolley has managed activities throughout Africa and LAC, including IRS field evaluations in Zimbabwe, Mozambique and Senegal, programmatic environmental assessments in Mali and Haiti, the development of USAID Sector Environmental Guidelines for Water Supply and Sanitation, and for Fisheries and Aquaculture, as well as the USAID Best Practices Review for Uganda, and the DRC. In 2018, he completed the health care waste management assessment and USAID staff training for USAID/Uganda. He has provided technical environmental compliance support to USAID Missions and BEOs, including AFR/SD, since 2012. Mr. Jolley served as the provincial water engineer for the Ministry of Agriculture in the North Province, in Garoua, Cameroun, as a Peace Corps Volunteer (1986-88). Mr. Jolley has a B.S. in Civil Engineering from the University of Washington and an M.S. in Civil and Environmental Engineering from the University of Maine.

Joshua Habib (Deputy Team Leader) – Mr. Habib is an international development specialist focusing on environmental, energy, and social impacts of projects, with over 20 years of experience. Mr. Habib has conducted field- and desk-based work in Africa, Eastern Europe, Latin America, and Asia, primarily for the U.S. Agency for International Development (USAID) and U.S. Forest Service International. Recent work includes Biodiversity and Forestry Assessments for USAID/Pakistan and South Sudan (2017, 2018); conducting USAID training in Malawi (2015), Kenya (2016), Tanzania (2017), Ukraine (2018), and Zimbabwe (2017) on environmental compliance and environmentally sound design and management (ESDM) of international development projects. Mr. Habib has a B.A. in Public Policy from Duke University and an M.S. in International Environment and Policy from the University of Michigan.

Nduka Okaro (Senior USAID Portfolio and Nigeria Institutional Policy Expert) – Mr. Okaro is an international development consultant specializing in monitoring, evaluation, and learning (MEL) with 19 years of experience. He served for over 15 years with USAID/Nigeria in senior professional positions providing technical and managerial expertise in a wide range of agricultural and environmental activities. Previous experience with USAID includes 10 years as the USAID/Nigeria Mission Environmental Officer and extensive experience with performance monitoring for the Economic Growth Office. Mr. Okaro's most recent experience includes consultancy on a DFID funded Oil and Gas sector reforms project. Mr. Okaro has a B.Sc. in Agricultural Economics from the University of Ibadan and a M.Sc. in Agricultural Economics from the University of Reading.

Dr. Iyiola Tella (Senior Forest and Biodiversity Expert) – Dr. Tella is a professor of Ecosystems Management at the Federal University of Technology in Yola Nigeria and Director of the Center for Research Development with over 15 years' experience. Dr. Tella has published over 36 peer-reviewed articles in national and international scientific journals. Select publications include *Frugivorous Bird Species Diversity in Relation to the Diversity of Fruit Tree Species in Reserved and Designated Green Areas in the Federal*

Capital Territory, Nigeria, and *Plant species diversity along river Benuebank under the influence of siltation and solid waste effluent*. Dr. Tella's recent environmental assessment experience includes work as Deputy Team Leader for the Adamawa State Fadama II Baseline Study (2006-2007), and researcher and contributing author to the Gbaran-Ubie IOGP Biodiversity Action Plan for Shell Petroleum Development Company (2013-2015). Dr. Tella holds a PhD in Forest Resources Management from the Federal University of Technology of Akure, Nigeria, a M.Sc. in Forest Resources Management from the University of Ibadan, and a B.Tech. in Forestry and Wood Technology from the Federal University of Technology of Akure, Nigeria.

ANNEX C: BIBLIOGRAPHY

Abbas, Innocent, Olalekan Bello, and Hannatu Abdullahi. "Mapping and analyzing the land use–land cover of Nigeria between 2001 and 2009." MOJ Eco Environ Science Vol. 3 Issue 3 (June 2018):197–205. DOI: 10.15406/mojes.2018.03.00087.

Abd El-Ghani, Monier. "Traditional medicinal plants of Nigeria: an overview." *Agriculture and Biology Journal of North America.* Vol. 7 (2016): 220-247. https://www.traffic.org/site/assets/files/2960/traffic_pub_bulletin_18_1.pdf#page=39.

Abdulaziz, Hassan, Foziah Johar, M. Rafee Majid, & N. I. Medugu. "Protected area management in Nigeria: A review." Journal Teknologi, Vol. 77 (January 2015): 31-40. DOI: 10.11113/jt.v77.6526.

Adekola, Olalekan, and Gordon Mitchell. The Niger Delta wetlands: Threats to ecosystem services, their importance to dependent communities and possible management measures. *International Journal of Biodiversity Science, Ecosystem Services & Management*, Vol. 7, No. 1: 50-68 (August 2011).

Adepoju, M., A. Millington, and K. Tansey. "Land Use/Land Cover Change Detection in Metropolitan Lagos (Nigeria): 1984-2002." ASPRS 2006 Annual Conference, 1-5 May 2006, Reno, Nevada. http://www.asprs.org/a/publications/proceedings/reno2006/0002.pdf.

Adeyemo, Olanike. "Consequences of Pollution and Degradation of Nigerian Aquatic Environment on Fisheries Resources." *The Environmentalist.* Vol. 24 (2004): 297-306. https://doi.org/10.1023/B:ENVR.0000031357.89548.fb.

Agbeja, Yetunde E. "Marine protected area: Prospective tool for ecosystem-based fisheries management in Nigeria." *International Journal of Biodiversity and Conservation.* Vol. 9 *(* 2017): 158-166. DOI: 10.5897/IJBC2016.1062.

Aliyu, Alhaji A. & Lawal Amadu. "Urbanization, cities, and health: The challenges to Nigeria - A review." *Annals of African medicine*. Vol. 16 No. 4 (December 2017):149–158. DOI: 10.4103/aam.aam_1_17.

Aliyu, Rafeeat. "Cross River Superhighway Pushes Forth Despite Pushback." *Heinrick Boll Stiftung*. 15 April 2019. https://ng.boell.org/en/2019/04/15/cross-river-superhighway-pushes-forth-despite-pushback.

Alkali, Arc. John L.S. "Planning Sustainable Urban Growth in Nigeria: Challenges and Strategies. Conference on Planning Sustainable Urban Growth and Sustainable Architecture," held at the ECOSOC Chambers, United Nations Headquarters, NY, USA, 6 June 2005. https://www.un.org/en/ecosoc/meetings/2005/docs/Alkali.pdf.

Allison, Martin E. and Daniel Okadi. "Species distribution and abundance in the lower Nun River, Niger Delta, Nigeria." *Journal of Fisheries International.* Vol. 4 No. 1: 13-18 (February 2009).

Ajonina, Gordon, Abdoulaye Diame, and James Kairo. "Current status and conservation of mangroves in Africa: An overview." *World Rainforest.* (2008). https://wrmbulletin.wordpress.com/2008/08/25/current-status-and-conservation-of-mangroves-in-africa-an-overview/.

Africa Tour Operators. "Chad Basin National Park." Africa Tour Operators. 2019. https://www.africatouroperators.org/nigeria/chad-basin-national-park.

African Development Bank Group. *Programme for Integrated Development and Adaptation to Climate Change in the Niger Basin*. African Development Bank Group. (October 2018): 1- 24. https://www.afdb.org/en/documents/document/multinational-programme-for-integrated-development-and-adaptation-to-climate-change-in-the-niger-basin-pidacc-appraisal-report-109273.

African Development Bank Group. *Federal Republic of Nigeria Country Strategy Paper 2013-2017*. AfDB. (January 2013). https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Nigeria%20-%202013-2017%20-%20Country%20Strategy%20Paper.pdf.

ARD, Inc. *Nigeria Environmental Analysis Final Report*. Under USAID Contract No. LAG-I-00-99-00013-00 BIOFOR IQC. (April 2002): 0 – D-10. https://rmportal.net/library/content/1/118_nigeria/view.

Atu, Joy, Offiong Raphael Ayama, and Eja. "Urban Sprawl Effects on Biodiversity in Peripheral Agricultural Lands in Calabar, Nigeria." *Journal of Environment and Earth Science*. Vol. 3, No. 7 (2013). https://www.iiste.org/Journals/index.php/JEES/article/view/6408.

BBC, "Nigerians Living in Poverty Rise to Nearly 61%." BBC. (13 February 2012). https://www.bbc.com/news/world-africa-17015873.

Balinga, M. USAID/West Africa Biodiversity and Climate Change (WA BiCC). Understanding Threats to West African Biodiversity and Linkages to Wildlife Trafficking: Nigeria Assessment Field report. (2018). 2nd Labone Link, North Labone, Accra.

Bioresources Development and Conservation Programme (BDCP). *Assessment of Control Measures for Nypa Palm Infestation in Nigeria Final Report.* United Nations Industrial Development Organization (UNIDO). (2007): 1- 112. https://open.unido.org/api/documents/4788762/download/(R)%20NIGERIA.%20ASSESSMENT%20OF%20CONTROL%20MEASURES%20FOR%20NYPA%20PALM%20INFESTATION%20IN%20NIGERIA.%20FINAL%20REPORT%20(23585.en).

BirdLife International. "Chad Basin National Park: Chingurmi-Duguma Sector." Data Zone.. 2020. http://datazone.birdlife.org/site/factsheet/chad-basin-national-park:-chingurmi--duguma-sector-iba-nigeria.

Blom, Allard. "Western Africa: Western Cameroon Extending into Nigeria." WWF. *World Wildlife Fund*. www.worldwildlife.org/ecoregions/at0103.

Borokini, Temitope I. "Invasive Alien Plant Species in Nigeria and their Effects on Biodiversity Conservation." *Tropical Conservation Science*, Vol. 4 No. 1 (2011): 103-110. https://doi.org/10.1177/194008291100400110.

Bourn, D., W. Wint, R. Blench, & E. Woolley. "Nigerian Livestock Resources Survey." *FAO*. http://www.fao.org/livestock/agap/frg/FEEDback/War/t1300b/t1300b0g.htm.

The Cadmus Group. Stakeholder consultations, periodic report 1. 9 – 13 September 2019.

Cannon, John C. "Cross River superhighway changes course in Nigeria." *Mongabay.* 28 April 2017. https://news.mongabay.com/2017/04/cross-river-superhighway-changes-course-in-nigeria/.

Central Intelligence Agency (CIA). "Nigeria." The World Factbook. *Central Intelligence Agency (CIA)*. Last updated 1 February 2018. https://www.cia.gov/library/publications/resources/the-world-factbook/geos/ni.html.

Chatham House. The Royal Institute of International Affairs. (2019). Illegal Logging Portal: Nigeria. https://www.illegal-logging.info/regions/nigeria.

Chete, L.N., J.O. Adeoti, F. M. Adeyinka, & O. Ogundele. "Industrial development and growth in Nigeria: Lessons and challenges." Learning to Compete Working Paper No. 8. (2016). https://www.brookings.edu/wp-content/uploads/2016/07/L2C_WP8_Chete-et-al-1.pdf.

Conservation Biology Institute (CBI). "Biodiversity Hotspots Revisited, Conservation International, 2011." Data Basin. *Center for Applied Biodiversity Science at Conservation International.* https://databasin.org/datasets/23fb5da15861411 09fa6f8d45de0a260.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Interpretation and Implementation Matters General Compliance and Enforcement Compliance Matters Application of Article XIII in Nigeria. Seventieth meeting of the Standing Committee Rosa Khutor, Sochi (Russian Federation). 1-5 October 2018. https://cites.org/sites/default/files/eng/com/sc/70/E-SC70-27-03-05.pdf.

Corcoran, Emily, Corinna Ravilious, and Mike Skuja. *Mangroves of Western and Central Africa.* United Nations Environment Programme (UNEP) World Conservation Monitoring Centre (WCMC). (June 2007): 1-88. http://wedocs.unep.org/bitstream/handle/20.500.11822/7768/-Mangroves%20of%20West%20Africa-20073922.pdf?sequence=3.

Daniels, Alfonso, et. al. *Western Africa's Missing Fish. The Impacts of Illegal, Unreported, and Unregulated Fishing and Under-Reporting Catches by Foreign Fleets.* June 2016. https://www.odi.org/sites/odi.org.uk/files/resource-documents/10665.pdf.

Demographia "World Urban Areas." 15 Ed. Demographia. (2019). http://www.demographia.com/db-worldua.pdf.

Dunn, Andrew, Richard Bergl, et. al. Revised Regional Action Plan for the Conservation of the Cross-River Gorilla: 2014-2019. IUCN/SSC Primate Specialist Group & Wildlife Conservation Society, New York.

Earth Policy Institute (EPI). "World on the Edge by the number of growing goat herds signal global grassland decline." *EPI.* (2011). http://www.earth-policy.org/mobile/releases/highlights14.

"Ecoregions 2017 ©." Ecoregions 2017 ©. https://ecoregions2017.appspot.com/.

Edozien, Frankie. "In Nigeria, Plans for the World's Largest Refinery." *The New York Times.* 9 October 2018. https://www.nytimes.com/2018/10/09/business/energy-environment/in-nigeria-plans-for-the-worlds-largest-refinery.html.

Eneh, Onyenekenwa C. "Managing Nigeria's Environment: The Unresolved Issues." *Journal of Environmental Science and Technology.* Vol 4. Issue 3 (2011): 250-263. DOI: 10.3923/jest.2011.250.263.

Enuoh, Oliver and Francis Bisong. "Colonial Forest Policies and Tropical Deforestation: The Case of Cross River State, Nigeria." Open Journal of Forestry, Vol 5, (2015): 66-79. DOI: 10.4236/ojf.2015.51008.

Environmental Investigation Agency (EIA). *The Racket Continues: The unabated illegal and unsustainable timber trade from Nigeria*. (2017): 1-18.

Environmental Investigation Agency (EIA). *The Rosewood Racket, China's Billion Dollar Illegal Timber Trade and the Devastation of Nigeria's Forests.* (October 2017): 1-40. https://content.eia-global.org/assets/2017/rosewood-racket/PDF/Rosewood+Racket+Report+(High+Res).pdf.

Environmental Investigation Agency. "Immediate Suspension: Global Wildlife Treaty Bans Massive Illegal Timber Trade from Nigeria." Environmental Investigation Agency. (1 November 2018). https://eia-global.org/press-releases/20181101-immediate-suspension.

Eyo, A.A. and Y. B. Ahmed. "Management of Inland Capture Fisheries and Challenges to Fish Production in Nigeria." *Fisheries Society of Nigeria.* (2015): 624-636. http://aquaticcommons.org/id/eprint/4088.

Ezeobi, Chiemlie. "Nigeria: How Nigeria Loses $70m to Illegal Fishing by Chinese Vessels." AllAfrica. (7 March 2018). https://allafrica.com/stories/201803070060.html.

Federal Department of Forestry (FDF) and Federal Ministry for Environment (FMEnv). *National Forest Reference Emission Level for the Federal Republic of Nigeria.* (January 2019): 1-54. https://redd.unfccc.int/files/2019_submission_frel_nigeria.pdf.

Federal Government of Nigeria (FGN). *Nigeria's Fifth National Biodiversity Report*. Convention on Biological Diversity (CBD). (December 2015): 1 -75. https://www.cbd.int/doc/world/ng/ng-nr-05-en.pdf.

Federal Government of Nigeria (FGN). Nigeria's Fourth National Biodiversity Report. CBD. (2010). https://www.cbd.int/doc/world/ng/ng-nr-04-en.pdf.

Federal Government of Nigeria (FGN). *Nigeria's Path to Sustainable Development Through Green Economy, Country Report to the Rio +20 Summit.* (June 2012). https://sustainabledevelopment.un.org/content/documents/1023nigerianationalreport.pdf.

Federal Ministry of Environment (FMEnv). Department of Forestry (DOF). "National Ivory Action Plan for Nigeria." https://cites.org/sites/default/files/common/prog/niaps/Nigeria_NIAP.pdf.

Federal Ministry of Environment (FMEnv). Federal Republic of Nigeria (FRN) National Biodiversity and Strategy Action Plan (NBSAP) 2016-2020. Convention on Biological Diversity. (December 2015). https://www.cbd.int/doc/world/ng/ng-nbsap-v2-en.pdf.

Federal Ministry of Environment (FMEnv) Special Climate Change Unit (SCCU). *National Adaption Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN).* (November 2011). http://csdevnet.org/wp-content/uploads/NATIONAL-ADAPTATION-STRATEGY-AND-PLAN-OF-ACTION.pdf.

Federal Republic of Nigeria (FRN). *Nigeria's Second National Communication Under the United Nations Framework Convention on Climate Change*. (2014). https://unfccc.int/sites/default/files/resource/nganc2.pdf.

Fentiman, Alicia. "The Anthropology of Oil: The Impact of the Oil Industry on a Fishing Community in the Niger Delta." *Social Justice* Vol. 23 No. 66 (1996): 87-99. Accessed January 15, 2020. www.jstor.org/stable/29766976.

Fisheries Committee for the West Central Gulf of Guinea. Nigeria's Fight Against Illegal Fishing Improves through Inter-Agency Cooperation. (15 May 2018). https://fcwc-fish.org/nigerias-fight-against-illegal-fishing-improves-through-inter-agency-cooperation/.

Food and Agriculture Organization of the United Nations (FAO). "The future of livestock in Nigeria. Opportunities and challenges in the face of uncertainty." 2019. Rome.

Food and Agriculture Organization of the United Nations (FAO). "Description of Fisheries." Marine Fishery Resources of Nigeria: A Review of Exploited Fish Stocks. www.fao.org/3/R9004E/R9004E04.htm.

Food and Agriculture Organization of the United Nations (FAO). "Nigeria at a Glance." FAO in Nigeria. *FAO*. http://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/.

Food and Agriculture Organization of the United Nations (FAO). Global Forest Resources Assessment 2015. 2nd Ed. (2016). "http://www.fao.org/3/a-i4793e.pdf.

Food and Agriculture Organization of the United Nations (FAO). "Chapter 2 - Direct contribution of wildlife to food security," (1995). http://www.fao.org/3/w7540e/w7540e04.htm.

Food and Agriculture Organization of the United Nations (FAO). "Country Profile – Nigeria." AQUASTAT - FAO's Information System on Water and Agriculture. 2016. Accessed August 2019. www.fao.org/nr/water/aquastat/countries_regions/NGA/index.stm.

"GPS Coordinates of Nigeria. Latitude: 9.0778 Longitude: 8.6775." Latitude.to, Maps, Geolocated Articles. Latitude Longitude Coordinate Conversion. https://latitude.to/map/ng/nigeria.

Hahn, Beth. Nigeria Biodiversity and Tropical Forests 118/119 Assessment. USDA Forest Service Office of International Programs. (2013): 1-49. https://ecd.usaid.gov/faa/source/Nigeria_2013.pdf.

Hansen, Matthew, Peter Potapov, et. al. "High-Resolution Global Maps of 21st-Century Forest Cover Change." *Science* Vol. 342 Issue 6160. (15 November 2013): 850–853. DOI: 10.1126/science.1244693.

Harrison, Paula, et al. "Linkages between biodiversity attributes and ecosystem services: A systematic review." *Ecosystem Services*. Vol. 9 (September 2014):191-203. https://doi.org/10.1016/j.ecoser.2014.05.006.

Hoornweg, Daniel, & Kevin Pope. "Population predictions for the world's largest cities in the 21st century." *Environment and Urbanization*. Vol. 29 No. 1 (2016):195-216. DOI: https://doi.org/10.1177/0956247816663557.

Idowu, Mbolaji and Olajumoke Morenikeji. "Wild Fauna Conservation in Nigeria." *Environment and Natural Resources Research. Vol. 5 No. 3* (June 2015): 98-108. https://www.researchgate.net/publication/282070993_Wild_Fauna_Conservation_in_Nigeria.

Ifeanyi, Anago. "Environmental impact assessment as a tool for sustainable development: The Nigerian experience. Proceedings of the FIG XXII International Congress," 19-26 April 2002: 1-13, Washington, D.C. USA.

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. "Ecosystem Services." *Science and Policy for People and Nature Secretariat*. 2019. https://www.ipbes.net/glossary/ecosystem-services.

Internal Displacement Monitoring Centre. "Nigeria, Overview." Internal Displacement Monitoring Centre. (2019). http://www.internal-displacement.org/countries/nigeria.

International Crisis Group. "Stopping Nigeria's Spiraling Farmer-Herder Violence." Africa Report No. 262, 26 July 2018. https://d2071andvip0wj.cloudfront.net/262-stopping-nigerias-spiralling-farmer-herder-violence.pdf.

International Union for Conservation of Nature (IUCN) Niger Delta Panel. *Developing a biodiversity conservation strategy for the Niger Delta: Integrating biodiversity considerations into SPDC's operations.* International Union for Conservation of Nature (IUCN). (January 2018). https://portals.iucn.org/library/sites/library/files/documents/2018-014-En.pdf.

International Union for Conservation of Nature (IUCN) Red List of Threatened Species. *IUCN.* https://www.iucnredlist.org/.

Izuchukwu, Oji-Okoro. "Analysis of the Contribution of Agricultural Sector on the Nigerian Economic Development." World Review of Business Research, Vol. 1 No. 1 (March 2011):191 – 200. https://www.researchgate.net/publication/264887608_Analysis_of_the_Contribution_of_Agricultural_Sector_on_the_Nigerian_Economic_Development.

Jacob, D. E. et al. "Wildlife Poaching in Nigerian National Parks: A Case Study of Cross River National Park." *International Journal of Mol. Ecology and Conservation*. Vol.5, No.4 (2015): 1-7. DOI: 10.5376/ijmec.2015.05.0004.

Kaetzer-Hodson, Katherine, correspondence with authors, 19 November 2019.

Kelman, Illisa and Paul Burgess. "Western Africa: Stretching from Nigeria to Senegal." WWF. *World Wildlife Fund.* www.worldwildlife.org/ecoregions/at0707.

Kimutai, Kenneth. "Ecological Regions of Nigeria." World Atlas. *WorldAtlas.* 18 October 2016. www.worldatlas.com/articles/ecological-regions-of-nigeria.html.

Kimutai, Kenneth. "Endangered Mammals of Nigeria." World Atlas. *WorldAtlas.* 1 August 2019. https://www.worldatlas.com/articles/endangered-mammals-of-nigeria.html.

Lameed, Gbolagade. "Species Diversity and Richness of Wild Birds in Dagona-Waterfowl Sanctuary, Nigeria." *African Journal of Food, Agriculture, Nutrition and Development*. Vol. 12, No. 5 (August 2012). http://www.bioline.org.br/pdf?nd12062.

Luiselli, Luca M. "Comparative abundance and population structure of sympatric Afrotropical tortoises in six rainforest areas: The differential effects of "traditional veneration" and of "subsistence hunting" by local people." *Acta Oecologica* Vol. 24: 157-163 (July 2003).

Luiselli, Luca M. "How an Ebola campaign in Nigeria discouraged bushmeat consumption." (30 October 2016). https://theconversation.com/how-an-ebola-campaign-in-nigeria-discouraged-bushmeat-consumption-67733.

MacPherson, Ronnie. Final report of the Land Degradation Neutrality Target Setting Programme. UNCCD. (March 2019). https://www.unccd.int/sites/default/files/relevant-links/2019-04/LDNTSP-EvalReport%20final.pdf.

Martin-Mehers, Gillian. IUCN Niger Delta Panel: Stories of influence. *IUCN.* (November 2018): 1-18. https://portals.iucn.org/library/node/47915.

McGinley, M. Niger Delta swamp forests: In: Encyclopedia of Earth. Environmental Information Coalition. National Council for Science and the Environment. Washington, DC, USA. (2008).

Messenger, Stephen. "There Are Only 100 Gorillas Left in Nigeria, Conservationists Say." The Dodo. *The Dodo*. (24 July 2014). www.thedodo.com/there-are-only-100-gorillas-le-639866691.html.

Mmom, Prince and Samuel Arokoyu. "Mangrove Forest Depletion, Biodiversity Loss and Traditional Resources Management Practices in the Niger Delta, Nigeria." Research Journal of Applied Sciences, Engineering and Technology. (2010): 28-34.

Mohamed, Hamza. "Nigeria bushmeat industry rebounds after Ebola outbreak." Al Jazeera. (31 May 2018). https://www.aljazeera.com/indepth/features/nigeria-bushmeat-industry-rebounds-ebola-outbreak-180329072812588.html.

Mongabay.com. "Nigeria Forest Information and Data." Mongabay.com. https://rainforests.mongabay.com/deforestation/2000/Nigeria.htm.

Morgan, Bethen, et. al., *Regional Action Plan for the Conservation of the Nigeria-Cameroon Chimpanzee (Pan troglodytes ellioti)*. IUCN. (2011): 1-48.

National Center for Genetic Resources and Biotechnology (NCGRB). *State of Plant Genetic Resources for Food and Agriculture in Nigeria.* (October 2008): 1-73. http://www.fao.org/pgrfa-gpa-archive/nga/Nigeria2.pdf.

National Economic Council. "National Livestock Transformation Plan (NLTP) 2019-2028." Association of Food and Agro Processors. 6 February 2019. https://foodprocessorsng.org/national-livestock-transformation-plan-nltp-2019-2028/.

NS Energy. "Mambilla Hydropower Project." NS Energy. *NS Energy*. https://www.nsenergybusiness.com/projects/mambilla-hydropower-project-nigeria/.

Nelson, Erik. "The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations." *Journal of Natural Resources Policy Research*. Vol. 5. 10.1080/19390459.2013.763324.

News Agency of Nigeria. "Kashimbila power project ready for commissioning – minister." *Energy Central.* 31 August 2019. https://www.energycentral.com/news/kashimbila-power-project-ready-commissioning-%E2%80%93-minister.

Nigeria National Park Service. "Chad Basin National Park." National Park Service. http://nigeriaparkservice.org/?p=136.

"Nigerian Oil Spill Monitor." (2019). https://oilspillmonitor.ng/

Nigerian Conservation Foundation (NCF). "Annual Report & Financial Statements 2016." (2016). https://www.ncfnigeria.org/Reports/2016%20NCF%20Annual%20Report.pdf.

Njoroge, Teresia. "Nigeria Approves US $471 Million for Construction of 10 Roads." *Construction Review Online.* 10 May 2019. https://constructionreviewonline.com/2019/05/nigeria-approves-us-471m-for-construction-of-10-roads/.

Norris, Ken, et al. "Biodiversity in a forest-agriculture mosaic – The changing face of West African rainforests." *Biological Conservation.* Vol. 143 No. 10 (October 2010): 2341-2350. https://doi.org/10.1016/j.biocon.2009.12.032.

Nwabeze, G.O. & A.P. Erie. "Artisanal Fishers' Use of Sustainable Fisheries Management Practices in the Jebba Lake Basin, Nigeria." *Journal of Agricultural Extension*. Vol. 17 No.1 (June 2013): 123-134. http://dx.doi.org/10.4314/jae.v17i1.12.

Okaeme, R.A., A. N. Omorinkoba, & R.L. Bwala, "Illegal Fishing of Inland Water Bodies of Nigeria: Kainji Experience." *Continental J. Fisheries and Aquatic Science*, Vol. 6 No.1 (2012): 47-58.

Okafor-Yarwood, Ifesinachi. "Nigeria's depleting fish stocks may pose a threat to regional security." The Conversation. (7 December 2018). https://theconversation.com/nigerias-depleting-fish-stocks-may-pose-a-threat-to-regional-security-105168.

Okoi, Obasesam. "The Paradox of Nigeria's Oil Dependency." Africa Portal. (21 January 2019), https://www.africaportal.org/features/paradox-nigerias-oil-dependency/.

Olaoye, Olalekan Jacob and Wahab Gbenga Ojebiyi. "Marine Fisheries in Nigeria: A Review." *Marine Ecology - Biotic and Abiotic Interactions*. (2018). doi:10.5772/intechopen.75032.

Omoniyi, Benjamin. "An examination of the causes of poverty on economic growth in Nigeria." Africa's Public Service Delivery and Performance Review. Vol. 6 No. 1 (12 September 2018): 175. https://doi.org/10.4102/apsdpr.v6i1.175.

Page, Matthew T. "A New Taxonomy for Corruption in Nigeria." *The Carnegie Endowment for International Peace*, (July 2018). https://carnegieendowment.org/files/CP_338_Page_Nigeria_FINAL.pdf.

Paraskova, Tsvetana. "Nigeria Approves New Crude Oil Export Terminal In Niger Delta." *OilPrice.com.* 28 May 2019. https://oilprice.com/Latest-Energy-News/World-News/Nigeria-Approves-New-Crude-Oil-Export-Terminal-In-Niger-Delta.html.

Phelps, Teale, Tuesday Reitano, and Wietse van der Werf. *The Illegal Fishing and Organized Crime Nexus: Illegal Fishing as Transnational Organized Crime. The Global Initiative Against Transnational Organized Crime and The Black Fish*. April 2015. https://www.unodc.org/documents/congress/background-information/NGO/GIATOC-Blackfish/Fishing_Crime.pdf.

Power Technology. "Zungeru Hydropower Project." Power Technology. *Power Technology*. https://www.power-technology.com/projects/zungeru-hydropower-project/.

Premium Times. "Nigeria releases census of goats, sheep, pigs, other livestock in country." *Premium Times*. 2 June 2016. https://www.premiumtimesng.com/news/top-news/204577-nigeria-releases-census-goats-sheep-pigs-livestocks-country.html.

Ramsar. "Nigeria." Ramsar Sites Information Service. *RAMSAR*. https://rsis.ramsar.org/ris-search/?f%5B0%5D=regionCountry_en_ss%3ANigeria&pagetab=2.

Ross, Will. "Lake Chad: Can the Vanishing Lake Be Saved?" BBC News. *BBC*. (31 March 2018). www.bbc.com/news/world-africa-43500314.

Smetana, Dave. "The Nature Conservancy Terrestrial Ecosystems." The Nature Conservancy. *Data Basin.* (9 January 2014). https://databasin.org/datasets/9c7bc177c6154d71b045839 1f3177053.

Sodeinde, O.A. and D.A. Soewu. "Pilot Study of the Traditional Medicine Trade in Nigeria." TRAFFIC Bulletin, Vol. 18 No. 1 (September 1999): 35-40. https://www.traffic.org/site/assets/files/2960/traffic_pub_bulletin_18_1.pdf#page=39.

Søreide, Tina, & Ivar Kolstad. "Corruption in Natural Resource Management: Implications for Policy Makers." *Resources Policy*. Vol. 34 (2019): 214-226. DOI: 10.1016/j.resourpol.2009.05.001.

Stakeholder Consultation at the Bauchi Reserve, Nigeria. September 2019.

Stakeholder Consultations with Federal Ministry of Water Resources. 13 September 2019.

Stakeholder Consultation with Geoffery Nachamada, Chief Sarki Duguri, and Dr. Issa Mohammed. 16 September 2019. Cauchi Town & Yankari Game Reserve, Bauchi Nigeria.

Stakeholder Consultation with Nachamada, Duguri, and Mohammed. 17 September 2019. Yankari Game Reserve & Bauchi Town.

Stakeholder Consultation with the Wildlife Conservation Society (WCS). September 2019.

Stakeholder Consultation, Yankari Game Reserve, Nigeria. September 2019.

Stakeholder consultation Yankari Game Reserve, and Cross River National Park. September 2019.

Sunday, Nwafor. "Nigeria Ranks 144/180 On Transparency International's Corruption Perception Index." *AllAfrica*. (29 January 2019). https://allafrica.com/stories/201901290456.html.

Sustyvibes. "How Nigeria strives to achieve biodiversity conservation targets, by CBD." Sustyvibes. (2017). https://sustyvibes.com/nigeria-strives-achieve-biodiversity-conservation-targets-cbd/.

Tognetti, Sylvia. "Western Africa." WWF, *World Wildlife Fund.* www.worldwildlife.org/ecoregions/at1401.

Transparency International. Corruption Perception Index, Nigeria. (2018). https://www.transparency.org/news/feature/cpi2018-subsaharan-africa-regional-analysis.

"Tropical Research & Conservation Centre." Omogolo Wildlife Trust. https://omogolowildlife.org/projects/sea-turtles-nigeria.

Ukpabi, Itehm and Inaoyom Imong. *Wildlife Conservation Society Cross River National Park (Oban Division) Annual Report: January – December 2018*. Wildlife Conservation Society. (February 2019). https://nigeria.wcs.org/About-Us/Publications/Categoryid/930.aspx.

Uluocha, N. and I. Okeke. "Implications of wetlands degradation for water resources management: Lessons from Nigeria." *Geojournal*, Vol. 61: 151-154 (October 2004).

Umoh, Gabriel S. "The promise of wetland farming: Evidence from Nigeria." *Agricultural Journal*, Vol. 3 Issue 2: 107-112 (April 2008). http://medwelljournals.com/abstract/?doi=aj.2008.107.112.

United Nations "World Population Prospects 2019." United Nations. 2019. https://population.un.org/wpp/DataQuery/.

United Nations Development Program (UNDP). "Niger Delta Biodiversity Project." UNDP Nigeria. *UNDP.* 2011. https://www.ng.undp.org/content/nigeria/en/home/operations/projects/environment_and_energy/niger-delta-biodiversity-project.html.

United Nations Development Program (UNDP). "Human Development Reports, Nigeria." UNDP. (2019). http://hdr.undp.org/en/countries/profiles/NGA.

United Nations Development Program (UNDP). *The State of Biodiversity in Africa: A Mid-Term Review of Progress Towards the Aichi Biodiversity Targets.* UNDP. (2016): 1-95. https://www.unep-wcmc.org/system/comfy/cms/files/files/000/000/731/original/Biodiversity_Review_AFRICA.pdf.

United Nations Development Programme (UNDP). *Global Multidimensional Poverty Index.* United Nations Development Programme (UNDP). (2019). http://hdr.undp.org/sites/default/files/mpi_2019_publication.pdf.

United Nations Environment Program (UNEP). Environmental Assessment of Ogoniland. (August 2011). https://wedocs.unep.org/bitstream/handle/20.500.11822/25282/ogoniland_chapter1_UNEP_OEA.pdf?sequence=1&isAllowed=y.

United Nations Environment Program (UNEP). "Environmental cooperation as a pathway to resolve Nigeria's deadly farmer-herder conflicts." UNEP. (4 October 2018). https://www.unenvironment.org/news-and-stories/story/environmental-cooperation-pathway-resolve-nigerias-deadly-farmer-herder.

United Nations Environment Program – World Conservation Monitoring Center (UNEP-WCMC). "World Database on Protected Areas." Data Basin. *Conservation Biology Institute.* 25 October 2018. http://wcmc.io/WDPA_Manual.

United Nations High Commissioner for Refugees (UNHCR). "Statistics related to Nigerian refugees refer to those in three main asylum countries: Cameroon, Chad, and Niger." UNHCR. (30 September 2019). https://data2.unhcr.org/en/situations/nigeriasituation#_ga=2.127130121.507587016.1571340286-865989447.1569484145.

U.S. Agency for International Development (USAID). Climate Risk Profile: Nigeria. February 2019. https://www.climatelinks.org/sites/default/files/asset/document/2019_USAID-ATLAS-Nigeria-Climate-Risk-Profile.pdf.

U.S. Agency for International Development (USAID). *Nigeria Country Development and Cooperation Strategy (CDCS) 2015-2020*. U.S. Agency for International Development (USAID). 2015. https://www.usaid.gov/sites/default/files/documents/1860/Nigeria_CDCS_2015-2020.pdf.

U.S. Energy Information Administration. "Country Analysis Brief: Nigeria." (6 May 2016). https://www.eia.gov/beta/international/analysis.php?iso=NGA.

U.S. Fish and Wildlife Service. "FY 2018 Summary of Projects, Combating Wildlife Trafficking Program." 2018: 1-9. https://www.fws.gov/international/pdf/project-summaries-cwt-2018.pdf.

Vidal, John. "The 100 million city: is 21st century urbanization out of control?" 19 March 2018. *The Guardian.* https://www.theguardian.com/cities/2018/mar/19/urban-explosion-kinshasa-el-alto-growth-mexico-city-bangalore-lagos.

WCS Nigeria. "Wild Places, Cross River National Park (Oban Division)." WCS Nigeria. https://nigeria.wcs.org/Wild-Places/Cross-River-NP-Oban.aspx.

WCS Nigeria. "Initiatives Local Livelihoods." WCS Nigeria, *WCS, https://nigeria.wcs.org/Global-Initiatives/Local-Livelihoods.aspx*.

Were, Jan Lodewijk R. "Central Africa: Nigeria." WWF. *World Wildlife Foundation.* https://www.worldwildlife.org/ecoregions/at1010.

Were, Jan Lodewijk R. "Western Africa: Southern Nigeria, extending into Benin." WWF. *World Wildlife Fund*. https://www.worldwildlife.org/ecoregions/at0123.

Were, Jan Lodewijk R. "Western Africa: Southern Nigeria." WWF. *World Wildlife Fund*. https://www.worldwildlife.org/ecoregions/at0106.

WikiMedia. "Nigeria in Africa." WikiMedia Commons. 7 April 2011. https://commons.wikimedia.org/wiki/File:Nigeria_in_Africa_(-mini_map_-rivers).svg.

World Bank. "Employment in agriculture (% of total employment) (modeled ILO estimate) – Nigeria." (2019). https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=NG.

The World Bank. "Life expectancy at birth, male (years) – Nigeria." The World Bank. (2017). https://data.worldbank.org/indicator/SP.DYN.LE00.MA.IN? locations=NG.

The World Bank. "Nigeria." Climate Change Knowledge Portal. *The World Bank.* https://climateknowledgeportal.worldbank.org/country/nigeria.

The World Bank. "Overview." The World Bank in Nigeria. *World Bank.* Last updated 13 October 2019. www.worldbank.org/en/country/nigeria/overview#1.

The World Bank. "Project Information Document/Integrated Safeguards Data Sheet." 17 July 2017. http://documents.worldbank.org/curated/en/479121500403272629/pdf/ITM00184-P160865-07-18-2017-1500403268591.pdf.

The World Bank. "Urban population (% of total population) – Nigeria." World Bank. (2018). https://data.worldbank.org/indicator/SP.URB. TOTL.IN.ZS?end=2018&locations=NG&start=1968.

The World Bank. "World Bank Data Set: Population growth (annual %) – Nigeria." The World Bank. (2018). https://data.worldbank.org/indicator/SP.POP. GROW?locations=NG.

World Meteorological Organization (WMO): World Climate Programme Department (WCPD). *Climate change and desertification*. https://library.wmo.int/doc_num.php?explnum_id=5047.

ANNEX D: STAKEHOLDERS CONSULTED

(The list of stakeholders consulted has been provided to USAID/Nigeria under separate cover in compliance with privacy requirements.)

ANNEX E: KEY AGENCIES IN NIGERIA WORKING IN CONSERVATION AND MANAGEMENT OF TROPICAL FORESTS AND BIODIVERSITY

TABLE E- 1. GOVERNMENT INSTITUTIONS/AGENCY WITH OPERATIONAL IMPACTS ON BIODIVERSITY CONSERVATION

SN	NAME OF MINISTRY/AGENCY	BASIC AREA OF OPERATIONS
1	Federal Ministry of Water Resources	Watershed management, Important Bird Areas (IBAs), migratory waterfowls, management of inland water resources, dam and biodiversity issues, coastal and inland protected areas.
2	Federal Ministry of Health Environmental and Public Health	Role of biodiversity in public hygiene, traditional medicine, biodiversity and traditional knowledge, bioprospecting and health implications, wildlife, and medical research vaccine production.
3	Federal Ministry of Agriculture	Land use planning, agriculture and fisheries project design and management, agricultural design for biodiversity sensitivity, agricultural production, certification, trade, biodiversity connection, agro-forestry, and human wildlife conflict management.
4	Federal Ministry of Transport and Nigerian Maritime Administration and Safety Agency	Coastal and marine biodiversity related issues including impacts of pollution, shipwrecks and coral reefs, and sea-based endangered species, such as sea turtles, manatees, whales and dolphins.
5	Federal Ministry of Education	Environmental education and awareness, curricular development.
6	Ministry of Works and Housing	Infrastructure development, the impact of and/or biodiversity regarding in respect of environmental impact assessments.
7	Ministry of Solid Minerals	Mining and impacts on biodiversity, mining and protected area principles.
8	Ministry of Power and Steel	Energy production and biodiversity implications, power lines and biodiversity issues.
9	Ministry of Culture and Tourism	Tourism development, heritage and indigenous people's right on biodiversity.

TABLE E- 1. GOVERNMENT INSTITUTIONS/AGENCY WITH OPERATIONAL IMPACTS ON BIODIVERSITY CONSERVATION		
SN	NAME OF MINISTRY/AGENCY	BASIC AREA OF OPERATIONS
10	Ministry of Aviation	Biodiversity considerations, wildlife hazards, and bird strikes.
11	National Communication Commission	Communication masts and birds biodiversity.
12	Nigerian National Petroleum Corporation,	Biodiversity issues in oil resource extraction and petroleum exploration, oil pollution impacts on biodiversity.
13	Department of Petroleum Resources	Biodiversity issues in oil resource extraction and petroleum exploration, oil pollution impacts on biodiversity.
	Nigerian Agricultural Quarantine Service	Plant and animal species export and import to and from Nigeria, role of invasive species in biodiversity management, pests and pesticides.
14	Ministry of Science and Technology;	Genetic Resource conservation and management; biosafety.
15	National Agency for Genetic Resource and Biotechnology	Genetic Resource conservation and management; biosafety.
16	The Ecological Fund Office	Ecological Fund management and support for biodiversity management initiatives.
17	Ministry of Police Affairs and the Nigerian Police Service	Enforcement of environmental laws and those associated with trade in endangered species in collaboration with the National Environmental Standards and Regulations Enforcement Agency (NESREA).
18	Nigerian Custom Service	Border checks and awareness on international trade on endangered species in collaboration with NESREA on biodiversity; Wood/wood product export control.
19	Central Bank of Nigeria	Biodiversity connections with the currently developed *Nigerian Sustainable Development Banking Principles – Guidelines on Agriculture, Oil and Gas.*
20	National Planning Commission (NPC)	Mainstreaming biodiversity in national development planning. Ecological Fund management and support for biodiversity management

TABLE E- 1. GOVERNMENT INSTITUTIONS/AGENCY WITH OPERATIONAL IMPACTS ON BIODIVERSITY CONSERVATION

SN	NAME OF MINISTRY/AGENCY	BASIC AREA OF OPERATIONS
		initiatives.
21	National Space Agency	Satellite imagery, remote sensing application to biodiversity management.
22	National Environmental Standards and Regulations Enforcement Agency (NESREA)	Enforcement of biodiversity related laws.
23	National Park Service (NPS)	Focal point for national parks, promotion of ecotourism.
24	Forestry Research Institute of Nigeria (FRIN)	Forestry research and development.
25	Nigerian Institute of Oceanography and Marine Research (NIOMR)	Marine biodiversity research and development.
26	Federal Department of Fisheries in the Federal Ministry of Agriculture and Rural Development	Fisheries and aquatic ecology.
27	Nigerian Freshwater Fisheries Research Institute (NIFFR)	Freshwater biodiversity research and development.
28	Nigerian Institute of Horticultural Research (NIHORT)	Horticultural plants research and development.
29	National Centre for Genetic Resources and Biotechnology (NACGRAB)	Genetic biodiversity data bank and research.
30	National Cereals Research Institute	Agricultural research and development.
31	National Council of Women Societies (NCWS)	Gender issues in biodiversity management.

TABLE E- 1. GOVERNMENT INSTITUTIONS/AGENCY WITH OPERATIONAL IMPACTS ON BIODIVERSITY CONSERVATION		
SN	NAME OF MINISTRY/AGENCY	BASIC AREA OF OPERATIONS
32	Biodiversity-minded NGOs	Advocacy, education and awareness-raising; complementary field work and research.
33	Community-based Organizations	Community-level actions and advocacy.
34	National Institute for Pharmaceutical Research and Development (NIPRD)	Traditional medicine development and research.
35	Institute of Oceanography, University of Calabar	Estuarine, coastal, and mangrove ecosystem biodiversity research and development.

TABLE E- 2. KEY AGRICULTURAL RESEARCH INSTITUTIONS THAT INTERFACE WITH MINISTRY OF ENVIRONMENT		
SN	NAME OF RESEARCH INSTITUTION	BASIC AREA OF OPERATIONS
1	Rubber Research Institute of Nigeria (RRIN)	Conservation of in-situ conservation of species of rubber, ex situ seed gene bank, live field gene bank and in-vitro for rubber.
2	Cocoa Research Institute of Nigeria (CRIN) Ibadan	Conservation of *in situ* species of cocoa, *ex situ* Seed gene bank, live field gene bank and in-vitro for cocoa.
3	Nigerian Institute for Oil Palm Research (NIFOR) Benin	Conservation of *in situ* species of oil palm, *ex situ* seed gene bank, live field gene bank in vitro for oil palm.
4	National Cereals Research Institute (NCRI) Badagi	Conservation of *ex situ* gene bank and live field gene bank for all cereals.
5	National Root Crops Research institute, Umudike	Conservation of live field gene bank on farm for cassava, potato, sweet potato, ginger and coca yam.
6	Institute of Agricultural Research, Samaru Zaria	Conservation of gene bank for various food crops.

TABLE E- 2. KEY AGRICULTURAL RESEARCH INSTITUTIONS THAT INTERFACE WITH MINISTRY OF ENVIRONMENT

SN	NAME OF RESEARCH INSTITUTION	BASIC AREA OF OPERATIONS
7	Institute of Agricultural Research and Training (IAR&T) Moor Plantation, Ibadan	Conservation of live gene bank for various crops for training and development.
8	National Horticultural Research Institute (NHRI) Ibadan	Conservation of seed gene bank, and live field *in vitro* for horticultural food crops.
9	National Centre for Genetic Resources and Biotechnology (NACCREB), Ibadan	Conservation of seed field gene bank in vitro for forest trees, fruit trees, vegetable and ornamentals.
10	International Institute of Tropical Agriculture (IITA) Ibadan	Conservation of *ex situ* seed gene bank and field gene bank for agricultural crops, and multipurpose trees.
11	Lake Chad Research Institute Maiduguri (LCRI)	Conservation and genetic improvement of cereals, *ex situ* seed gene bank and field gene bank.
12	National Agricultural Extension and Research Liaison Services (NAERLS), Zaria	Conservation of crop gene banks on the field and the use of environmentally friendly agricultural practices.
13	National Animal production Research Institute (NAPRI) Zaria	Conservation of gene banks in livestock species.
14	National Institute for Freshwater Fisheries Research (NIFFR)	Contribute to genetic improvement of freshwater fisheries and conservation.

ANNEX F: ENDEMIC AND THREATENED FLORA AND FAUNA IN NIGERIA

TABLE F- 1. KNOWN NUMBER OF FLORA AND FAUNA SPECIES IN NIGERIA

GROUP	NUMBER OF SPECIES IN NIGERIA
Birds	941
Mammalia	274
Amphibians	109
Reptiles	135
Fish	338
Orchids	145
Flowering Plants	5209

USAID, *West Africa Biodiversity and Climate Change (WA BiCC)*, 2019.

TABLE F- 2. KNOWN NUMBER OF THREATENED FLORA AND FAUNA SPECIES IN NIGERIA

GROUP	NUMBER OF THREATENED SPECIES
Birds	19
Mammalia	26
Amphibians	13
Reptiles	8
Fish	60
Orchids	-
Flowering Plants	168

"The IUCN Red List of Threatened Species." IUCN Red List of Threatened Species, 2019 www.iucnredlist.org/species/39998/102326240.

TABLE F- 3. KNOWN NUMBER OF ENDEMIC FAUNA IN NIGERIA[363]

MAMMALS	BIRDS	FRESHWATER FISH	MARINE FISH	REPTILES
Sclater's guenon (*Cercopithecus sclateri)*	Ibadan malimbe *(Malimbus ibadanensis)*	*Alestopetersius smykalai*	*Grammonus longhursti*	*Cynisca gansi*
Savanna swamp shrew *(Crocidura longipes)*	Anambra waxbill *(Estrilda poliopareia)*	*Arnoldichthys spilopterus*	*Meganthias carpenteri*	*Cynisca kigomensis*

[363] Idowu, Mobolaji A., and Olajumoke A. Morenikeji. "Wild Fauna Conservation in Nigeria." *Environment and Natural Resources Research*, Vol. 5, No. 3 (2015). DOI:10.5539/enrr.v5n3p98.

TABLE F- 3. KNOWN NUMBER OF ENDEMIC FAUNA IN NIGERIA[363]

MAMMALS	BIRDS	FRESHWATER FISH	MARINE FISH	REPTILES
Fox's shaggy rat *(Dasymys foxi)*	Rock firefinch *(Lagonostita sanguinodorsalis)*	*Ctenopoma nebulosum*		*Cynisca nigeriensis*
Gotel Mountain soft-furred mouse *(Praomys obscurus)*	Jos Plateau indigobird *(Vidua Maryae)*	Delta Killifish *Aphyosemion deltaense*		*Mehelya egbensis*
		Epiplatys biafranus		Cross's beaked snake *(Rhinotyphlops crossii)*
		Epiplatys longiventralis OC		*Cnemaspis gigas*
		Fundulopanchax arnoldi		*Cnemaspis petrodroma*
		Fundulopanchax powelli		
		Nothobranchius kiyawensis		
		Parauchenoglanis akiri		
		Paraucjenoglanis buettikoferi		
		Thysochromis annectens		
		Neolebias axelrodi		
		Neolebias powelli		
		Barbus aboinensis OC		
		Barbus clauseni OC		
		Garra trewavasai		
		Dormitator pleurops		
		Synodontis guttatus OC		
		Synodontis robbianus OC		

ANNEX G: PROTECTED AREAS: RAMSAR WETLANDS OF INTERNATIONAL IMPORTANCE

TABLE G- 1. RAMSAR WETLANDS OF INTERNATIONAL IMPORTANCE IN NIGERIA

SITE	DESCRIPTION
Apoi Creek Forests	A tidal freshwater, lowland swamp-forest located in the Central Niger Delta and composed mainly of marshes, mangrove forests and freshwater swamps. The forest is dense and rich in several ecologically and economically valuable flora and fauna species. The site supports the endemic and endangered Niger Delta Red Colobus monkey amongst others, and serves as an important spawning and nursery ground for fish. It also contributes to the livelihood of local dwellers through provision of non-timber forest products, agricultural land and fisheries. Digging of canals for transport of timber constitutes a potential threat. The site is technically state-owned but practically under customary authority of local families and communities. The Niger Delta Wetlands Centre works for the study and protection of the Red Colobus and its habitat.
Baturiya Wetland	A good example of a natural wetland of the Sudano-Sahelian biogeographical region, comprising ponds and seasonally flooded land that is replenished by the annual flooding of the Kafin Hausa River. It supports a great diversity of flora and fauna and is particularly important for its waterbirds. A wide range of resident and migratory waterbirds depend on this wetland - the Yellow billed stork, Knob-billed goose, African Grey Hornbill, etc. A large population of over 10,000 inhabitants living in the surrounding villages depend on the wetland's resources for their livelihood. They practice agriculture, fishing and general harvesting of resources. The site falls entirely within the Baturiya Wetland Games Reserve, which is under "Multiple Use Management" in which state and local officials grant licences for exploitation of resources (hunting, fishing, grazing, woodcutting, etc.). The Game Reserve has been proposed as a National Park to reinforce the present management system.
Dagona Sanctuary Lake	A large, natural, seasonally flooded oxbow lake that falls in the section of Hadejia-Jamaare River floodplain within the Chad Basin National Park. The site supports over 25 bird species and is one of the most important sites in the Hadejia-Nguru wetlands for wintering Palaearctic and inter-African migrant waterbirds. It also provides a breeding site for the Grey heron and Little Egret. The lake also supports a wide range of fish species, and is an important source of drinking water for local cattle. The sanctuary is under protection as part of the Chad Basin National Park, hence, under the multiple use management, within the site free access to wild resources (wild animals, fish, birds) is forbidden. However, grazing and collection of wild resources are practiced by the local population, and there is therefore a need for more stringent enforcement of existing laws.
Foge Islands	Small islands in Lake Kainji, a reservoir formed by construction of the Kainji Dam on the Niger River in 1968, part of the Kainji Lake National Park, Nigeria's oldest. The site forms part of the regional biodiversity hotspot characteristic of the wetlands in the Guinea

TABLE G- 1. RAMSAR WETLANDS OF INTERNATIONAL IMPORTANCE IN NIGERIA

SITE	DESCRIPTION
	savanna woodland of Nigeria. It supports over 180 species of birds, and there is also a remnant population of mammals such as western hartebeest, waterbuck, hippopotamus, and green monkeys trapped by the creation of the lake. Local communities fish in the pools and lake and also engage in traditional irrigated agriculture and harvesting of wild resources. The site is managed under the National Park management system in Nigeria, and further management measures include those put in place by the Kainji Lake Research Institute against overfishing, restricting fishnet mesh size and regulating the fishing season. Declining trends in rainfall are leading to long-term low water conditions.
Lake Chad Wetlands in Nigeria	In northeast Nigeria, bordered by Niger to the north, Chad to the northeast, and Cameroon to the south. The site comprises a disjointed complex of permanent freshwater marshes (formerly inundated as part of Lake Chad), some rivers and their deltas, and the remaining part of Lake Chad. The main feature, Lake Chad, is an historically large, shallow lake whose size has varied greatly over the centuries. The major vegetation types include grasses, sedges, floating macrophytes, and shrubs, which form important habitats for a great variety of Palearctic migrating waterbirds, including the vulnerable Marbled Teal. The lake supports some indigenous fish species and is economically important, providing water, fish and other resources to the surrounding populations. Agriculture is also greatly practiced around the wetlands. Threats to the site include recession of lake waters due to climatic influence and upstream dam construction, and the consequent continuing desiccation of the wetlands. The only element of management in the area is provided by the Kanuri traditional rulers, who see to the sale of fishing rights in ponds and stretches of water as well as farming rights on the receding lakebed.
Lower Kaduna-Middle Niger Floodplain	An extensive alluvial wetland on the floodplain of the mid-section of River Niger and the lower course of River Kaduna, a main tributary of the Niger. The site consists of pools, lakes, shifting river courses, and sand banks and is inundated annually by floodwaters. The wetlands constitute an important breeding area for the Rosy bee-eater and supports a significant number of bird species that are restricted to the Sudan-Guinea Savanna biome. Local people depend on the site for fishing, collection of wild resources, and agriculture, but their activities require better regulation to be sustainable. Extensive cultivation of rice and sugarcane on the floodplains for commercial purposes encourages degradation of the swamp forest, and declining trends in rainfall have promoted desiccation.
Maladumba Lake	A natural, shallow lake and the surrounding forest reserve in Central Northern Nigeria. It is representative of the natural wetlands of the Sudan savanna in Nigeria. The wetland has a unique assemblage of plant and animal species that are important for the maintenance of biological diversity. It supports a large number of migrant bird species such as the Grey Heron, white-necked stork, Green Fruit Pigeon, etc. The lake has a high diversity of fish species and thus plays an important role as a source of protein for the local population and enhances the local economy. Agriculture, grazing, hunting, and recreation are also practiced by the surrounding population. Rapid siltation is a growing threat.

TABLE G- 1. RAMSAR WETLANDS OF INTERNATIONAL IMPORTANCE IN NIGERIA	
SITE	DESCRIPTION
Nguru Lake (and Marma Channel) complex	A sahelian floodplain and lake which qualifies under the representative Criterion (embodying all of the diverse flora and fauna of both the Sahel and Sudan), the 20,000 waterfowl Criterion for at least three species (*Philomachus pugnax, Anas querquedula, and Dendrocygna viduata*), and the fish Criteria (with some 20% of the fish variety of the Lake Chad Basin and about 1% of all fish caught in inland freshwater bodies in Nigeria; the "disc Tilapia" is thought to be endemic). Floods in the wet season play a critical role in recharging groundwater, upon which Nguru town and the string of settlements along the channel and lake are dependent. Some 200,000 people depend for their livelihoods upon the site, particularly for water supply. Educational research and ecotourism are practiced sustainably, but grazing, cultivation, and fishing are increasingly causing pressure. The spread of invasive Typha grass, taking over flood rice and cassava fields, blocking river channels, and undermining fisheries, is seen as a major problem. The IUCN-Hadejia Nguru Wetlands Conservation Project maintains research facilities and an information center and encourages ecotourism with boat rides. HNWCP's wise use guidelines for the site have been accepted by government as a working document.
Oguta Lake	The largest natural, freshwater lake in southeastern Nigeria, located in a natural depression within the floodplain of River Niger. Its water surface area varies from 180 to 300 hectares depending on the season, and its average depth is 5.5m. It receives perennial drainage from Rivers Njaba, Utu and Awbuna and the lake drains into River Orashi. The lake contains 258 species of phytoplankton in 107 genera and 40 fish species. Small scattered populations of the endangered Sclater's guenon (*Cercopithecus sclateri*) occur in some relict forests south of the lake. The lake is an important source of municipal and domestic water to the people of Oguta, but is also the recipient of urban sewage. It is also of cultural and spiritual importance to many community members. Fishing and tourism are important socioeconomic activities in the area. Overfishing is stressing the lake and sewage and sedimentation aided by deforestation are seen as threats, mitigated by the fact that the lake is annually flushed by floodwaters through an active outlet. The Oguta Lake Watershed Protection Project is involving local communities in revitalizing the lake and promoting sustainability.
Pandam and Wase Lakes	Two tributaries drain into each of the lake's arms, and the lake is separated from River Dep by a swamp which extends along both of them. The lake supports large numbers of resident and migrant birds, with about 217 bird species recorded in the area. It supports large flocks of White-faced Whistling Duck (Dendrocygna viduata) during the dry season and provides a breeding ground for the Long-toed Lapwing. The lake and the adjoining Wildlife Park support endangered species such as the West African manatee. The site supports fishing and forestry, as well as tourism and an annual fishing festival. Livestock grazing, bush burning, farming and harvesting of wild resources support community livelihoods but need to be better regulated. There is also significant pressure from poaching. A management plan has been developed for the wetland and the adjoining Wildlife Park but is yet to be implemented.
Upper Orashi Forests	A freshwater swamp forest in the central Niger Delta, inundated from September to November by floodwaters of the River Orashi, resulting in siltation and soil fertility augmentation. The reserve is the remnant of a small center of endemism, noted for hosting the

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SITE	DESCRIPTION
	critically endangered Sclater's guenon and endangered White-throated guenon, Red Colobus monkey and Heslop's pygmy hippopotamus. The site is a roost for the Grey Parrot (Psittacus erithacas) and also hosts a significant number of water bird species whose distribution is confined to the Guinea-Congo Forest biome. The forest reserve has an official management plan which is, however, not being implemented, and the reserve is recommended for a more articulate management plan and management structure. Opportunities for tourism, education, and research are currently hampered by ethnic militancy and insecurity, and poaching and uncontrolled logging are related, serious problems.

Ramsar Sites Information Service, "Nigeria," Ramsar, https://www.ramsar.org/wetland/nigeria.