



Republic of Botswana



BOTSWANA NATIONAL ECOSYSTEM ASSESSMENT UPDATED SCOPING REPORT

October 2023



DISCLAIMER:

This report has been produced by Botswana University of Agriculture and Natural Resources (BUAN), as part of the initiative on Building Capacity for National Ecosystem Assessments: Linking Science and Policy and the Biodiversity and Ecosystem Services Network (BES-Net). Financial support was provided by the International Climate Initiative (IKI) of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection of the Federal Republic of Germany.

The contents of this report do not necessarily reflect the views or policies of the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and their partners, nor the Government of Germany. The designations employed and the presentations of material in this report do not imply the expression of any opinion whatsoever on the part of UNEP or contributory organizations, editors or publishers concerning the legal status of any country, territory, city area or its authorities, or concerning the delimitation of its frontiers or boundaries or the designation of its name, frontiers or boundaries. The mention of a commercial entity or product in this publication does not imply endorsement by UNEP, UNDP or UNESCO.



BOTSWANA NATIONAL ECOSYSTEM ASSESSMENT UPDATED SCOPING REPORT

October 2023

Authors

Botswana University of Agriculture and Natural Resources (**BUAN**)

WAME LUCRETIA **HAMBIRA**

KEOIKANTSE **SIANGA**

VICTOR KURAUWONE **MUPOSHI**

BELDA **MOSEPELE**

NELSON MOTLAPELE **TSELAESELE**

DITIRO BENSON **MOALAFHI**

TIROYAONE ALBERTINAH **MATSIKA**

KETLHATLOGILE **MOSEPELE**

ONKGOPOTSE **MORERI**

With contributions from the following personnel from the Department of Environmental Affairs.

TSOSOLOSO **MATALE**

MOKGADI **MONAMATI**

LECHANI **MOTSHWARAKGOLE**

OAGENG **DISANG**

LESEGO **SEAKANYENG**

KGOMOTSO **MASILO**

The Updated Scoping Report builds on the 2021 Scoping report developed by the Okavango Research Institute of the University of Botswana by the following authors:

OLUWATOYIN **DARE KOLAWOLE**

MIKE **MURRAY-HUDSON**

WAME LUCRETIA **HAMBIRA**

GASEITSIWE **MASUNGA**

DONALD LETSHOLO **KGATHI**

OLEKAE TSOMPI **THAKADU**

The updated Scoping Report was reviewed by:

BOIPELO **TSHWENE-MAUCHAZA** (UNEP-WCMC)

JUANITA **CHAVES** (UNEP-WCMC)

CEIRE **BOOTH** (UNEP-WCMC)

NOOR **NOOR** (UNEP-WCMC)

JOSEPH **KARANJA** (UNESCO)

Acronyms

BUAN	Botswana University of Agriculture and Natural Resources
BW-NEA	Botswana National Ecosystems Assessment
CBD	Convention on Biological Diversity
CBNRM	Community-Based Natural Resources Management
CBOs	Community-Based Organisations
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLAs	Coordinating Lead Authors
COP	Conference of the Parties
DEA	Department of Environmental Affairs
DNA	Deoxyribonucleic Acid
DPSIR	Driver-Pressure-State-Impact-Response
DWNP	Department of Wildlife and National Parks
ENVI	Environment for Visualising Images
ESSs	Ecosystem Services
GDP	Gross Domestic Product
GoB	Government of Botswana
GYBN	Global Youth Biodiversity Network
IKI	International Climate Initiative
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
KAZA	Kavango Zambezi Trans-frontier Conservation Area
LAC	Limits to Acceptable Change
LULC	Land Use and Land Cover Change
NBDA	National Biodiversity Authority
NBSAP	National Biodiversity Strategy and Action Plan
NBP	National Biodiversity Platform
NCP	Nature's Contributions to People
NCS	National Conservation Strategy
NEA	National Ecosystems Assessment
NFP	National Focal Point
NGO	Non-Governmental Organizations
NSP	National Spatial Plan

NTFPs	Non-timber Forest Products
OKACOM	Okavango River Basin Commission
ORI	Okavango Research Institute
PMU	Project Management Unit
PSC	Project Steering Committee
UNCBD	United Nations Convention on Biological Diversity
UNEP-WCMC	United Nations Environment Programme World Conservation Monitoring Centre
UNESCO	United Nations Educational, Scientific and Cultural Organisation
SDGs	Sustainable Development Goals
TRG	Technical Reference Group
CCCD	Cross-cutting Capacity
SOE&OR	Development State of Environment and Outlook Report

List of figures

Figure 1: Conceptual framework adapted from IPBES framework showing the interaction of nature, its contribution to people and its impact on Botswana ecosystems

Figure 2: Botswana National Ecosystem Assessment Operational Structure

Figure 3: Summary projects timelines and deliverables. Adopted from National Ecosystem Assessment Initiative (NEA)

List of tables

Page 14: Table 1, Proposed chapter outline for the NEA Technical Report.

Contents

Acronyms.....	V
List of Figures.....	VII
List of Tables.....	VII
Glossary of Terms.....	X
1. Rationale.....	1
1.1 Conceptual Framework.....	3
2. Key policy Questions.....	4
3. Defining the Assessment Scope.....	6
3.1. Priority ecosystems and Services.....	6
3.1.1. Aquatic and wetlands Ecosystem.....	7
3.1.2. Forests and Woodlands Ecosystem.....	8
3.1.3. Grassland and shrubland Ecosystem.....	9
3.1.4. Desert Ecosystem.....	9
3.1.5. Hill ecosystem.....	10
3.1.6. Agroecosystem.....	10
3.2. Temporal Scale.....	11
3.3. Geographic Boundaries.....	11
4. Potential use of the Assessment.....	12
5. Methodological Approach.....	13
6. Chapter Outline.....	14
7. Relevant Stakeholders and Initiatives.....	16
7.1. Key Stakeholders.....	16
7.2. Science-Policy Initiatives or Mechanisms in Botswana.....	16
7.3. Synergies.....	17
8. Key Data, Knowledge, and Information.....	18
9. Operational Structure.....	18
9.1. Project Management Unit (PMU).....	19
9.2. National Biodiversity Platform.....	19
9.3. Technical Reference Group (TRG).....	19
9.4. Traditional Knowledge Task Force.....	19
9.5. National Biological Diversity Authority (NBDA).....	19
9.6. Author Teams.....	20
9.7. Reviewers.....	20
10. Process and Timeline.....	20
11. Communications Strategy.....	22
12. Capacity building Needs.....	22
13. Next Steps.....	23

Acknowledgments.....	24
Disclaimer.....	24
APPENDICES	25
Appendix 1: Priority Ecosystems and Their Descriptions	25
Appendix 2: National Ecosystem Assessment-Stakeholder Mapping.....	28
Appendix 3: Links to Databases that are Potential Sources of Information to the NEA Project.	34
Appendix 4: Specific hard and soft copy reports available from Government Departments and the Botswana National Reference Library	43
Appendix 5: Proposed operational structure for national Ecosystems Assessment.....	48
Appendix 6: BW-NEA Communications Strategy	50
Appendix 7: Botswana National Ecosystem Assessments Capacity Needs.....	54

Glossary Of Terms¹

Driver-Pressure-State-Impact-Response²: A problem structuring approach that allows the cause- effect relationships between anthropogenic activities and their environmental and socio- economic impacts to be explored and described in a sequential manner, while also accounting for feedback loops.

Economic value: A measure of the benefit provided by a good or service to an economic agent (e.g. buyer or seller). It is not necessarily the same as market value. It is generally measured by units of currency and can be interpreted to mean the maximum amount of money a specific actor is willing and able to accept or pay for the good or service.

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

Ecosystem Assessment: Assessing the state of knowledge on biodiversity and nature's contributions to people in support of sustainable development.

Local community: Local community is a self-identified human group that relates to a life environment in collective ways that participate to define a shared territory and culture.

Monetary valuation: The amount of value an item or a service has in relation to its acceptable cash price for a willing seller and buyer.

Nature's benefits to people: Within the context of the IPBES Conceptual Framework - all the benefits (and occasionally disbenefits or losses) that humanity obtains from nature.

Traditional Knowledge: Local communities knowledge innovations and practices accumulated, developed and inherited generation by generation and helpful to conservation and sustainable use of biodiversity. (An idea, knowledge, practice, use

or invention, written or unwritten which, may be associated to biological diversity, is a cultural, traditional or spiritual belief or value of a group of people³).

Valuation: It is the process of documenting the existence of values, identifying when and where and by whom they are expressed, that in turn allows characterising values.

Value Chain Development: describes the sequence of activities from producing raw material and transforming the same into products that can be purchased by final consumers.

Value of nature: The values of nature encompass the different layers of the values typology, including worldviews (and underpinning knowledge systems, languages and cultures), broad values, specific values, indicators and preferences.

¹ <https://www.ipbes.net/glossary-definitions?page=36>

² <https://www.sciencedirect.com/science/article/abs/pii/S0264837721001174>

³ Industrial Properties Act, No 8 of 2010

1. Rationale

The rationale for carrying out a National Ecosystems Assessment (NEA) is premised on the Decision 14/1 of the Conference of the Parties (COP) to the Convention on Biological Diversity (CBD), which urged Parties and invited other national governments to undertake national assessments of biodiversity and ecosystem functions and services⁴. Despite the commitment to sustainable growth, a fully integrated approach to conservation and development, and equitable distribution of benefits from environment and wildlife by 2016⁵, management of the environment and conservation in Botswana is hampered by a lack of integration of knowledge and data on ecosystem and biological diversity, state, major drivers, ecosystems interdependency and linkages^{6,7,8,9}. While there is a measure of knowledge of some components, there are major gaps in understanding the systems in a holistic way.

Most planning and management decisions are made without consideration of the full value of nature's contributions to the economy and livelihoods (Nature's Contributions to People (NCP)¹⁰), despite high quality planning and management documentation, and national environmental impact legislation¹¹. The sustainability of ecosystem services takes second priority after economic growth, and its lack of integration in planning and development means that the link between ecosystems and the services they provide is often not considered. A simple example is the tourism industry, where allocations of sites and utilisation areas have been predicated purely on the perceived need for large numbers to increase revenue, without any consideration for the previously set carrying capacity

or recommended limits to acceptable change (LACs), and in the absence of impact monitoring to allow evaluation of LACs and carrying capacities.

Energy, water, renewable and non-renewable resources are all valued according to supply-and-demand market principles¹². In addition, land and resource tenure and management are primarily through de-facto open-access regimes, with little or no local-level accountability for, or participation in, resource management decisions¹³. This has led to disenfranchisement of local level stakeholders especially local communities.

Barriers to incorporating NCP in decision making include a lack of capacity in ecosystem services valuation, systems understanding, and mapping biodiversity and ecosystem services, with a resultant lack of knowledge of baselines and hotspots. There is also a long-standing perception of nature without limits. A lack of mainstreaming of ecosystem thinking across line ministries results in conflicting activities and expectations¹⁴.

Sound knowledge of baselines to support decision-making is needed because human population growth, growing expectations and aspirations, burgeoning infrastructure, and open-access resource use frameworks are putting increasing pressure on ecological systems. In many cases, the limits of sustainability to many of the resource bases are being reached. There is a lack of integrated (at national level) understanding of ecosystems, their interdependencies, linkages and drivers as well as their specialised traditional knowledge. A national assessment will help to address this and will improve the National Spatial Plan (NSP).

The major contributing sectors to the gross

⁴ UNEP. (2018). Conference of the Parties to the Convention on Biological Diversity. Fourteenth meeting, Sharm ElSheikh, Egypt, 17-29 November. Agenda item 8. Online document: <https://www.cbd.int/doc/decisions/cop-14/cop->

⁵ The Presidential Task Group (1997). Vision 2016: Towards Prosperity for All. Gaborone, Botswana.

⁶ Department of Environmental Affairs (2008). Okavango Delta Management Plan. Ministry of Environment, Wildlife and Tourism: Gaborone.

⁷ Jansen, R. (2002). How integral is wetland monitoring to integrated wetland management? The case of the Okavango Delta Management Plan. in Environmental Monitoring of Tropical and Subtropical Wetlands. Maun, Botswana: Global Wetland Consortium.

⁸ National Conservation Strategy Coordinating Agency (2004). *Draft National Wetland Policy and Strategy*. Ministry of Environment, Wildlife and Tourism: Gaborone.

⁹ Department of Environmental Affairs (2016). National Biodiversity and Action Plan. Ministry of Environment, Natural Resources and Tourism: Gaborone.

¹⁰ Díaz, S., et al. (2016). The IPBES Conceptual Framework—connecting nature and people. *Current opinion in environmental sustainability*, 2015. 14: p. 1-16.

¹¹ Magole, L., (2009). The 'shrinking commons' in the Lake Ngami grasslands, Botswana: the impact of national rangeland policy. *Development Southern Africa*, 26(4): p. 611-626.

¹² African Development Bank (2014). Botswana Country Strategy Paper 2015-2019. Southern Africa Resource Centre, Centurion, RSA.

¹³ Trollope, W.S. (2006). Vegetation Resource Management: Fire Management Plan, Component 8, in Okavango Delta Management Plan. Department of Environmental Affairs, Botswana: Maun.

¹⁴ Motsumi, S. and Cassidy, L. (2012). Adaptive Management and Scale in a Flood-Pulsed Ecosystem—the Case of the Okavango Delta Management Plan, Botswana. *Journal of Natural Resources Policy Research*, 4(4): p. 271-291.

domestic product (GDP) of Botswana include mining and industry (28%), tourism (11%), livestock rearing (<2%) and the service sector (58%)¹⁵ while the major employers are the national and local government, and the service sector (62%), agriculture (20%), tourism (7%) and other private sector activities. Of these, tourism, livestock rearing (healthy in most places but with some evidence of range degradation in parts of the country^{16,17}), and subsistence livelihoods (agriculture and fishing) are underpinned by healthy, well-functioning ecosystems.

Botswana's key priority areas include water security, food security, climate resilience, energy security and global market stability (minerals) (roughly in that order). The Botswana National Ecosystem Assessment (BW-NEA) will evaluate existing data relevant to integrated management of the country's major ecosystems (including interdependencies and linkages). The biophysical data will be subjected to valuation to determine where the country is losing or gaining benefits of priority ecosystems and services. Monetary valuation of ecosystems and associated services provides a case for investing and maintaining the condition of ecosystems. That is, it is more of an investment narrative rather than a conservation cost. This assessment will, therefore, support conservation, protected area management, sustainable tourism, subsistence livelihoods, environment and range management taking into consideration traditional knowledge of local communities as an important component.

Traditional knowledge is important because it encompasses unique practices which are relevant to knowledge of conservation and biodiversity.

The BW-NEA will also help the country to meet its commitments to international conventions, such as the Convention on Biological Diversity (CBD), Convention on Wetlands Conservation (also known as the Ramsar Convention), United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Convention, Convention for the Safeguarding Intangible Cultural Heritage, The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity; among others that Botswana subscribes to. Furthermore, the assessment will contribute greatly to transboundary conservation efforts implemented under the auspices of the Okavango River Basin Commission (OKACOM) and the Kavango Zambezi Trans-frontier Conservation Area (KAZA) to name a few.

The National Biodiversity Strategy and Action Plan (NBSAP) of 2016 does not explicitly call for a NEA. However, the NBSAP envisions that by 2025 'ecosystem, species and genetic diversity is [sic] valued, protected, and used sustainably and equitably...' (our emphasis)⁹. Without a NEA, neither the valuation, nor the sustainable management of ecosystems specified here will be possible.

¹⁵ <https://santandertrade.com/en/portal/analyse-markets/botswana/economic-outline>

¹⁶ Perkins, J., et al. (2013). Making land management more sustainable: experience implementing a new methodological framework in Botswana. *Land Degradation & Development*, 24(5): p. 463-477.

¹⁷ Perkins, J. and Thomas, D. (1993). Spreading deserts or spatially confined environmental impacts? Land degradation and cattle ranching in the Kalahari Desert of Botswana. *Land Degradation & Development*, 4(3): p. 179-194

1.1. Conceptual Framework

Developing a conceptual framework (Figure 1) at the outset can be useful to guide assessors' thinking. The framework also provides support in the communication of the rationale.

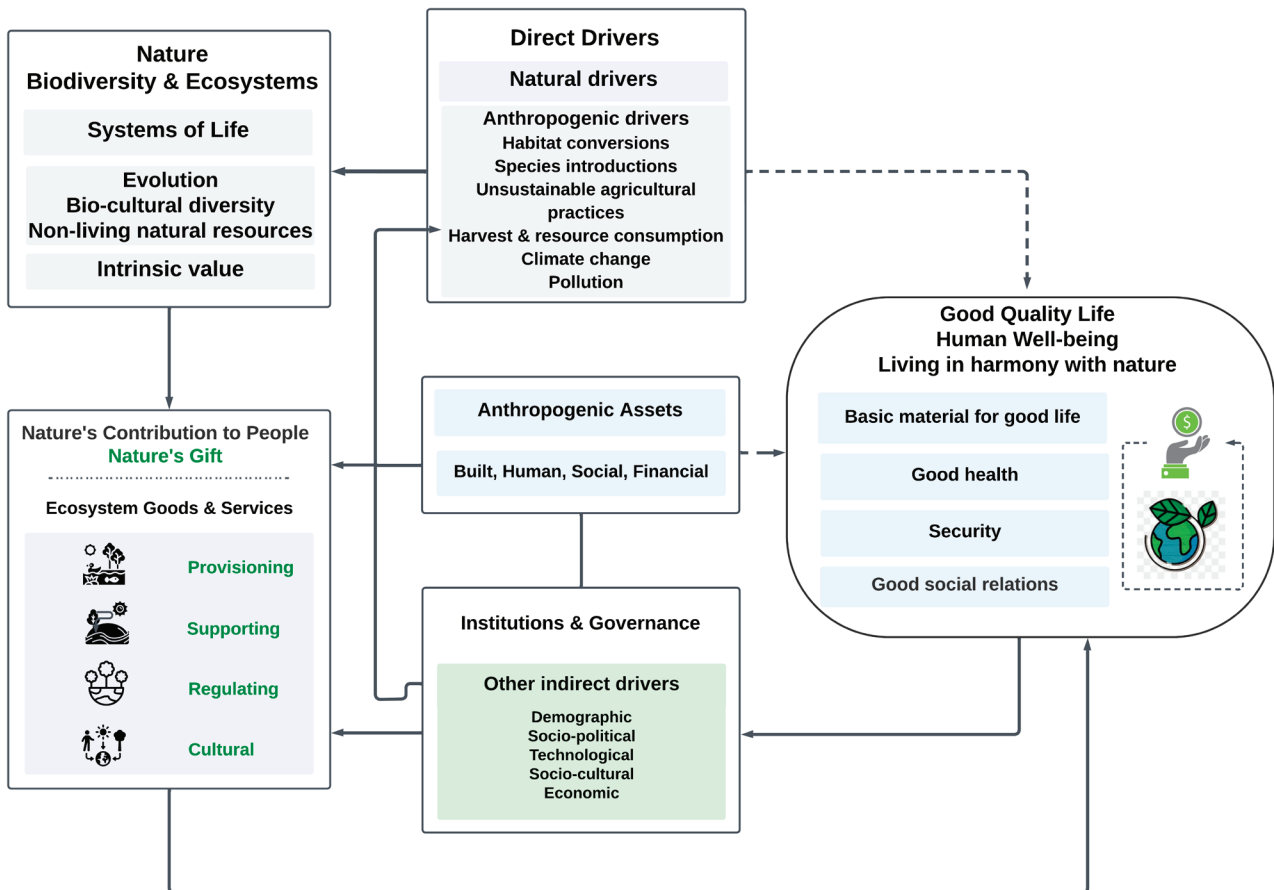


Figure 1: Conceptual framework adapted from the Intergovernmental Science- Policy Platform on Biodiversity and Ecosystems Services (IPBES) framework showing the interaction of nature, its contribution to people and its impact on Botswana ecosystems

The framework provides a simplified depiction of complex relationships which occur between nature and its benefits to people in the quest for great economic and environmental returns, for overall good quality of life. Some key natural drivers of ecosystems in Botswana to be explored include climate change, soils, fire, wildlife, and human activities. Botswana has a hot, semi-arid climate with low and erratic rainfall, high evaporation rates, and frequent droughts. Overtime, climate change is expected to have negative effects on natural ecosystems, such as reduced rainfall, increased temperatures, and more frequent extreme events. Rainfall variability influences the distribution and productivity of vegetation, water resources, and wildlife in Botswana. Botswana has mostly sandy soils that are low in nutrients and organic matter.

Soil quality affects the growth and diversity of plants as well as the availability of water and nutrients for wildlife. Soil erosion and degradation are some of the major threats to natural ecosystem sustainability in Botswana.

Fire is a natural disturbance that shapes the structure and composition of savannah ecosystems. Fires can reduce woody species encroachment, promote grass regeneration, and maintain biodiversity. However, fires can also have negative effects, such as habitat destruction, greenhouse gas release, and soil erosion. Botswana has a rich and diverse wildlife heritage with some iconic species such as elephants (*Loxodonta africana*) which are ecosystem engineers. Wildlife plays an important role in maintaining ecosystem functions such as

pollination, seed dispersal, nutrient cycling, and predation. Wildlife also provides economic benefits through tourism, hunting, and trade. However, wildlife faces many challenges, such as habitat loss, poaching, human-wildlife conflict, and disease.

Human activities are a natural driver of ecosystems in Botswana, as they shape and modify the natural environment and its components. Human activities can have both positive and negative effects on the ecological integrity and sustainability of ecosystems. However, this depends on the type, intensity, and scale of the activities. Some of the major human activities that affect the natural ecosystems of Botswana are resource exploitation, pollution, mining, agriculture, urbanisation, and infrastructure development. Therefore, achieving

sustainable development and safeguarding the environment in Botswana necessitates finding a harmonious balance between the needs and desires of the human populace and the conservation and stewardship of the indigenous ecosystems.

Considering that most ecosystems are human mediated, the conceptual framework further highlights the significant role that institutions, governance, and decision-making play on the links among biodiversity and ecosystems, nature's gifts to people and the associated anthropogenic assets. Contextually, the status of each identified ecosystem, the goods and services derived therein as well as the drivers and threats will be examined as part of the assessment.

2. Key policy Questions

In tandem with the Botswana Vision 2036, which in part, aims at achieving sustainable and optimal use of natural resources for sustainable livelihoods¹⁸, and in line with the 2050 Vision on Biodiversity¹⁹ as well as the Sustainable Development Goals (SDGs) of the Agenda 2030, this national assessment will address policy relevant but not prescriptive questions tailored for decision-makers and other stakeholders whose interest borders on environmental issues, and Botswana's wetland and dryland ecosystems. The questions would include but not limited to the following:

- a). What are the priority policies and policy issues in Botswana, which address the sustainability of ecosystems in the country?
 - i. How do these policies and issues align with Botswana's current strategies for the sustainable management of biodiversity and ecosystem services (ESSs) across diverse societal groups?
 - ii. Is there a disconnect between statutory and customary governance systems in biodiversity conservation? If yes, how can they be harmonized and strengthened?
- b). What gaps exist in current land use, ecosystems/biodiversity related environment, conservation

and management legislation and natural resources policies?

- i. How can these gaps be addressed to enhance the provision of ecosystem goods and services?
 - ii. Are there gaps in land tenure system and access rights hindering sustainable use of natural resources?
- c). What are the priority ecosystems in Botswana?
 - i. How might their mapping contribute to the conservation and sustainable utilisation of natural resources?
 - d). How do key ecosystems in Botswana contribute to people's livelihoods and well-being?
 - i. What are the ecological, economic, social, cultural and indigenous benefits provided by ecosystems?
 - ii. What sustainable income generating opportunities can be explored by communities dependent on these ecosystems to facilitate their adaptation and resilience to climate change?
 - iii. How do key ecosystems contribute to the livelihoods of women and men?
 - e). How might inventory taking, resource mapping and accounting, and ecosystem valuation help in devising strategies for the sustainable management of natural resources in Botswana?

¹⁸ GoB. (2016). Vision 2036: Achieving Prosperity for All. The Vision 2036 Presidential Task Team, Government of Botswana, 53pp. Online document: https://www.bocra.org.bw/sites/default/files/documents/Vision%202036_0.pdf (Accessed 12 April 2021).

¹⁹ UNEP (2019). Towards the Vision 2050 on Biodiversity: Living in Harmony with Nature. Environmental Rights and Governance. United Nations Environment Program. 17 July. Online document: <https://www.unep.org/news-and-stories/story/towards-vision-2050-biodiversity-living-harmony-nature> (Accessed 12 April 2021).

- i. What type of knowledge, skills, tools and approaches (e.g., etic, emic or both) are needed by all the existing and relevant sectors to achieve this objective?
 - f). What are the direct and indirect drivers of biodiversity and ESSs degradation in Botswana?
 - i. How might these drivers be slowed down or stopped to ensure the equalisation of the off take from and renewal of ecosystems in the country?
 - g). What are the existing knowledge gaps in the assessment and management of biodiversity and sustainable ecosystems in Botswana?
 - i. How can these knowledge gaps be addressed?
 - h). How do different interest groups envision sustainable ecosystems in Botswana, which are in tandem with the 2050 Vision for Biodiversity and the Sustainable Development Goals (SDGs)?
 - i). What are the existing conservation strategies and / or future environmental management plans and policies that might positively impact the socio-economic, political, and cultural scenarios in Botswana?
 - j). What information is needed to enhance their implementation?
 - k). Which sectors in Botswana economy are linked to and highly dependent on the country's biodiversity and ecosystems?
 - l). How might over-prioritisation of these sectors compromise the social equity and environmental justice of any groups of Botswana whose livelihoods are purely dependent on natural resources?
 - m). How can conservation of ecosystems and economic development be best harmonised such that one may not be perceived to impede the other?
 - n). What is the nature of the interlinkages between and among sectors, which might impact on sustainable management of Botswana ecosystems?
 - o). How can there be synergies and reduction of the impact of trade-offs across sectors for the purpose of enhancing a holistic management of biodiversity and ecosystems in Botswana?
 - p). What roles can local communities and their traditional knowledge play in enhancing biodiversity and sustainable management of ecosystems in Botswana?
 - i. How can they be better positioned to enhance their legitimate access to ecosystem services?
 - ii. How do their knowledge, values, sustainable practices and customary governance contribute to conservation and sustainable use of natural resources?
 - iii. How does natural resource access, use and management differ between men and women?
 - q). What are the obstacles and challenges that might impede a meaningful management of biodiversity and ecosystems in Botswana?
 - i. How might they be surmounted to enhance environmental and human wellbeing?
 - r). How might transboundary governance of natural resources impact on Botswana's biodiversity and its ecosystems?
 - i. What roles could multilateralism play in enhancing efficient use of biodiversity and ecosystems services in Botswana?
 - s). What are the strategies (e.g. communication, training, etc.) needed to effectively educate the intended users of the BW-NEA for the realisation of sustainable and healthy environment in Botswana?
 - i. How might institutional arrangements and capacity building enhance the sustainable management of biodiversity and ecosystems in Botswana?
 - ii. What strategies can strengthen intergenerational knowledge transfer and demystify associated misconceptions?
 - t). What are the existing policies and pollinator protection measures tailored to address the threats and drivers to their abundance and diversity in Botswana?
- The assessment process will evaluate and address these policy questions, culminating in policy briefs and guidelines for advancing ecosystem management and value chain development in Botswana.

3. Defining the Assessment Scope

3.1. Priority Ecosystems And Services

Priority ecosystems are those which provide significant ecosystem services (or have done so in the past or may do so in the future); they may be resilient or vulnerable, facing serious threats from anthropogenic activities. Some of these ecosystems are vulnerable on their own due to drastic climatic and environmental changes that limit the potential of these ecosystems to provide food, shelter and welfare factors for species. For efficient management of these ecosystems, extensive biodiversity and functional assessments must be carried out to develop baseline data for each system of interest and document the type and level of the heterogeneous factors that are critical for the survival and reproduction of these species²⁰. As this could be a costly undertaking especially for developing countries, there is, therefore, the need to prioritise ecosystems in terms of their multiple values and vulnerability to climatic and environmental disasters.

Leveraging science and Traditional Knowledge, the assessment will capture baseline data on status and trends of the prioritised ecosystems including the pressures and drivers of change. These drivers might comprise both natural and anthropogenic ones ranging from drought, flood, climatic change, invasive species, bush and peat fires, air and water. The IPBES defines an ecosystem as a community of living organisms (plants, animals, fungi and various microbes) in conjunction with the non-living components of their environment (such as energy, air, water and mineral soil), all interacting as a system²¹. Similarly, Article 2 of the CBD defines an ecosystem as a dynamic complex of plants, animals, and micro-organisms, as well as communities and their non-living environment interacting as a functional unit²². The BW-NEA adopts the CBD definition of ecosystems which also aligns with that of IPBES which is also in tandem with the Kunming-Montreal Global Biodiversity Framework.

At present, there is no single document or database that lists an official total number of distinct

ecosystems in Botswana, as different sectors (forestry, agriculture, mapping etc.) often categorise ecosystems according to different criteria. The Botswana Spatial Biodiversity Assessment Project (BSBAP), sought to address some of the questions by identifying, classifying, and mapping eco- regions and ecosystems, in Botswana. As such, the BW-NEA project will utilise the data and insights from the BSBAP as a foundational resource, representing the most updated and comprehensive repository on Botswana's ecosystems to date.

However, the necessity to consolidate information from various sectors and expert consultations to provide a comprehensive and unified classification and delineation of ecosystems in the country is greatly acknowledged. Accordingly, the BW-NEA project will leverage on these synergies and scaffold on existing information and extensive mapping exercise done by the BSBAP to clearly delineate and document the various ecosystems found in Botswana. The outcomes of the assessment will serve as an official record of ecosystems in Botswana, facilitating cross-sectoral alignment and uniformity in broad-based ecosystem classification. pollution, land use and land cover change (LULC), and overexploitation of non-timber forestry products (NTFPs). Others include poaching, logging, mining, forest fires, physical infrastructure development, and loss of traditional knowledge. The BW-NEA will, therefore, interrogate direct and indirect drivers of biodiversity and ecosystem services degradation in Botswana and how these drivers might be slowed down or stopped to ensure the equalisation of the off take from and renewal of ecosystems in the country.

The existence of various international and Botswana-specific ecosystem classifications presents both a challenge and an opportunity for BW-NEA. It is essential to align Botswana's ecosystem classifications with international standards and nomenclature to facilitate comparison and integration of data at a regional and global scale. There is need to tailor classifications to the unique contexts and characteristics of Botswana's ecosystems. To achieve this, the BW-NEA will include a consultative process involving

²⁰Sierra, R., Campos, F., & Chamberlin, J. (2002). Assessing biodiversity conservation priorities: ecosystem risk and representativeness in continental Ecuador. *Landscape and Urban Planning*, 59(2), 95-110.

²¹Daiz et al, 2019. Summary for policymakers of the global assessment report on biodiversity and ecosystem services. IPBES secretariat, Bonn, Germany. 56 pages

²² [Convention Text \(cbd.int\)](https://www.cbd.int/convention-text)

experts from various sectors and disciplines to review, harmonise, and possibly realign ecosystem classifications in Botswana.

Furthermore, the BW-NEA acknowledges the complexities and opportunities brought about by the divergent ecosystem classifications both globally and specific to Botswana. It remains imperative to harmonise Botswana's ecosystem classifications with international standards and nomenclature, facilitating seamless data integration and comparison at a regional and global scale.

Botswana has two broad ecosystem categories namely terrestrial and aquatic. For the BW-NEA, these broad categories have been sub-classified into six (6) main ecosystems found in Botswana. These are: 1) Aquatic and wetlands ecosystem, 2) Forests and woodlands ecosystem, 3) Grassland and shrubland ecosystem, 4) Desert ecosystem, 5) Hill ecosystem and 6) Agroecosystem (Appendix 1). Classification of the six ecosystems followed a broad-based habitat type approach²³ where a generalised approach of ecosystem delineation was followed. For this assessment, the delineation of the six priority ecosystems was based on a preliminary analysis that considered factors such as biodiversity richness, ecosystem services provision, vulnerability to climate change and other threats and drivers, and their socio-economic importance in Botswana.

3.1.1. Aquatic and Wetlands Ecosystem

Article 1.1. of the Ramsar Convention on Wetlands defines wetlands as 'areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres²⁴. Wetlands thus comprise any area of land that is saturated with water either permanently or seasonally. They can be freshwater, rivers, lakes, brackish (partly salty), or saline (very salty), swamps, springs, groundwater and marine (sea, oceans). Types of aquatic and wetlands resources found in Botswana include lentic (lakes), lotic (rivers), brackish (pans), wetlands, ripples, swamps and marshes, temporary/seasonal pools, natural

springs, and gorges. Considering that Botswana is a generally arid country, these ecosystems are well conserved and managed.

Seasonal interfaces between inundation (during flooding) and recession (during dry periods), provide for: recharge of groundwater, habitat niche for various aquatic species reproduction, interactions between rich nutrients load and the aquatic environment. These interactions are important for different migration of birds, wildlife interactions and migration of large wild mammals, worth documenting for their management. Seasonal shifts are key drivers of biodiversity changes and a key feature of most floodplains and seasonal pans across Botswana. The assessment of these will contribute greatly to value chain development and their management. Several springs occurring in hills, and in some areas considered sacred, like the Tsodilo Hills, have rich unknown biodiversity and traditional community uses, that makes them important to assess and document.

The northern Botswana wetland ecosystems covering the Linyanti, Chobe-Zambezi, Okavango and Makgadikgadi are globally renowned for their species richness. The Okavango Delta in particular is a worldrenowned designated site under the RAMSAR Convention and as a UNESCO World Heritage site due to its biological diversity and socio-cultural values. The northern region receives more rainfall than other parts of the country and its ecosystems are supported by the presence of wetlands sitting over a deep layer of the Kalahari sand. The heterogenous diversity due to edaphic and biological factors contributes to the numerous and spatially large hotspots of biodiversity. The diversity and abundance of permanent surface water sources, vegetation, wildlife, food (e.g. fish), soils, aesthetic and cultural values as well as the juxtaposition of wetlands and drylands all contribute to the diverse ecosystem services that the region is endowed with as compared to the vast drylands in southern Botswana. The regional economy is thus significantly underpinned by the exploitation of its rich wetlands biodiversity for sectors such as energy, tourism, livestock, and arable agriculture²⁵. The availability and abundance of food and potential opportunities for agriculture

²³National Ecosystem Assessment of Ethiopia. <https://www.ecosystemassessments.net/content/uploads/2022/06/Composite-Book-06.06.2022.pdf>

²⁴https://rmi-data.sprep.org/system/files/RMI%20Ramsar%20Sites_appendix7.pdf

²⁵GOB (2022). Botswana state of environment and outlook report. Government of Botswana, Gaborone

engenders intense human-wildlife conflict and this puts conservation efforts in danger if sustainable co-existence programmes are not initiated. The assessment will, therefore, take cognisance of the concerns and values of local communities and other key stakeholders that largely live and depend primarily on the aquatic system, springs, rivers, wetlands and floodplains ecosystems and its natural resources.

The wetlands found in the hard veld of eastern Botswana, trap and produce high quality water resources not only for people but also for livestock and wildlife. These are the upper catchment springs, seeps and runoff zones of the seasonal rivers of the east of the country. They are fragile and vulnerable and require a massive effort to restore and conserve them. They are the provisioning ecosystems for the water, which fills the dams and supply the entire eastern corridor. They are also critical refugia for many wetlands' species, especially birds, in the matrix of agricultural and urban development, which characterises the part of Botswana where most people live. However, very few studies have been conducted in this part of the country thus somehow, contributing to insignificant conservation efforts of the wetlands in this area. The country-wide assessment will thus address such a gap.

The artificial dams in eastern Botswana such as Shashe, Dikgatlong and Gaborone Dam may be of lower ecological significance and vulnerability but may also be refugia for rare species of conservation concern because of their potential to hold water throughout the year²⁶. It is important that some information about these ecosystems (especially surface water bodies) be captured, assessed for future decision making that also recognises the ecological functions and contribution of the 'less ecological significance' to biodiversity conservation.

Hill ecosystems harbour water resources in the form of wells, springs and rivers that are essential for communities' intrinsic traditional use, as well as is home to unknown rich aquatic biodiversity. The

seasonal, pans, some of which are large and salty, contribute greatly to interface and interactions between the recharge of ground water, seasonal migration of different wildlife species and a habitat for diatoms of several forms that require an assessment for better management.

Inclusion of the aquatic and wetland ecosystem in the assessment shall provide a comprehensive insight of their conservation and management status in line with existing policies, challenges, traditional knowledges, the existing potential for value chains development, as well as an insight of their contribution to food security, research and economic development. The assessment shall identify challenges and policy gaps needed to achieve desirable environmental conservation and ecosystems services.

3.1.2. Forests and Woodlands Ecosystem

This ecosystem is dominantly characterised by large and dense tree cover with moderate to minimal undergrowth, some of which constitute riparian vegetation. In Botswana, woodlands are generally classified according to the vegetation types that are influenced by the region's semiarid climate²⁷. These include mopane woodlands, acacia woodlands, Kalahari woodlands, riparian woodlands, and teak woodlands²⁸. The riparian woodlands for example will also be key to the BW-NEA since they are found in key economic zones of the country notably the Chobe and Okavango Rivers²⁹. This large and dense vegetation often presents in different complex structures, compositions, ages and diverse processes, which facilitate the persistence of a vast array of ecological interactions of other diverse flora and fauna within it. Within the woodland and forest ecosystem, the "size-orientated" categorisation approach will be used following the "project for enhancing national forest monitoring system for the promotion of sustainable natural resource management" in Botswana³⁰. Forests and woodlands are characterised by high rainfall and good quality soils to facilitate the growth and sustenance of big and dense trees.

²⁶Fattorini, S., Fiasca, B., Di Lorenzo, T., Di Cicco, M., & Galassi, D. M. (2020). A new protocol for assessing the conservation priority of groundwater dependent ecosystems. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 30(8), 1483-1504.

²⁷Forestry Outlook Study for Africa – Botswana. <https://www.fao.org/3/x6774e/x6774e.pdf>

²⁸Botswana National Biodiversity Strategy and Action Plan (NBSAP). <http://faolex.fao.org/docs/pdf/bot155279.pdf>

²⁹Tsheboeng, G., Teketay, D., Murray-Hudson, M., Kashe, K., Mmusi, M., & Madome, J. (2020). Classification of riparian woody plant communities along the Thamalakane River in northwestern Botswana. *Botswana Journal of Agriculture and Applied Sciences*, 14(1), 47-59.

³⁰https://openjicareport.jica.go.jp/pdf/12301594_01.pdf

The forest and woodland ecosystem provide vast ecosystem services which include fuel wood, building material, furniture raw material, fruits, forage and animal habitat³¹. Activities and resources under the forest and woodland ecosystem primarily contributes to the tourism, agricultural and export industry. The reliance of local communities on wood as a primary source of fuel forms one major threat towards this ecosystem. Confounding over reliance of local communities on forest, many indirect ecosystem services such as control of soil erosion, carbon sequestration and thermo-regulation provided by forest are not economically appreciated. Even though substantial studies have been done around the ecosystem services, under appreciation of the multiple values including economic value of forests aggravates the threats, encourages lack of this ecosystem inclusion into economic planning and mismanagement of its resources. Thus, it is envisaged that the prioritisation of this ecosystem in the assessment will address this gap.

3.1.3. Grassland and Shrubland Ecosystem

A vast grassy land area capable of biodiversity persistence and sustenance. It is covered with vegetation which primarily consists of many types of grasses, forbs, scattered shrubs and often small or no trees. Even though vast spreading grasses characterise much of the area, drought resistant trees are present but very rare or infrequent. This characteristic often results from soil and climatic conditions that do not support larger tree growth. The grassland ecosystem receives lower to moderate rainfall than forest and woodlands ecosystem but a little more than desert ecosystems. Phenomena such as wildfires are prevalent and very important in maintaining this ecosystem. There are several types of grassland around the world. In Botswana, tropical or savanna grasslands are more common in the western part of the country. This habitat provides specific services to many flora and fauna adapted explicitly to this eco-region, hence the grassland ecosystem composition.

This ecosystem provides rangeland services that support smallholder livelihoods through provision of grazing for cattle, small stock, and game³² which also directly play a major role in the agricultural industry and food security at large. Similarly, extensive grasslands in Botswana provide a source of building materials, a habitat for diverse wildlife and environmental services such as prevention of soil erosion and nutrient control. However, there are gaps in understanding the importance of maintaining pristine grasslands for improved ecosystem services benefits derived from them. As a result, grasslands continue to decline at an alarming rate and facing major threats such as conversion to agricultural land, bush encroachment³³, poor management and unsustainable afforestation practices. Also, there is limited knowledge on how traditional fire management systems could help curb increasing fires in these ecosystems.

3.1.4. Desert Ecosystem

Desert ecosystems exist worldwide in desert areas where annual rainfall is very low. The Kalahari Desert, a vast interior plateau covering a large portion of southern Africa, encompasses almost all of Botswana. Sunlight is usually very intense in the desert ecosystem due to limited vegetation cover. The desert ecosystem has incredibly high temperatures and low availability of water. However, the nights are quite cold. The Desert ecosystem has a unique diversity of flora and fauna. Plants grow with small amounts of water and their leaves and stems are adapted to conserve water. Similarly, animals are also adapted to the dry conditions of desert ecosystems. The species that can only be found in the desert ecosystem have developed unique ways to feed themselves, go long periods without water and to survive extreme temperatures. Despite its dryness, the Kalahari Desert of Botswana has become increasingly used for livestock production. Ranches have been established and are highly dependent on drilled boreholes for water supply³⁴.

³¹Thakadu, O.T., Garekae, H. and Lepetu, J. (2020). Forest resource utilisation and rural livelihoods: Insights from Chobe enclave, Botswana. *South African Geographical Journal= Suid-Afrikaanse Geografiese Tydskrif*, 102(1), pp.22-40.

³²Dougill, A. J., Akanyang, L., Perkins, J. S., Eckardt, F. D., Stringer, L. C., Favretto, N., Athlhopeng, J., & Mulale, K. (2016). Land use, rangeland degradation and ecological changes in the southern Kalahari, Botswana. *African Journal of Ecology*, 54(1), 59–67

³³Bengtsson, J., J. M. Bullock, B. Egoh, C. Everson, T. Everson, T. O'Connor, P. J. O'Farrell, H. G. Smith, and R. Lindborg. (2019). Grasslands—more important for ecosystem services than you might think. *Ecosphere* 10(2):e02582. 10.1002/ecs2.2582

³⁴Dougill, A. J., Akanyang, L., Perkins, J. S., Eckardt, F. D., Stringer, L. C., Favretto, N., Athlhopeng, J., & Mulale, K. (2016). Land use, rangeland degradation and ecological changes in the southern Kalahari, Botswana. *African Journal of Ecology*, 54(1), 59–67.

Of particular importance, the Kalahari Desert has huge potential for tourism activity. For instance, the Khawa Dune Challenge which features activities such as quad and motor bike challenges, fun camel rides, cultural performances and exhibitions and sale of arts and crafts from the Kgalagadi area generates revenue in this desert region³⁵. This ecosystem is therefore important in the provision of ecosystem services, and hence important for inclusion in the assessment process.

3.1.5. Hill Ecosystem

Hilly ecosystems are becoming increasingly important during this era of climate change. These ecosystems are stable states transitioning from long-term adaptation and succession processes which makes them resilient to external disturbance stimuli. Due to their longer periods of succession towards reaching climax, they are vulnerable to any disturbance, and as such, it is difficult for them to reach ecosystem stability after disturbance. Similarly, this ecosystem is becoming increasingly important for the provision of ecosystem services to enhance human- livelihoods. For example, hills such as Tsodilo and Aha in the western Okavango Delta, and Ghoha and Gubatsaa in Chobe region have become important for revenue generation through tourism, while others including Tswapong, Shoshong and Mokgware near Palapye are equally rich in cultural and heritage services. In addition, these ecosystems provide key aquatic services essential for wildlife, food, medicinal and cultural rituals. The ecosystem has potential for bio-prospecting³⁶ (for example, algae, Deoxyribonucleic Acid (DNA), proteins, micro-organisms) that could contribute to biodiversity economy in Botswana. As such, these ecosystems need further assessment to document the diversity of ecosystem services provided, and the associated traditional knowledge.

3.1.6. Agroecosystem

An agroecosystem refers to spatially and functionally coherent unit of agricultural activity with complex relationships and interactions between soils, climate, plants, animals, other organisms, and humans in a physical space. Agroecosystems are characterised by both planned and unplanned diversity³⁷. These ecosystems are principally managed to optimise the provisioning of desired agricultural goods and services³⁸. In the process, they depend on a wide variety of supporting and regulating ecosystem services provided by natural ecosystems, including pollination, biological pest control, maintenance of soil structure and fertility, nutrient cycling, and hydrological services³⁹. Of the 581,730 km² of Botswana's surface area, about 45.63% is zoned for agricultural production. Agriculture has been documented to contribute less than 2% of the GDP of Botswana but remains vital for the livelihoods of many citizens who operate subsistence farms. Nonetheless, the crop sub-sector productivity is limited due to unreliable water supply given that 70% of Botswana's landscape consists of desert and poor soils⁴⁰.

The Botswana government is making efforts in improving agricultural production as evidenced by the setting up of Agricultural Economic Special Zone in Pandamatenga as well as horticultural production in the southeast of the country. In 2022, the government of Botswana (GoB) placed restrictions on the importation of some horticultural products and enacted an Impact Accelerator Subsidy program for horticultural farmers. There remain knowledge gaps on how these efforts would have on the agroecosystem and subsequently other ecosystem services derived from this critical ecosystem. It is acknowledged that depending on management practices, agriculture can also be the source of numerous disservices,

³⁵ Botswana Tourism Organization. (2021).

<https://www.botswanaturism.co.bw/search/node?keys=khawa+dune+challenge>

³⁶ Hannah, L., Wetterberg, G., & Duvall, L. (1988). *Botswana Biological Diversity Assessment*. Bureau for Africa, Agency for International Development.

³⁷ Hodgson, E. (2012). Human environments: definition, scope, and the role of toxicology. *Progress in molecular biology and translational science*, 112, 1-10

³⁸ Zhang, W., Ricketts, T. H., Kremen, C., Carney, K., & Swinton, S. M. (2007). Ecosystem services and dis-services to agriculture. *Ecological economics*, 64(2), 253-260.

³⁹ Power, A. G. (2013). "Ecology of agriculture," in *Encyclopaedia of Biodiversity*, 2nd Edn, ed S. A. Levin (Cambridge, CA: Academic Press), 9–15. doi: 10.1016/B978-0-12-384719-5.00006-X

⁴⁰ Botswana - Country Commercial Guide: Agricultural Sectors. <https://www.trade.gov/country-commercial-guides/Botswana-agricultural-sectors>

including loss of wildlife habitat, nutrient runoff, sedimentation of waterways, greenhouse gas emissions, and pesticide poisoning of humans and non-target species. Agroecosystems have less resilience than natural ecosystems due to reduced structural and functional diversity in relation to natural ecosystems. In this regard, the trade-offs that may occur between provisioning services and other ecosystem services and disservices shall be evaluated in terms of spatial scale, temporal scale, and reversibility for sustainability⁴¹.

3.2. Temporal Scale

In tandem with Botswana Vision 2036⁴² (which is a 20-year plan commencing 2016) and other previous milestones in the country, the temporal scale of the assessment will cover the period 1990-2036. The baseline year is significant in the history of biodiversity conservation in the country because the implementation of the first National Conservation Strategy (NCS)⁴³ was approved in 1990. Anchored on the concept of sustainable development, the strategy heralded an era of deliberate environmental awareness in relation to the concerns on rangelands degradation, and overexploitation of veldt products, among others. The NCS Action Plan, which was introduced after the approval of the NCS resulted in new strategic approaches geared towards promoting the integration of NRs conservation in the national development process.

Lack of alignment of development initiatives with key national planning and strategic plans has been implicated in poor implementation of some environmental management plans in Botswana. The assessment will ensure that its scope and coverage align well with Vision 2036 to make it relevant to the national agenda⁴⁴.

3.3. Geographic Boundaries

The assessment will adopt a national scale approach considering the geographical spread of the various ESs in Botswana. Although there may be challenges with the assessment to entirely cover the entire borders of Botswana, it is significant to deploy all efforts to ensure a national coverage. It is also noteworthy that some key ecosystems may be concentrated in selected regions and may not necessarily be found at national scale. The terrestrial and aquatic ESs are influenced by 'edaphic factors, patterns of rainfall, nutrient availability, fire regimes and herbivory⁴⁵. The geographic regions comprising sandveld, hardveld, Chobe, Okavango and Makgadikgadi pans⁴⁶ have a diversity of flora and fauna. Certain context specific policy questions addressing direct and indirect drivers of biodiversity and ESs degradation; how different interest groups envision sustainable ecosystems in Botswana; economic sector linkages to biodiversity and ecosystems in Botswana; and the roles that local communities and their knowledge play in enhancing a holistic management of biodiversity and ecosystems in Botswana may not have been entirely covered in the current databases, but it is imperative to ensure that baseline data for other ecosystems is documented to enhance this national exercise.

⁴¹ Power, A. G. (2010). Ecosystem services and agriculture: trade-offs and synergies. *Philosophical transactions of the royal society B: biological sciences*, 365(1554), 2959-2971.

⁴² Government of Botswana (2016). *Vision 2036: Achieving Prosperity for All*. Lentswe la Lesedi, Gaborone.

⁴³ Government of Botswana (1990). *National Conservation Strategy: National Policy on Natural Resources Conservation and Development*. Government Paper No. 1. Government Printer, Gaborone.

⁴⁴ Vision 2036 Presidential Task Team (2016). *Vision 2036-Achieving Prosperity for all*. Lentswe la Lesedi, Gaborone.

⁴⁵ Ringrose, S., Chipanshi, A.C., Matheson, W., Chanda, R., Motoma, L., Magole, I. et al. (2002). Climate-and human-induced woody vegetation changes in Botswana and their implications for human adaptation. *Environ. Manage.* 30, 98-109.

⁴⁶ Ministry of Environment, Wildlife and Tourism (2002). *State of the Environment Report*. ABC Press, Gaborone.

4. Potential Use of The Assessment

The assessment process will outline the potential use of the NEA for policy and decision-making in Botswana to promote sustainable management of biodiversity and ESSs or their broader notion of nature's contribution to people. At the local level, the BW-NEA will provide support to national policies through evidence-based information needed for the implementation of biodiversity-related processes. These policies and plans include Vision 2036, National Biodiversity Strategy and Action Plan (NBSAP), Forest Policy, Climate Change Policy, State of the Environment and Outlook Report and the domestication of the of the Nagoya Protocol on genetic resources and fair and equitable sharing of benefits arising from their utilization through the Access and Benefit Sharing of Biological Diversity Act of 2022. Also, the BW-NEA could be used for providing information necessary for drafting key biodiversity-related policies, notably the next NBSAP, Environmental Policy and the Bioeconomy Strategy. It will also be of potential use for drafting national reports on the CBD and other biodiversity related conventions such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the World Heritage and Ramsar Conventions. At the global level, the BW-NEA could be used for the provision of information needed to inspire national actions and strategies to strengthen the implementation of the Kunming-Montreal Global Biodiversity Framework⁴⁷.

In recognizing the key role of valuation in biodiversity and ESSs policies, the BW-NEA will emphasize that ESSs values are not only limited to instrumental values (values justifying conservation of nature to achieve human benefits), but also include relational values (aesthetics, spiritual services) and inherent values (intrinsic values)⁴⁸. The assessment will thus make a case for the importance of incorporating valuation in national assessment to inform ecosystem restoration plans, ecological

compensation schemes, sustainability goals of national development plans, sustainable land use management programs and institutionalisation of ecosystem valuation in key ministries. For example, economic valuation of the forest ecosystem may help make a case for addressing deforestation and investing in ecosystem-based adaptation. Valuation thus facilitates the assimilation of ecosystem investment into economic planning and processes including national statistics with respect to what ecosystems can deliver on environment, social and economic objectives of development.

The BW-NEA will further highlight the policy relevance of indigenous, cultural and social values based on traditional knowledge systems (TKS) and their associated use and understanding of ecosystems. The assessment report will identify the type of knowledge, skills and approaches needed by all the existing and relevant sectors, stakeholders and knowledge holders for enhancing sustainable management of natural resources in Botswana. The report will, therefore, underscore the importance of emic-etic perspectives in the discussion of relational and multiple values, especially in relation to cultural services⁴⁹. More importantly the assessment will propose ways in which communities can capitalize on biodiversity and ecosystem services in their localities for product value chain development for purposes of improvement of community livelihoods through income generation, employment creation and ultimately rural development⁵⁰. This realisation may further inform the National Environment Fund in the prioritisation of thematic areas and projects for funding to foster biodiversity and ecosystems services management in the quest for improved community livelihoods.

Finally, the BW-NEA will underscore the application of management tools for the assessment of biodiversity and ESSs in the country. These tools include the use of maps to make inventory assessments of the current status of biodiversity and ecosystem services. This is with a view to

⁴⁷ Keoagile, K. (2021). Convention on Biological Biodiversity (CBB). Department of Environmental Affairs, Ministry of Environment, Natural Resources and Tourism, Gaborone, Botswana

⁴⁸ Arias-Arevalo, P (2017). Exploring intrinsic, instrumental and relational values for sustainable management of social-ecological systems. *Ecology and Society*, 22 (4), 43.

⁴⁹ Morris M. W., Leung, K., Ames, D., Lickel B (2017). Views from inside and outside: integrating emic and etic insights about culture and justice judgement. *Academy of Management Review*, 24 (4), 781-736.

⁵⁰ The former is derived from absolute values of ESSs as the name suggests whereas the latter may be derived by estimating policy-related changes and their impact on economic values. See Everard, M. (2017). *Ecosystem Services: Key Issues*. London: New York, Routledge

addressing the critical question of how to halt the loss of biodiversity in the country. In addition, the assessment will also highlight the applications of tools such as natural capital accounting⁵¹ and payment for ecosystem services⁵². The NEA will also provide additional highlights that have the potential to enhance the conceptualization and application of these tools to achieve sustainable management of natural resources in Botswana.

5. Methodological approach

The assessment will be documented by a carefully selected group of assessment authors who have multidisciplinary trainings in requisite fields such as Conservation Biology, Environmental Economics, Hydro-climatology, Modelling, Biodiversity and Ecosystems Dynamics, Wildlife and Rangeland Management, Rangeland Ecology, Forestry, Remote Sensing, Plant Ecology, Human-Wildlife Conflict, Rural Sociology, Aquatic and Wetland Ecology, Environmental Communication, Indigenous Knowledge, Geographic Information Systems, Agronomy, Gender, Water Conservation, Plant Taxonomy, Agricultural Economics and Climate Change Policy with considerable years of broad-base experience in context-specific biodiversity and ecosystems issues. The document will be compartmentalized into different chapters addressing topical ecosystems and ecosystem services-related subjects based on the requirements and deliverables of the United Nations Environment Programme World Conservation Monitoring Centre (UNEP- WCMC) (Table 1).

The assessment tailors IPBES methodologies and process to national context. As a point of departure, the assessment will base its analyses on (i) the IPBES conceptual framework, which embeds the characterisation of Botswana within country-specific variables that influence biodiversity and ecosystem management; and (ii) the overarching policy-relevant but non-prescriptive questions addressing the country's NEA. The key elements and associated methodologies are described below:

Status and Trends – assessment of priority ecosystems and their services, as well as the

associated drivers of change. The Driver-Pressure-State-Impact-Response (DPSIR) model will be applied to provide qualitative or quantitative cause-effect descriptions of underlying factors that cause changes in key priority ecosystems (Drivers); the Pressures thereof which entail the human activities directly affecting the environment; the State in which the ecosystems and services are in terms of observable changes; the Impacts of the observed changes and their ultimate effects on human health and/or ecosystems; and the Responses or actions taken by the society to adapt, prevent or alleviate vulnerabilities and take advantages of the opportunities presented by the changes. In addition, the six prioritised ecosystems will be mapped spatially. Landsat scenes across Botswana will be atmospherically and radiometrically corrected, and Supervised Maximum Likelihood Classifier in ENVI will be applied to show their distribution across Botswana. Similarly, a change detection technique will be explored using ENVI, to determine how the ecosystems have changed with time.

Scenarios – development of descriptive story lines or representations of possible futures to illustrate the consequences of plausible changes in drivers, ecosystems and their services, policies, as well as their impact on human well-being. Exploratory scenarios will be adopted to high level of unpredictability/uncertainties associated with the future trajectory of many drivers while intervention scenarios will be used to evaluate alternative policy or management options⁵³.

Valuation – of ecosystem services in monetary and non-monetary terms and examining present and future delivery of services. There are numerous valuation methods with different approaches and applications to ecosystems services⁵⁴. The assessment will lean towards methods whose approaches do not require primary data such as the Value Transfer (Benefits Transfer) method where values of ecosystem services are estimated using existing information from a different site. The method is applicable to all ecosystem services such as recreation, landscape aesthetics

⁵¹ Natural capital accounting is the process of estimating changes in stocks of natural resources and the ESSs they provide (in physical or monetary terms). See Hambira, Wame L (2007). Natural resources accounting: a tool for water resources management in Botswana. *Physics and Chemistry of the Earth*, 32 (15-18), 1310-1314.

⁵² Payment for ESSs is an incentive-based scheme for conserving ESSs whereby the landowner may enter a contract with a buyer of the ESS service to obtain additional environmental benefits from the conservation of ESSs. The CBNRM program in Botswana is an example of this incentive-based scheme

⁵³ <https://www.ipbes.net/scenarios>

⁵⁴ https://www.esvd.info/files/ugd/53b4f9_1167734bd8724e8f921ed497f037201e.pdf

and flood risk attenuation.

Response Options – examining past and current actions that have been taken to secure/enhance contribution of biodiversity to human well-being. This will entail a content analysis of Responses take the form of technological changes, policy and legislation and other program activities that foster adaptation.

The assessment will be cognizant of the existing power relations between different stakeholders and knowledge holders including local communities. It will also recognize the existing knowledge gaps that require attention for developing human capital in relation to ecosystems management in Botswana. The analyses will thus encompass both scientific and TKS with strong consideration given to multiple realities as against one single reality within the context of natural resources governance in the country.

The exercise will rely on existing data in all forms

(archival records, scientific publications, personal communications, etc.) to build on existing national, regional and global assessments on biodiversity and ecosystems as reflected in the works of UNEP-WCMC and IPBES. To enhance national capacity building in ecosystems management, the assessment authors will rely heavily on ground truthing through, consultative workshops, community dialogues, key informants’ interviews, case studies, participatory action research, stakeholder dialogues and observations. As such, the assessment will be based on multiple evidence-based approaches which present enriched understanding of traditional knowledge in the development of the assessment document.

The report will be rigorously subjected to verification and validation exercises through layered or phased stakeholders’ consultations to enhance buy-ins and wide acceptability among all interested parties whose academic backgrounds and or worldviews are shaped by multiple factors, and who are situated within diverse socio-politico-cultural milieus.

6. Chapter Outline

The BW-NEA technical report will be organised by priority ecosystems. While the technical report is not meant to answer individual policy questions, it will provide information on data and knowledge to answer them. The proposed outline for the technical report is presented in Table 1:

Table 1: Proposed chapter outline for the NEA Technical Report.

EXECUTIVE SUMMARY	
Key messages	
Part One: Setting the Scene	
Chapter 1: National Ecosystem Assessment: Context and Rational	<ul style="list-style-type: none"> • An overview of Botswana (Climate, topography, vegetation, soils, hydrology, ecosystems, econmy, political landscape, demographics) • Rational of the NEA and its role in bridging the gap between science and policy • Significance of ecosystem assessment in Driving Botswana's sustainable development agenda (include MEAs)
Chapter 2: Assessment Overview and Methodological Approaches	<ul style="list-style-type: none"> • Assessment Scope and Policy Questions • Assessment overview and conceptual framework • Biodiversity and key ecosystems • Ecosystem services • Methodological framework and approaches

Chapter 3: Overview of cross cutting issues	<ul style="list-style-type: none"> • Climate change (Trends, status, and outlook); adaptation mechanisms • Participation of vulnerable groups (Youth, women, people living with disabilities) • Status and value of traditional knowledge
PART 2: ASSESSMENT OF KEY ECOSYSTEMS	
Chapter 4: Aquatic and Wetland Ecosystem	<ul style="list-style-type: none"> • Ecosystem Description and Mapping <ul style="list-style-type: none"> □ Overview of the ecosystem □ Detailed map showing the distribution and extent of the ecosystem within Botswana. • Ecosystem Status and Trends <ul style="list-style-type: none"> □ Assessment of the current state of the ecosystem □ Analysis of drivers, pressures, and changes in ecosystem conditions – baseline over time • Ecosystem Services Assessment (benefits to local communities and environment) <ul style="list-style-type: none"> □ Identification and classification of ecosystem services □ Assessment of how the ecosystem services contribute to various aspects of human well-being, including livelihoods, culture, and resilience to climate change. □ Gender, private sector, and youth involvement
Chapter 5: Forest and Woodland Ecosystem	
Chapter 6: Grassland and Shrubland Ecosystem	
Chapter 7: Agroecosystem	
Chapter 8: Desert Ecosystem	
Chapter 9: Hill Ecosystem	
PART 3: SOCIO-ECONOMIC OPPORTUNITIES FOR A SUSTAINABLE FUTURE	
<p>Chapter 10: Scenarios and pathways to a sustainable future for Botswana</p> <ul style="list-style-type: none"> • How might the indirect and direct drivers on ecosystems change over time? • How might ecosystems and associated ecosystem services change over time? • How might human well-being change due to changing ecosystems and scenarios? • What are the benefits of proactive management of ecosystems? 	
<p>Chapter 11: Valuation of key ecosystems and opportunities for value chain development</p> <ul style="list-style-type: none"> • Economic Valuation of Key Ecosystem Services <ul style="list-style-type: none"> □ Monetary Valuation of Ecosystem Services □ Non-Monetary Valuation of Ecosystem Services • Sustainable Value Chain Development Opportunities <ul style="list-style-type: none"> □ Sustainable value chains - circular economy principles and responsible resource utilisation □ Green Entrepreneurship and Innovation - opportunities for developing new markets or expanding existing markets by incorporating sustainable practices 	
<p>Chapter 12: Opportunities for Policy and Management Interventions</p> <ul style="list-style-type: none"> • Recommendations for policy interventions and management strategies • Proposed measures to enhance ecosystem resilience, safeguard biodiversity, and foster the sustainable management of ecosystem services in the context of Botswana's unique challenges and opportunities 	

7. Relevant Stakeholders and Initiatives

7.1. Key stakeholders

Stakeholder participation and engagement will be an integral part of the assessment process. Based on their varied interests in biodiversity and ecosystem services, different stakeholders will be actively involved in the development of the assessment report. A stakeholder participation and engagement strategy will be developed at the inception of the assessment to guide and inform stakeholder communication, engagement, and consultation. Stakeholder mapping (Appendix 2) will form a key part of strategy development. Generally, stakeholder groups with interest in biodiversity resources and ecosystem services include the public, specialised user groups (e.g., fishermen, farmers, basket weavers, husbandmen and craftsmen), community-based organisations (CBOs) including the community-based natural resources management (CBNRM) Trusts, civil society (non-governmental organisations), academia, private sector and parastatals, donors, international organisations and policymakers.

Among these stakeholders, the government has decision-making power in relation to natural resources management, though this is done in consultation with other key stakeholders such as local communities. The advent of CBNRM in 1989 partly devolved decision-making powers and management responsibilities of natural resources to local communities. To this effect, communities living within or adjacent to community designated concession areas formed community trusts to benefit from natural resources utilisation in their areas. In Botswana, different communities continue to live and co-exist within an ecosystem in the ever-changing agroecological and socio-economic environment. The NEA will, therefore, consider how the shifts in power and influence brought about through CBNRM have contributed to improved biodiversity and ecosystem management.

Within the CBOs, public and civil society, local communities and marginalised groups who possess

unique traditional knowledge of the biodiversity resources and systems and/or their representatives will be prioritised because their livelihoods are intricately linked with ecosystems health and services. The private sector depends on biodiversity and ecosystems services for material inputs which may result in habitat fragmentation due to resource extraction, pollution due to emissions from industries resulting in climate change. Biodiversity loss and decline in ecosystem services poses a risk to businesses. Therefore, the role of the private sector in the conservation of biodiversity and ecosystems cannot be overemphasised.

The assessment will consider different stakeholders in terms of their relative position of importance and influence, power, and control⁵⁵ in biodiversity and ecosystem services. The status of each stakeholder group will determine the level of involvement and emphasis that should be placed on the stakeholders during the assessment process. The proposed strategy will establish the existing communication practices, processes, and behaviour of each stakeholder group to provide information on the existing, potential and emerging approaches (e.g., virtual platforms), channels and means, which are considered appropriate or suitable for outreach, dialogue, consultation and engagement during the assessment process.

7.2. Science-policy initiatives or mechanisms in Botswana

The NEA is an avenue that allows key stakeholders to determine the country's biodiversity status and people's needs, collate necessary data at a national scale and make them available to other science-policy interface platforms such as the Inter-governmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES). Through the Department of Environmental Affairs (DEA), the NEA has, therefore, become one of the strategies that Botswana government adopted to enhance capacity and support country-wide biodiversity assessments. This is further aimed at fulfilling the implementation of the National Biodiversity Programme (NBP), which has national and international biodiversity targets including the reduction of ecological footprints on biodiversity. Like other existing biodiversity platforms,

⁵⁵ Rietbergen-McCracken, J., & Narayan, D. (1998) Participation and Social Assessment: Tools and Techniques. Washington, D. C.: World Bank

the DEA, which is the National Focal Point (NFP) for the CBD, is an important partner to IPBES because of its ability to mobilise stakeholders to contribute to biodiversity assessments and enhance the credibility and uptake of the biodiversity assessments⁵⁶. While IPBES has been active in Botswana over the years, it is important that data collection and analysis are better coordinated to enable all key stakeholders to fully contribute to the assessments, either through the expression of interest in the data collection process or the data themselves. There is also the National Biodiversity Strategy and Action Plan (NBSAP) which is the guiding tool⁵⁷, through which policymakers broaden their understanding on the status of biodiversity in Botswana following the assessments done by the scientific community and civil societies.

Currently, there has not been any country-wide intensive biodiversity assessments in Botswana except for system specific assessments such as for the Okavango Delta and Makgadikgadi Pans due to them being the pull factors of tourism which is the second largest earner of GDP in Botswana. This has led to skewed attention at the expense of other ecosystems with economic potential.

7.3. Synergies

The BW-NEA marks Botswana's inaugural comprehensive ecosystem assessment, amalgamating extensive data on the current states and trajectories of various ecosystems. This initiative will offer detailed guidance and present well-informed scenarios to enhance the development of value chains for several promising ecosystem products.

Much of the data to be used in the assessment will be gathered from previous, as well as existing projects and initiatives across all stakeholders within Botswana. To eliminate problems arising from duplicated information and data, synergies and a functional network integrating efforts of BW-NEA,

NBSAP, IPBES and other previous and ongoing initiatives will be established. The BW-NEA will build upon and integrate the synergies from existing, ongoing, and completed projects and initiatives. The BW-NEA will leverage on some of these projects including but not limited to the following which fall under the National Transition Plan: The Commercialisation of Veld Products Project in Tswapong region, Makgadikgadi Framework Management Plan Implementation in the Boteti region, and the Domestication of the Nagoya Protocol project in Okavango. Another key project relevant to the BW-NEA is the Cross-cutting Capacity Development Project (CCCD) through which the following sub-projects have been undertaken: the production of the State of Environment and Outlook Report (SOE&OR); the development of the Strategic Environmental Assessment Guidelines and the Environmental Information System (EIS); as well as the Nagoya Protocol Awareness Raising project. Similarly, the following projects and initiatives would be critical and useful to the BW-NEA: National Forest Monitoring System (Natural Forests Maps), Land degradation assessment, and National Forest Master Plan. The synergies will facilitate more efficient data evaluation, policy development, and engagement with stakeholders, including local communities.

It is critical that different structures at local, regional and national levels appreciate their involvement in data collection and the benefits associated with participation in such a global conservation initiative. Methodologies of involving key stakeholders (i.e., dialogues) and sustaining their interest and support is crucial for the credibility of the data and the buy-in of the assessment process and subsequent policies recommendations. Policy formulation will be informed by the prevailing situations in locations where most vulnerable stakeholders such as local communities are residing.

⁵⁶ The Inter-governmental Science Policy Platform on biodiversity and Ecosystem Services (IPBES), which was established in 2010 has proved to be more effective in bringing key stakeholders together and transforming and packaging scientific data and information for easier retrieval, understanding and use by national governments. (see IPBES 2021. <https://ipbes.net/national-regional-platforms-networks>.)

⁵⁷ National biodiversity platforms are established to bridge knowledge gaps and understanding of technical and policy interests and implementation issues between the scientific community and policy makers and implementers. The platforms are meant to create and use different forms of partnerships between government, civil society, academics, and local communities to fast track the implementation and ownership of biodiversity conservation initiatives.

8. Key data, knowledge, and information

Observations are that in most cases, inventory taking is done in silos and housed by different departments and institutions. Hence it is possible that data availability and sources of knowledge may not cover the whole country.

Appendices 3 and 4 show some datasets/knowledge sources portals that are available at various international and local institutions ranging from species occurrence, biodiversity mapping, and hydrology. Although applicable only to certain selected species, wildlife aerial survey data generated periodically by the Department of Wildlife and National Parks (DWNP) are available at a national scale. Therefore, knowledge sources from government (e.g., DWNP and Statistics Botswana) are important in the national geographic context. At international level platforms, wildlife movement data for large herbivores in Botswana generated by individuals scholars is available through the AfriMove⁵⁸ data portal. Appendices 3 and 4 will, however, provide key insights relevant to the BW-NEA. That said, there exists the Botswana National Spatial Plan 2036 (NSP), which provides broad-based data and a spatial vision for national development⁵⁹. Among others, the plan ‘...promotes greater economic diversity in the agriculture and tourism sectors and contributes to a more sustainable environment in the areas of energy, water and sanitation’. The assessment will also leverage on traditional knowledge to enrich the assessment through knowledge complementarity and co-production. The following sources of information will be useful in providing information relevant to traditional knowledge: the traditional leadership (*Bogosi*) are custodians of traditional and cultural values of the communities; the United Nations Educational, Scientific and Cultural Organization (UNESCO) provides data on cultural and heritage sites around the world; Community Based Organisations (CBO) will provide information specific to their areas of jurisdiction; the Non-Governmental Organisations (NGO) usually support the communities by providing funding for value addition of natural resources and

facilitate marketing of their products. There are individual experts who can provide relevant data and publications about traditional and indigenous knowledge.

The BW-NEA team will endeavour to make data, knowledge, and information available to stakeholders in line with international standards and protocols acceptable by UNEP-WCMC and BES-Net. Dissemination of data, knowledge, and information to stakeholders shall be done in accordance with international standards. The findings will be made available through a variety of platforms including a digital repository that adheres to open-access standards, fostering a wider reach and facilitating interdisciplinary collaborations.

In line with IPBES principles, the assessment encourages active involvement of various stakeholders, including indigenous communities and local knowledge holders, in knowledge generation and decision-making processes. Periodic stakeholder engagement workshops and forums will be conducted to facilitate dialogue, knowledge sharing, and to build capacities at various levels.

Furthermore, to ensure utmost transparency and reliability, the assessment would be subjected to a rigorous peer-review process including experts from diverse sectors. The data, integrated with state-of-the-art technology, will foster knowledge co-production, ultimately contributing to informed policymaking and sustainable management of Botswana’s rich biodiversity and ecosystems.

9. Operational Structure

The operational structure of the NEA process shall comprise the Project Management Unit (PMU) the National Biodiversity Authority, Technical Reference Group (TRG), Traditional Knowledge Task Force, National Biological Diversity Authority (NBDA) and author teams (see Figure 2 and Appendix 5). While these will be the key structures in country, the PMU will be working closely with the UNEP-WCMC and the BES-Net Indigenous and Local Knowledge support Unit, for technical support.

⁵⁸ <https://afrimove.org/what-is-afrimove/>

⁵⁹ MLMW & SS (2018). National Spatial Plan. Ministry of Land Management, Water and Sanitation Services, Government of Botswana. Online document: https://drive.google.com/file/d/1SrN2hCaydEwT3QsjGzMzMLi4ZKpGfgra/view?usp=drive_web

9.1. Project Management Unit (PMU)

The BUAN technical team and the DEA representatives shall constitute the PMU. The PMU will be responsible for providing technical and professional support for the assessment, overseeing selection of authors, creating stakeholder engagement strategy for stakeholder engagement,

coordinating meetings and workshops, as well as managing the administrative side of the assessment. Focal persons for communications, capacity building, knowledge management, local knowledge task force and funds administration team shall also form part of the PMU as conveners of their respective subcommittees.

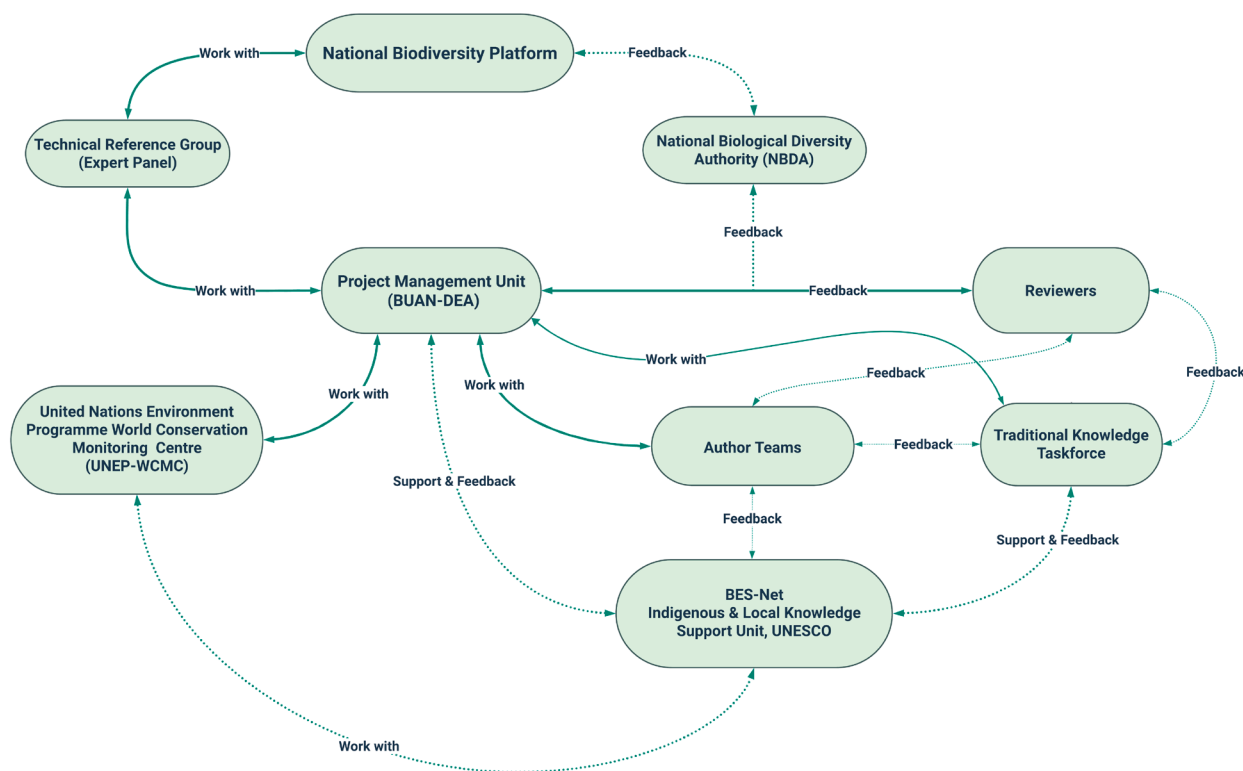


Figure 2: Botswana National Ecosystem Assessment Operational Structure

9.2. National Biodiversity Platform

The National Biodiversity Platform shall be responsible for approval of all BW-NEA deliverables. It is chaired by the Deputy Permanent Secretary in the Ministry of Environment and Tourism and comprises directorates of key institutions instrumental to the assessment.

9.3. Technical Reference Group (TRG)

The TRG is made up of experts in various disciplines that are critical to the BW-NEA. These include natural scientists, social scientists, traditional knowledge experts and communication experts. The TRG provides expert advice on the assessment design, implementation and communication and submits recommendations for approval of project deliverables to the National Biodiversity Platform.

9.4. Traditional Knowledge Task Force

The Traditional Knowledge task force comprising traditional knowledge experts and traditional knowledge holders will oversee the mainstreaming of traditional knowledge in the BW-NEA process and project writeup.

9.5. National Biological Diversity Authority (NBDA)

The National Biological Diversity Authority (NBDA) comprising academics, civil societies and local communities provides technical and technological advice in the implementation of national biodiversity programmes including the NBSAP in Botswana. Similarly, the NBDA will review BW-NEA outputs to ensure they are technically sound in line with CBD and IPBES requirements and principles. The NBDA shall have representation in the National Biodiversity Platform to ensure sustainability of the project and continuity beyond 2026 when the assessment ends.

9.6. Author Teams

The team responsible for the assessment writing. Teams shall comprise of Coordinating Lead Authors (CLAs), Lead Authors, Contributing Authors and Fellows. CLAs are experienced experts in the topic the chapter is addressing who will be responsible for coordinating a chapter of the assessment, including coordinating lead authors, contributing authors and fellows. Lead Author's responsibility will be to produce designated sections or parts of chapters. These are experts of content in a specific section of the chapter. Contributing Authors are practitioners or traditional knowledge holders who will contribute specific knowledge (i.e. text, graphics, data, case studies, thematic boxes) but not be involved broadly in the assessment. Fellows will comprise early career professionals or post graduate students that could benefit from being mentored by more experienced authors in developing sections or parts of chapters.

9.7. Reviewers

These are external independent experts not involved in the assessment and write-up. The reviewers are responsible for reviewing BW-NEA technical report and summary for policy makers to ensure quality, validity and policy relevance.

10. Process and timeline

The Botswana National Ecosystem Assessment is a four-year project, implemented from the fourth quarter of 2022 to the third quarter of 2026. Summary of activities, milestones and outputs are outlined in Figure 3. Upon the completion of the BW-NEA, the PMU, relevant stakeholders, and government authorities intend to collaborate and facilitate an achievable implementation plan for ensuring the actualisation of the outcomes and recommendations of the BW-NEA. Some of the already proposed actions for implementation include:

1. Establishment of a virtual ecosystems services assessment centre under the Centre for Sustainable Resources at BUAN, the BW-NEA Implementing Agency. This will allow for the annual tracking and monitoring of the implementation matrix and report to the National Biodiversity Platform.

This will ensure continuous knowledge sharing among stakeholders as the main uses and users of the assessment findings will be mapped to meet their data and information needs for purposes of biodiversity and ecosystem services conservation.

2. Establishment of the Botswana Chapter of Global Youth Biodiversity Network (GYBN).
3. Codification of biodiversity frameworks and knowledge sharing with local and relevant ecosystems, including schools, councils, communities, governments, etc.
4. Identification and mapping of use cases and users to enable harmonious assimilation and integration of recommendations, at this level, it will be easier to monitor and track the adoption of use cases by users.
5. Implementation matrix mapping project outcomes and recommendations against strategic objectives and projects.
6. Track and monitor the implementation matrix annually and report back to the relevant Committees.
7. Create tools and mechanisms to enable recommendations and outcomes to be front-end loaded into strategies, programmes, projects initiatives and actions.
8. Completion of BW-NEA on time creates an opportunity for Botswana to be further funded for implementation of the project recommendations through the BES Solution Fund.

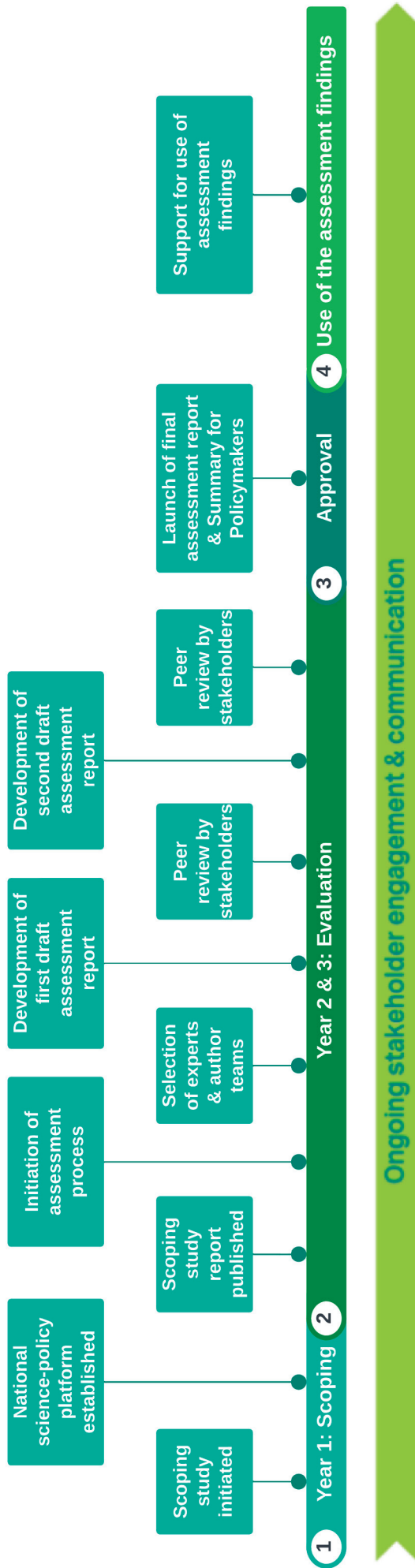


Figure 3: Summary of project timelines and deliverables. Adopted from National Ecosystem Assessment Initiative (NEA)

11. Communications Strategy

The communication strategy (Appendix 6) will guide the continuous dissemination of information pertaining to the activities that will be undertaken to accomplish the NEA to all stakeholders. In addition, it is intended to provide opportunities for assessors and stakeholders to jointly gather information which will assist in closing knowledge gaps whenever the need arises. The main objective of the communication strategy is to disseminate all achieved outcomes of the BW-NEA project by informing, educating and engaging stakeholders about the intended results at all levels (from local communities to high level government decision makers) using available channels of communication.

The strategy will target different audiences both internally (at national level) and externally (international level) who are involved and interested in the NEA process. The audiences will include policy makers, civil service, academics, non-governmental organizations (NGO's), international organizations, local communities, utilisers of ecosystems services, media, youth and the general public who are interested in the on-going outputs from the assessment. Different communication strategies will be employed to different categories of audiences. The policy makers will be provided with policy briefs, researchers/academics will receive reports and publications as well as relevant research methods for NEA process, information dissemination to communities will be through *Kgotla* (community traditional gathering place) meetings and community feedback sessions where they will be informed of the potential impact of the NEA findings on their livelihood strategies and contributions of their knowledge. In addition, the strategy will use different channels to target different audiences. These will include social media platforms, infographics, media briefs and videos. The activities and outputs of the communication strategy are drawn from the BW-NEA activities and tasks as set out in Figure 3. The inputs will be operationalised into communication activities, which include means to create awareness of the targeted stakeholders through different communication channels.

Branding will include designing letterheads and memoranda with appropriately arranged logos, and printed apparel. Online and offline branding will be

used respectively. A monitoring and evaluation plan of the communication strategy will be designed and used during the execution of the communication strategy.

12. Capacity-building Needs

The NEA will outline cost effective and standardised methodologies to enhance comparability of data across the national and international landscape. The intensity of the methodologies can be varied to cater for different users with different capacities in terms of technical knowledge and financial resources. The assessment will underscore essential training for all stakeholders at different strata with a view to promoting unison in needs identification, data collation and their relevance to policy, and uptake by policymakers and beneficiaries. Capacity needs at different levels and dimensions are summarised in Appendix 7 for the Project Management Unit, Authors and Reviewers. Capacity needs cover UNEP-WCMC standardised methodologies and extends to local communities. For the communities, this includes identification of key ecosystem service issues, data collation and relevance to policy, and local dialects and translation to and/or from scientific terminologies, and consensus building with emphasis on interface between science and policy within communities' local contexts. Furthermore, the BW-NEA will endeavour to raise awareness among policy makers about the importance and the role of traditional knowledge in biodiversity conservation.

Creating a platform where policymakers interact with the scientific community and holders of traditional knowledge to enable them to contribute to policy formulation and its implementation will be critical. Participation as fellows also offers capacitation through working under more experienced authors who will serve as mentors. Government contributing authors will also be capacitated by working under experienced authors. The PMU and authors at large also get capacitated by aligning with standard and contemporary UNEP-WCMC methodologies for global comparability, relevance and sustainability of use of assessment results and updates. The national assessment will also emphasise training for local communities and conservancy/concession owners. The preliminary capacity needs as tabulated in Appendix 7 will be updated from time to time.

13. Next steps

Following the validation of the scoping report through a multi-stakeholder streamlined Trialogue and community dialogues on traditional knowledge, the scoping report has gone through designated approval structures. Next, the Project Management Unit will prepare the ground for the full assessment. The development of the assessment report, summary for policy makers and subsequent approval is envisaged to cover a period of four years up to 2026. The expected outputs by 2026 are:

1. Scoping Report
2. National Biodiversity Platform
3. Assessment Report
4. Summary for Policymakers
5. Action Plan on the implementation of assessment recommendations

Acknowledgements

Botswana's National Ecosystem Assessment Scoping Report was initially produced by Okavango Research Institute (ORI), University of Botswana and updated by the Botswana University of Agriculture and Natural Resources [in partnership with the Department of Environmental Affairs, DEA], with support from UNEP-WCMC's National Ecosystem Assessment Initiative and UNESCO on traditional knowledge. This work was funded by the International Climate Initiative (IKI). All photographs on the front and back covers are obtained from Google Images.

Disclaimer

The contents of this report do not necessarily reflect the views or policies of the United Nations Environment Programme (UNEP), the UN Educational, Scientific and Cultural Organization (UNESCO) and the International Climate Initiative (IKI). The designations employed and the presentations of material in this report do not imply the expression of any opinion whatsoever on the part of UNEP or contributory organisations, editors or publishers concerning the legal status of any country, territory, city area or its authorities, or concerning the delimitation of its frontiers or boundaries or the designation of its name, frontiers or boundaries. The mention of a commercial entity or product in this publication does not imply endorsement by UNEP, UNESCO or IKI.

Appendices

Appendix 1: Priority ecosystems and their descriptions

Priority ecosystem	Location	Descriptions
Aquatic and wetland	North-West; part of the Cubango Okavango River Basin; North-East Central-North; North-Central ; North-Southwest.	<ul style="list-style-type: none"> • Wetlands of socio-ecological and economic importance • Home to diverse ethnic groups including local communities. • Characterised by permanent swamps, seasonal and occasional flooding zone and peripheral dry savanna woodlands. • Riverine forest, • Examples lentic (lakes), brackish (pans), lotic (rivers), ripples, wetlands; swamps, Marsh, Temporary/seasonal pools, Natural Springs / gorges. • Tourism hub; heritage hub; traditional and spiritual value. • Seasonal Hydrological variability • Important Bird Area • Large saline aquatic systems are breeding grounds for Greater and Lesser flamingos. • Large saline aquatic systems are key Wet season range for migratory zebras and wildebeests. • Permanent aquatic and wetland systems are important wet and dry season for a rich and diversity of wildlife, including rare aquatic ungulates such as red lechwe, bushbuck and kudu.
Forests and woodlands	North-West; part of the Cubango Okavango River Basin North-East Central-North North-Central North-Southwest	<ul style="list-style-type: none"> • Characterised by large and dense tree cover. • Moderate to minimal undergrowth. • Large and dense vegetation often presents in different complex structures, compositions, ages and diverse processes, • Facilitate the ecological interactions of other diverse fauna and flora within. • Occurs mostly in high rainfall and good quality soils to facilitate the growth and sustenance of big and dense trees. • Examples are the miombo forests, a mosaic of woodlands such as mopane-sandveld, and riverine woodlands.
Grassland and Shrubland	North-West; part of the Cubango Okavango River Basin North-East Central-North North-Central North-Southwest	<ul style="list-style-type: none"> • Vast grasslands supporting biodiversity persistence and sustenance. • Consists of vegetation which primarily consists of many types of grasses, forbs, scattered shrubs and often small or no trees. • Characterised by soil and climatic conditions that do not support larger tree growth. • The grassland ecosystem receives lower to moderate rainfall than forest and woodlands but a little more than deserts. • Wildfires are prevalent and very important in maintaining this ecosystem.

Hill	North-West North-East Central-North North-Central	<ul style="list-style-type: none"> • Characterised by large rocks protruding on the terrestrial habitats. • These ecosystems are climax stages of a long-term adaptations and succession. • Vulnerable to any disturbance, and as such, it is difficult for them to reach ecosystem stability after disturbance. • Becoming increasingly important for the provision of ecosystem services to enhance human- livelihoods. • Hills such as Tsodilo and Aha in the western Okavango Delta, and Ghoha and Gubatsaa in Chobe region have become important for revenue generation through tourism, • Hills including Tswapong, Shoshong and Mokgware near Palapye are equally rich in traditional knowledge.
Desert	Western Botswana in the Kalahari	<ul style="list-style-type: none"> • Desert ecosystems exist in desert areas where annual rainfall is very low. • Commonly known as The Kalahari Desert in Botswana • Sunlight is usually very intense in the desert ecosystem due to limited vegetation cover. • The desert ecosystem has incredibly high temperatures and low availability of water. • Nights are quite cold. • The Desert ecosystem has a unique diversity of flora and fauna. • Plants grow with small amounts of water and conserve water's possible amount in their leaves and stems. • Animals are also adapted to the dry conditions of desert ecosystems. The species that can only be found in the desert ecosystem have developed unique ways to feed themselves, go long periods without water and to survive extreme temperatures. • Despite its dryness, the Kalahari Desert of Botswana has become increasingly used for livestock production. Ranches have been established and are highly dependent on drilled boreholes for water supplies. Of particular importance, the Kalahari Desert is highly valued for its tourism activity. For instance, the Khawa Dune Challenge which features activities such as quad and motor bike challenges, fun Camel rides, Cultural performances and exhibitions and sale of arts and crafts from the Kgalagadi area generates revenue in this desert region

<p>Agroecosystems</p>	<p>Chobe Region (i.e. Pandamatenga Farms) North-East Central-North North-Central (e.g. Dovedale wheat farm) North-Southwest North-West (horticulture and molopo farming). Bobirwa district (e.g. Selibe Phikwe Citrus farm)</p> <p>Southern Region (i.e., Barolong Farms) Southern</p>	<ul style="list-style-type: none"> • Associated with units of agricultural activity. • Common of the complex relationships and interactions between soils, climates, plants, animals, other organisms, and humans in a physical space. • Managed to optimise the provisioning of desired agricultural goods and services. • Dependent on a wide variety of supporting and regulating ecosystem services provided by natural ecosystems, including pollination, biological pest control, maintenance of soil structure and fertility, nutrient cycling, and hydrological services. • Depending on management practices, agroecosystems can also be the source of numerous disservices, including loss of wildlife habitat, nutrient runoff, sedimentation of waterways, greenhouse gas emissions, and pesticide poisoning of humans and non-target species. • Agroecosystems have less resilience than natural ecosystems due to reduced structural and functional diversity in relation to natural ecosystems. • Molapo farming
-----------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Appendix 2: National Ecosystem Assessment-Stakeholder Mapping

The development of Ecosystem Assessment involves as many different stakeholders and knowledge holders as possible to compile all available data, information, and knowledge to inform conservation, sustainable use and management policies and actions. Using integrated planning and efficient networking of different stakeholders on different levels and exchange of good practices can contribute to the knowledge of better decision-making in everyday activities. It is therefore important to map all stakeholders associated with the NEA process. The objectives of the mapping are to:

1. Identify stakeholders that are key to the NEA project.
2. Determine the stakeholders' level of influence (power) and interest to the NEA.
3. Determine how the stakeholders can contribute to the NEA project.
4. Determine how the stakeholders stand to benefit from the NEA project.
5. Describe the next strategy to engage the stakeholders.

No	Stakeholder group	Stakeholder name	Justification and interest in the project	Level of influence over the project (1-Little/No Influence, 2-Some influence, 3-Moderate Influence, 4-Significant Influence, 5-Very Influential)	Direct/ Indirect	Engagement strategy
1	Decision Makers, Policy Makers and Government Departments	<ul style="list-style-type: none"> Honourable Ministers Members of Parliament Councillors Member of Ntlo ya Dikgosi 	<ul style="list-style-type: none"> To ensure buy-in, ownership and dissemination of information of the assessment to the public To ensure utilisation of the assessment findings to influence decision-making 	5	Direct	<ul style="list-style-type: none"> Quarterly meetings with the Rural Development Council (RDC) Parliamentary sub-committee on the environment briefing Full Council briefing Ntlo Ya Dikgosi briefing
		<ul style="list-style-type: none"> Department of Forestry and Range Resources Department of National Museum and Monuments Department of Waste Management and Pollution Control Department of Water and Sanitation Department of Meteorological Services Department of Tourism Department of Wildlife and National Parks 	<ul style="list-style-type: none"> To ensure that the assessment is policy relevant Has great networks therefore will assist the project to connect with key stakeholders To provide the data and information sources for the assessment To provide the technical input into the assessment technical report 	5	Direct	<ul style="list-style-type: none"> Through the National Biodiversity Platform Through workshops

2	<ul style="list-style-type: none"> Department of Surveys and Mapping Department of Animal Production Department of Crop Production Department of Town and Country Planning Department of Research and Knowledge Business Department of Energy Department of Gender Affairs Department of Macro-Economics – National Development Planning Ministry of Youth, Sports and Culture Ministry of Health and Wellness 	<ul style="list-style-type: none"> Emang Basadi Dingakatsa Setso Association Somarelang Tikologo Kgetsi Ya Tsie Tust Basadi ba Matute a Mongongo Non-governmental Organisations Council Botswana Community Based Organisations Network (BOCOPNET) Botswana Council for Non-governmental Organisations (BOCONGO) 	<ul style="list-style-type: none"> To provide in-kind contribution to project implementation 	4	Direct	<ul style="list-style-type: none"> Through the Biodiversity Platform Through workshops
---	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------	---	--------	----------------------------------------------------------------------------------------------------------------

3	<ul style="list-style-type: none"> • Kalahari Society • Conservation Society • Cheetah Conservation Botswana • National Environmental Education Committee (NEEC) • Business Botswana • Mining Companies • HATAB • Safari Operators • Botswana Chamber of Mines 	<ul style="list-style-type: none"> • To provide additional assistance or funding in undertaking the assessment • To provide data and information at grassroots level • To ensure utilisation of the assessment findings 	5	Direct	<ul style="list-style-type: none"> • Through workshops and Biodiversity Platform
4	<p>Local Communities</p>	<ul style="list-style-type: none"> • To provide traditional knowledge of the ecosystems and ecosystem services to enrich the assessment and fill knowledge gaps. • Some of them will contribute as contributing authors on traditional knowledge. • Safe and legal access to natural resources • IK protection: Bio-cultural Community Protocols (FPIC and MAT) 	5	Direct	<ul style="list-style-type: none"> • Through Kgotla meetings • Through focused group discussions
5	<p>Research Institutions and Academia</p> <ul style="list-style-type: none"> • University of Botswana – Department of Biological Science • University of Botswana – Department of Environmental Science 	<ul style="list-style-type: none"> • To provide better/targeted scientific information/ knowledge on Ecosystems for better solutions 	5	Direct	<ul style="list-style-type: none"> • Through Biodiversity Platform • During peer review

	<ul style="list-style-type: none"> UB-Okavango Research Institute UB-Centre for Scientific Research Indigenous Knowledge and Innovation (CesrIKi) BAISAGO University Botswana International University of Science and Technology Botswana Institute of Technology Research and Innovation National Agricultural Research and Development Institute The San Research Centre 	<ul style="list-style-type: none"> To provide contributions to specific chapters of the technical assessment report. Some will contribute as Authors (CAs), Review Editors (REs) and External reviewers. To ensure utilisation of the assessment findings 			
6	Parastatals <ul style="list-style-type: none"> Companies Intellectual Property Authority Water Utilities Cooperation Statistics Botswana Botswana Power Cooperation 	<ul style="list-style-type: none"> To provide information on ecosystem assessment relevant to their sectors 	4	Indirect	<ul style="list-style-type: none"> Through Biodiversity Platform Through focused group discussions
7	The media <ul style="list-style-type: none"> All Media Houses 	<ul style="list-style-type: none"> To disseminate information on National Ecosystem Assessment to the general public through Media briefings, coverage in magazines, producing press releases 	4	Indirect	<ul style="list-style-type: none"> Quarterly press meetings Through Press releases
8	Development Partners <ul style="list-style-type: none"> United Nations Development Programme (UNDP) Food Agricultural Organisation GTZ, CI, WorldBank, JICA 	<ul style="list-style-type: none"> To support the NEA process and help publicise with their networks and the global community. To provide and mobilise funding to the assessment 	3	Indirect	<ul style="list-style-type: none"> Through quarterly feedback

9	Multi-lateral Platforms/Agreements (International-aland Regional)	<ul style="list-style-type: none"> • Okavango Commission (OKACOM) • Kavango Transfrontier Area (KAZA) • Gaborone Declaration for Sustainability in Africa (GDSA) • Limpopo River Basin Commission (LIMKOM) • Orange-Senqu river basin Commission (ORASECOM) 	<ul style="list-style-type: none"> • To provide information and data on specific ecosystems 	3	Indirect	<ul style="list-style-type: none"> • Focused group discussion • Through questioners, interviews
---	--------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------	---	----------	-------------------------------------------------------------------------------------------------------------------------

Appendix 3: Links to databases that are potential sources of information to the NEA project.

PORTAL/DATABASE NAME	DESCRIPTION AND LINK	CUSTODIAN/CONTACTS
The BUAN Library Catalogue	https://www.buan.ac.bw/index.php/home/ https://library.buan.ac.bw/ Gateway to library content	BUAN Library Mr Jane Seanego jseanego@buan.ac.bw
The BUAN Research HUB	http://researchhub.buan.ac.bw/ This is a digital repository that showcases research at BUAN	BUAN Library Mr Tlhalefo Metlhaleng tmetlhaleng@buan.ac.bw
The UB Library Catalogue	http://medupe.ub.bw/ http://medupe.ub.bw/search/X?SEARCH=biodiversity+botswana&SORT=D&searchscope=9 Gateway to library content	UB Library at ORI Andreas Mutoroke amutoroke@ub.ac.bw
University of Botswana Research, Innovation and Scholarship Archive (UBRISA)	UBRISA is the digital repository that showcases research at the University of Botswana https://ubrisa.ub.bw/	UB Library at ORI Andreas Mutoroke amutoroke@ub.ac.bw
GBIF Elephant Hunting Records	Records of specimen measurements taken from hunted elephants and donated by the Botswana Wildlife Management Association to the UB Library at ORI https://www.gbif.org/dataset/search?publishing_org=bd14512a-b63d42c1-b426-4c4f0623b6c3	UB Library at ORI andreas Mutoroke amutoroke@ub.ac.bw Olebogeng Phaladze osuwe@ub.ac.bw Mosepele Mabutho mboiditswe@ub.ac.bw GIS Lab Anastacia Makati makatia@ub.ac.bw
Okavango Delta Monitoring & Forecasting	An overview of current, past and future hydrological and meteorological conditions as well as remote sensing and environmental data from the Okavango Delta and its environs http://okavangodata.ub.bw/ori/	The Monitoring Unit Mike Murray-Hudson mmurray-hudson@ori.ub.bw Kaelo Makati makatik@ub.ac.bw
Monitoring Unit datasets published on GBIF	https://www.gbif.org/dataset/search?publishing_org=02b89818-33ab-4bf7-984d-f88a8e0b0b0f Biodiversity data published by the Monitoring Unit at ORI. The datasets include time series monitoring and campaigns undertaken in and around the Okavango Delta	The Monitoring Unit Mike Murray-Hudson mmurray-hudson@ori.ub.bw Kaelo Makati makatik@ub.ac.bw
Okavango Basin Information System (OBIS)	OBIS is a data and information management platform that was created for the research project The Future Okavango (TFO) which ran from 2010 to 2015. OBIS offers access to various types of environmentally related information for the Okavango Basin (e.g. time series data, spatial data, documents)	ORI The GIS Laboratory Anastacia Makati

	<p>Links http://www.obis.ub.bw/obis/metadata/start.php http://future-okavango.org/ OBIS content has been subsumed under the SASSCAL Data and Information Portal</p>	<p>makatia@ub.ac.bw Dr Emily Bennitt ebennitt@ub.ac.bw</p>
SASSCAL Data and Information Portal	<p>SASSCAL Data and Information Portal The SASSCAL Data and Information Portal allows for the management, analysis, visualisation, linkage and presentation of various types of data and resources, including time series data, geospatial data, space-time data, publications, documents and others. http://data.sasscal.org/metadata/overview.php?global_search</p>	<p>Dr. Jörg HELMSCHROT Director of Science and Technology & Capacity Development SASSCAL Regional Secretariat Ph: +264 61 259733 (direct); Cell: +264 81 1414182 joerg.helmschrot@sasscal.org</p>
Okavango Delta Information System (ODIS)	<p>https://www.odis.ub.bw/portal/home/ ODIS was initially created as a spatial/non-spatial data repository to support the preparation of and implementation of the Okavango Delta Management Plan. Its geographic coverage was initially concentrated on the Okavango Delta, but has grown to include the rest of Botswana and other countries</p>	<p>The GIS Laboratory (The GIS Lab) Anastacia Makati makatia@ub.ac.bw Dr Emily Bennitt ebennitt@ub.ac.bw</p>
PSUB Botanical Records and Herbarium Management System (BRAHMS)	<p>The preserved plant collection at PSUB comprises specimens of the flora of the Okavango Delta in northern Botswana. These specimens are mounted on card with labels which describe when and where they were collected and often include habitat notes: what other plants were growing in proximity, water depth, soil type, flower colour, colloquial names and known uses. The collection is being made accessible to a wider public through an ongoing process of digitization and data entry into the BRAHMS database with plans to eventually make it available online. http://www.ori.ub.bw/services/psub-herbarium https://travelforimpact.com/?s=PSUB</p>	<p>PSUB Joseph Madome: Curator: madome@ub.ac.bw Mmusi Mmusi: Herbarium Assistant: mmmusi@ub.ac.bw Dr. Kashe Keotshepile: Herbarium Coordinator: kkashe@ub.ac.bw Mrs. Frances MurrayHudson: PSUB Data Mobilization Project Assistant: fmurrayhudson@ub.ac.bw</p>
Pete Smith Annotated Maps	<p>The Annotated Maps Collection During the 1970s to 80s, Peter Alexander Smith made frequent boat trips into the Okavango Delta, carrying with him a tin trunk filled with books and 1:50,000 topographic maps. There are 45 of these densely annotated maps, many of them related to content in his correspondence, notes and other items preserved within the ORI Library archival collections and pressed plant specimens at the Peter Smith University of Botswana (PSUB) Herbarium. As a collection, they provide valuable baseline data about environmental conditions in the Delta at the time.</p>	<p>Olebogeng Phaladze osuwe@ub.ac.bw Anastacia Makati makatia@ub.ac.bw</p>

Okavango Delta Fishes inaturalist app	a pilot project to develop a scalable, community-participatory fisheries monitoring system in the Okavango Delta using lowcost technology https://www.inaturalist.org/projects/okavango-delta-fishes?tab=about http://jrsbiodiversity.org/ori-2017-announcement/	Ineelo Mosie imosie@ub.ac.bw
Statistics Botswana Data Portal Department of Wildlife and National Parks	https://botswana.opendataforafrica.org/ A national statistical bureau for Botswana Management Oriented Monitoring System (MOMS) Data captured on problem animal control, wildlife population census, etc	Statistics Botswana Tel (+267) 3671300 Email: info@statsbots.org.bw Department of Wildlife and National Parks, Research Division Office Tel (+267) 3996588 Contact: Mr K. Nkape Knkape@gmail.com
African Development Bank Group Data Portal	https://projectsportal.afdb.org/dataportal/VTopCountry/show/BW A multilateral development finance institution data portal	African Development Bank
Convention on Biological Diversity (CBD)	https://www.cbd.int/ The Secretariat compiles national reports on compliance by domestic authorities and transmits such reports and information to the COP and sometimes elaborates a synthesis of the national reports and information on implementation. The Secretariat also acts as information clearing house.	Secretariat of the Convention on Biological Diversity 413, Saint Jacques Street, suite 800 Montreal QC H2Y 1N9 Canada Tel: +1 514 288 2220 Fax: +1 514 288 6588 E-Mail: secretariat@cbd.int Web: www.cbd.int
National Ecosystem Assessment Initiative	https://www.ecosystemassessments.net/assessment-process/what-are-neas/	
Global Fire Emissions Database	https://www.globalfiredata.org/	lgiglio@umd.edu jranders@uci.edu niels.andela@nasa.gov
Earth Online	https://earth.esa.int/eogateway earth Online presents news and information on European Space Agency activities in the field of earth observation data, and the Satellite missions and instruments that acquire this data.	
Conservation International	https://www.conservation.org/ C	Head Quarters 2011 Crystal Drive, Suite 600 Arlington, VA 22202 Phone: 1 703 341 2400

UNDP	<p>https://www.undp.org/ Kalahari Wildlife landscape Connectivity Analysis Plan Phase 1 (February 2022, Report)</p> <p>Kalahari Wildlife landscape Connectivity Analysis Plan Phase 2 (August 2022, Final Report)</p>	
CBD	<p>https://www.cbd/convention/ Kunming-Montreal Global Biodiversity Framework</p>	
FAO	<p>https://www.fao.org/documents/card/en/c/07b12696-9948-5250-9fe3-cca228939b34 Forestry Outlook Study for Africa (FOSA), Botswana Country Report (20001)</p>	
	<p>https://www.fao.org/soils-portal/data-hub/soil-maps-and-databases/soil-legacy-reports/en/?page=1&ipp=10&tx_dynalist</p>	
	<p>State of knowledge of soil biodiversity-Status, Challenges and potentialities (2020). (available)</p>	
	<p>https://doi.org/10.4060/cb1928en Soil Atlas (2015)</p>	
UNESCO	<p>UNESDOC Digital Library https://unesdoc.unesco.org/search/ede47365-7d3c-4116-842e-fd7e2c634967</p> <p>World Heritage Convention https://whc.unesco.org/en/list/1432/documents/</p> <p>LINKS Programme</p>	
CCB	<p>Natural and Cultural Resource Review in GH10 Detailed Assessment of Natural & Cultural Resources using TK and Participants from the Communities - This information will feed into an updated GH10 Management Plan soon to be finalised (CCB will share the management plan once it is released).</p>	
Digital earth Africa	<p>https://www.digitalearthafrica.org/</p>	

Bird Life Botswana	<p>http://www.birdlifebotswana.org.bw/publications.html LAKE NGAMI IMPORTANT BIRD AREA MONITORING REPORT 2007</p> <p>http://www.birdlifebotswana.org.bw/publications.html 2008 STATUS REPORT FOR PROTECTED IMPORTANT BIRD AREAS IN BOTSWANA</p> <p>http://www.birdlifebotswana.org.bw/publications.html MAKGADIKGADI PANS IMPORTANT BIRD AREA MONITORING REPORT 2007</p> <p>http://www.birdlifebotswana.org.bw/publications.html MAKGADIKGADI PANS IMPORTANT BIRD AREA MONITORING REPORT 2009</p> <p>http://www.birdlifebotswana.org.bw/publications.html BOTSWANA'S Protected Important Bird Areas Status and Trends Report 2009</p> <p>http://www.birdlifebotswana.org.bw/publications.html BOTSWANA'S Protected Important Bird Areas Status and Trends Report 2010</p> <p>http://www.birdlifebotswana.org.bw/publications.html BOTSWANA'S Protected Important Bird Areas</p> <p>http://www.birdlifebotswana.org.bw/publications.html Strategic Partnerships to Improve the Financial and Operational Sustainability of Protected Areas</p>	Virat Keogotsitse-3190540
	include time series monitoring and campaigns undertaken in and around the Okavango Delta.	KaeloMakatimakatik@ub.ac.bw
Okavango Basin Information System (OBIS)	OBIS is a data and information management platform that was created for the research project "The Future Okavango (TFO)" which ran from 2010 to 2015. OBIS offers access to various types of environmentally related information for the Okavango Basin (e.g. time series data, spatial data, documents)	ORI The GIS Laboratory Anastacia Makati makatia@ub.ac.bw
	Links http://www.obis.ub.bw/obis/metadata/start.php http://future-okavango.org/ OBIS content has been subsumed under the SASSCAL Data and Information Portal.	Dr Emily Bennitt bennitt@ub.ac.bw

SASSCAL Data and Information Portal	SASSCAL Data and Information Portal The SASSCAL Data and Information Portal allows for the management, analysis, visualisation, linkage and presentation of various types of data and resources, including time series data, geospatial data, space-time data, publications, documents and others. http://data.sasscal.org/metadata/overview.php?global_search	Dr. Jörg HELMSCHROT Director of Science and Technology & Capacity Development SASSCAL Regional Secretariat Ph: +264 61 259733 (direct); Cell: +264 81 1414182 joerg.helmschrot@sasscal.org
Okavango Delta Information System (ODIS)	https://www.odis.ub.bw/portal/home/ ODIS was initially created as a spatial/non-spatial data repository to support the preparation of and implementation of the Okavango Delta Management Plan. Its geographic coverage was initially concentrated on the Okavango Delta, but has grown to include the rest of Botswana and other countries.	The GIS Laboratory (The GIS Lab) Anastacia Makatimakatia@ub.ac.bw Dr Emily Bennitt bennitt@ub.ac.bw
PSUB Botanical Records and Herbarium Management System (BRAHMS)	The preserved plant collection at PSUB comprises specimens of the flora of the Okavango Delta in northern Botswana. These specimens are mounted on card with labels which describe when and where they were collected and often include habitat notes: what other plants were growing in proximity, water depth, soil type, flower colour, colloquial names and known uses. The collection is being made accessible to a wider public through an ongoing process of digitization and data entry into the BRAHMS database with plans to eventually make it available online. http://www.ori.ub.bw/services/psub-herbarium https://travelforimpact.com/?s=PSUB	PSUB Joseph Madome: Curator: madome@ub.ac.bw Mmusi Mmusi: Herbarium Assistant: mmmusi@ub.ac.bw Dr. Kashe Keotshepile: Herbarium Coordinator: kkashe@ub.ac.bw Mrs. Frances Murray Hudson: PSUB Data Mobilization Project Assistant: fmurrayhudson@ub.ac.bw
Pete Smith Annotated Maps	The Annotated Maps Collection During the 1970s to 80s, Peter Alexander Smith made frequent boat trips into the Okavango Delta, carrying with him a tin trunk filled with books and 1:50,000 topographic maps. There are 45 of these densely annotated maps, many of them related to content in his correspondence, notes and other items preserved within the ORI Library archival collections and pressed plant specimens at the Peter Smith University of Botswana (PSUB) Herbarium. As a collection, they provide valuable baseline data about environmental conditions in the Delta at the time.	Olebogeng Phaladze osuwe@ub.ac.bw Anastacia Makatimakatia@ub.ac.bw

Okavango Delta Fishes inaturalist app	A pilot project to develop a scalable, community-participatory fisheries monitoring system in the Okavango Delta using lowcost technology https://www.inaturalist.org/projects/okavango-delta-fishes?tab=about http://jrsbiodiversity.org/ori-2017-announcement/	Ineelo Mosie imosie@ub.ac.bw
Statistics Botswana Data Portal Department of Wildlife and National Parks	https://botswana.opendataforafrica.org/ A national statistical bureau for Botswana Management Oriented Monitoring System (MOMS) Data captured on problem animal control, wildlife population census, etc	Statistics Botswana Tel (+267) 3671300 Email: info@statsbots.org.bw Department of Wildlife and National Parks, Research Division Office Tel (+267) 3996588 Contact: Mr K. Nkape Knkape@gmail.com
African Development Bank Group Data Portal	https://projectsportal.afdb.org/dataportal/VTOPCountry/show/BW A multilateral development finance institution data portal	African Development Bank
Convention on Biological Diversity (CBD)	https://www.cbd.int/ The Secretariat compiles national reports on compliance by domestic authorities and transmits such reports and information to the Conference of Parties (COP) and sometimes elaborates a synthesis of the national reports and information on implementation. The Secretariat also acts as information clearing house.	Secretariat of the Convention on Biological Diversity 413, Saint Jacques Street, suite 800 Montreal QC H2Y 1N9 Canada Tel: +1 514 288 2220 Fax: +1 514 288 6588 E-Mail: secretariat@cbd.int Web: www.cbd.int
National Ecosystem Assessment Initiative	https://www.ecosystemassessments.net/assessment-process/what-are-neas/	
Global Fire Emissions Database	https://www.globalfiredata.org/	lgiglio@umd.edu jranders@uci.edu niels.andela@nasa.gov
Earth Online	https://earth.esa.int/eogateway Earth Online presents news and information on European Space Agency activities in the field of earth observation data, and the Satellite missions and instruments that acquire this data.	
Conservation International	https://www.conservation.org	Head Quarters 2011 Crystal Drive, Suite 600 Arlington, VA 22202 Phone: 1 703 341 2400

UNDP	https://www.undp.org/	
	Kalahari Wildlife landscape Connectivity Analysis Plan Phase 1 (February 2022, Report)	
CBD	Kalahari Wildlife Landscape Connectivity Analysis Plan Phase 2 (August 2022, Final Report)	
	https://www.cbd.int Kunming-Montreal Global Biodiversity Framework	
FAO	https://www.fao.org/documents/card/en/c/07b12696-9948-5250-9fe3-cca228939b34 Forestry Outlook Study for Africa (FOSA), Botswana Country Report (20001)	
	https://www.fao.org/soils-portal/data-hub/soil-maps-and-databases/soil-legacy-reports/en/?page=1&ipp=10&tx_dynalis_t_pi1[par]=YToxOntzOjE6lkwiO3M6MToiMCI7fQ== Soil Legacy Reports	
	State of Knowledge of Soil Biodiversity- Status, Challenges and Potentialities (2020). (available)	
	https://doi.org/10.4060/cb1928en Soil Atlas (2015)	
UNESCO	<ul style="list-style-type: none"> • UNESDOC Digital Library https://unesdoc.unesco.org/search/ede47365-7d3c-4116-842e-fd7e2c634967 • World Heritage Convention https://whc.unesco.org/en/list/1432/documents/ • LINKS Programme 	
CCB	Natural and Cultural Resource Review in GH10 Detailed Assessment of Natural & Cultural Resources using TK and Participants from the Communities - This information will feed into an updated GH10 Management Plan soon to be finalised (CCB will share the management plan once it is released).	

Digital Earth Africa	https://www.digitalearthafrika.org/	
Bird Life Botswana	http://www.birdlifebotswana.org.bw/publications.html LAKE NGAMI IMPORTANT BIRD AREA MONITORING REPORT 2007	Virat Keogotsitse- 3190540
	http://www.birdlifebotswana.org.bw/publications.html 2008 STATUS REPORT FOR PROTECTED IMPORTANT BIRD AREAS IN BOTSWANA	
	http://www.birdlifebotswana.org.bw/publications.html MAKGADIKGADI PANS IMPORTANT BIRD AREA MONITORING REPORT 2007	
	http://www.birdlifebotswana.org.bw/publications.html MAKGADIKGADI PANS IMPORTANT BIRD AREA MONITORING REPORT 2009	
	http://www.birdlifebotswana.org.bw/publications.html BOTSWANA'S Protected Important Bird Areas Status and Trends Report 2009	
	http://www.birdlifebotswana.org.bw/publications.html BOTSWANA'S Protected Important Bird Areas Status and Trends Report 2010	
	http://www.birdlifebotswana.org.bw/publications.html BOTSWANA'S Protected Important Bird Areas	
	http://www.birdlifebotswana.org.bw/publications.html Strategic Partnerships to Improve the Financial and Operational Sustainability of Protected Areas	

Appendix 4: Specific hard and soft copy reports available from Government departments and The Botswana National Reference Library

Department	Report Title	Soft/hard copy	Availability (and link)
Department of Environmental Affairs (DEA)	National Conservation Strategy (NCS) (1990)	Soft	Available
	National Biodiversity Strategy and Action Plan (NBSAP)(2016)	Soft	Available
	National Environment Education and Action Plan (NEESAP)	Soft	Available
	Okavango Delta Management Plan (2008)	Soft	Available
	Okavango Delta Ramsar Site Strategic Environmental Management Plan (Draft of 2012)	Soft	Available
	Makgadikgadi Framework Management Plan	Soft	Available
	Environmental Assessment (EA) Act (Cap 65:07)	Soft	Available
	Access and Benefit Sharing of Biological Diversity Act (2022)	Soft	Available
	Botswana Ecosystem Types MBP2 2022	Soft	Available (https://ubbw.maps.arcgis.com/apps/mapviewer/index.html?webmap=2a1821afe5924cc390e3f45296ff7a25)
Botswana Ecosystem Types -Ecological Condition MBP2 2022		Available (https://ubbw.maps.arcgis.com/apps/mapviewer/index.html?webmap=d1b816f3d88048ff95f74e5a9cd77c01)	
Protected Areas & Other Effective Conservation Measures MBP2 2022	Soft	Available (https://ubbw.maps.arcgis.com/apps/mapviewer/index.html?webmap=f7f574a029d841a38098e8eed9c2f3eb)	

	Botswana Ecosystem Types - Threat Status MBP2 2022	Soft	Available (https://ubbw.maps.arcgis.com/apps/mapviewer/index.html?webmap=e578d378bf6a4e60af90dfb30d41e62d)
	Botswana Ecosystem Types - Protection Level Status MBP2 2022	Soft	Available (https://ubbw.maps.arcgis.com/apps/mapviewer/index.html?webmap=4bd839120040452598b1e25333f866fe)
	Botswana State of the Environment and Outlook Report (2022). Being updated	soft	available
	Mapping Biodiversity Priorities: A practical science-based approach to national biodiversity assessment and prioritisation:	Soft	Available
	Bioeconomy Strategy	n/a	Being developed
	National Biodiversity Strategy and Action Plan (2016)	Soft	Under-review
Department of Wildlife and National Parks (DWNP)	Wildlife Conservation and national parks Act, 1992	Soft	Available
	Wildlife Conservation Policy, 2013	Soft	Available
	Elephant Management Plan (Draft of 2013)	Soft	Available
	Licensing regulations	Soft	Available
	CKGR Management Plan	Soft	Available
	CBNRM Policy, 2008	Soft	Available
	Human Wildlife Conflict Strategy-2020	Soft	Available
	Public Awareness Strategy, 2019	Soft	Available
	Parks and Reserves	Soft	Available

	Regulations		
	WMAs Regulations	Soft	Available
	Rhino Management Plan	Soft	Available
	Management Plan For Southern Sua Pan (2012)	Soft	Available
	Indigenous Peoples Planning Frame work (IPPF) for Human-Wildlife-Conflict Management in Northern Botswana Project (HWCM Project)	Soft	Available
Department of Forestry	Forest Act, 1968	Soft	Available
	National Action Programme (NAP) (2022)	Soft	Available
	Strategic Environmental Assessment (SEA) of Forest Reserves (2018)	Soft	Available
	Forest Reserves Management Plans (2021)	Soft	Available
	Agricultural Resources Conservation Act (1974)	Soft	Available
	Herbage Preservation Act (1977)	Soft	Available
	Forest Policy (2011)	Soft	Available
	Integrated Prosopis Management Strategy (2019-2024)	Soft	Available
	Integrated National Wild Land Fire Management Strategy(2012)	Soft	Available
	National Agroforestry strategy and Action Plan (2020)	Soft	Available
	Ecosystem-base Adaptation and Mitigation in Botswana's Communal Rangelands project Proposal (2021)- <u>Conservation International</u>	Soft	Available
	Enhancing National Forest Monitoring System for <u>the</u> Promotion of Sustainable National	Soft	Available

	Resource Management Report (2017)		
	Consultancy to undertake Range Assessment to determine prevalent species/capacity/encroacher species in east hanahai, West Hanahai, Ukhwi and Zutshwa	Soft	Available
	Forest Conservation Strategy (2013-2020)	Soft	Available
	National Policy on Natural Resources Conservation and Development (1990)	Soft	Available
Department of Town and Country Planning (DTCP)	National Spatial Plan (NSP)	Soft	Available
	Chobe Integrated Landuse Management Plan	Soft	Available
	Ngamiland Integrated Land Use Plan Final Report-2009	Hard	Not available
	Declaration of Botswana as a planning area, 2016 Declaration of Planning areas in Botswana (Part	Soft	Available
	IV; Section 15 TCPA of 2015; Part VII; Section 78 (I) Botswana Land Policy)	Soft	Available
	Declaration of planning areas: Gazettement Dates	Soft	Available
Department of National Museum and Monuments (DNMM)	Monuments and Relics Act, 2001	Soft	Available
	Tsodilo Hills Integrated Management Plan 2006-2010	Soft	Available
Department of Meteorological Services (DMS)	Botswana Climate Change Policy	Soft	Available

Department of Water and Sanitation (DWS)	Botswana Water Policy	Soft	Available
	Botswana National Water Conservation and Demand Management Strategy (2022)	Soft	Available
	Botswana Integrated Water Resources Management-Water Efficiency Plan (2013)	Soft	Available
	Botswana National Spatial Plan 2036	Soft	Available
Department of waste management	Integrated Waste Management Policy	Soft	Available
	Waste Management Act of 1998		
Ministry of Agriculture (MoA)	National Policy on Agricultural Development (1991)	Soft	Available
	Fish Protection Regulations (2008)	Soft	Available
Department of Tourism	Ecotourism Strategy (2002)	soft	Available
Botswana National Reference Library	Books: Farmers friendly guide to control termites for economic importance with minimal impact on Biodiversity of Botswana Crocodile pools.	Hard	Available

Appendix 5: Proposed operational structure for national ecosystems assessment

TEAM	MEMBERSHIP	SUMMARY OF ROLES
Technical Support Unit	<p>BUAN (Implementing Agency) Technical team comprising:</p> <ul style="list-style-type: none"> • Prof W.L. Hambira (Project Manager/ Coordinator) • Dr K. Sianga (Team Leader Technical) • Prof. V.K. Muposhi • Dr. N. Tselaesele • Ms B. Mosepele • Dr A. Matsika • Prof. D.B. Moalafhi • Ms E. Ntshaanana (Finance Officer) <p>DEA (government) team comprising:</p> <ul style="list-style-type: none"> • Ms Mokgadi Monamati NEA Focal Point/Project Manager) • Mr Lesego Seakanyeng (DEA -NEA Assistant Focal Point) 	<ul style="list-style-type: none"> • Provides technical support for the assessment • Oversees selection of authors • Creates a stakeholder engagement strategy and leads stakeholder engagement • Coordinates meetings and workshops • Manages the administrative side of the assessment
National Biodiversity Platform	<ol style="list-style-type: none"> 1. Ministry of Environment and Tourism – MEA Coordinator 2. Ministry of Agriculture - PS 3. Ministry of Youth, Sports and Culture – PS 4. National Planning Commission 5. Department of Research and Knowledge Business 6. Department of Town and Country Planning 7. Department of Tourism 8. Department of Waste Management and Pollution Control 9. Department of Wildlife and national Parks. 10. Department of Forestry and Range Resources 11. Statistics Botswana 12. NGO Council 13. Department of Forestry and Range Resources 	<ul style="list-style-type: none"> • Approves NEA Scoping and Technical Reports • Provides expert advice and input into the assessment design, implementation, and communication • Ensures the assessment remains policy relevant
Technical Reference Group	<ol style="list-style-type: none"> 1. Department of Gender Affairs 2. Department of Town and Country Planning 3. Department of Surveys and Mapping 4. Department of Meteorological Services 5. Department of National Museums and Monuments 6. Department of Waste Management and Pollution Control 7. Department of Wildlife and National Parks – Research, Fisheries 8. Ministry of Agriculture – Department of Crop Production 9. Ministry of Agriculture – Department of Animal Production 10. Ministry of Youth, Sports, and Culture 11. Department of Water and Sanitation 12. Department of Mines 13. Department of Forestry and Range Resources 14. Department of Rural Development 	<ul style="list-style-type: none"> • Provides expert and professional advice and input into the assessment design, implementation and communication • Ensures the assessment remains policy relevant

	<p>15. University of Botswana Department of Environmental Science</p> <p>16. University of Botswana Centre for Scientific Research, Indigenous Knowledge and Innovation (CESRIKI)</p> <p>17. Botswana Community</p> <p>18. Based Organisations Network (BOCOBONET)</p> <p>19. Botswana National Commission for UNESCO</p>	
Author Team	BUAN and government Team of Experts from various disciplines	Provides contributions to specific chapters of the technical assessment report. The level of contribution depends upon the role within the author team
External Reviewers	To be determined during the evaluation stage of the assessment	Responsible for the review of the NEA Technical Report

Appendix 6: BW-NEA Communications Strategy

1. Introduction

The goal of this communication strategy is to publicise all findings of the BW-NEA and share relevant information with all relevant stakeholders. The information shared will be packaged in different formats so that all national and international stakeholders are appropriately informed. In addition, the communications strategy will serve as a tool to provide an opportunity for assessors and stakeholders to jointly gather information to identify and close knowledge gaps where necessary. The major impact of the communication strategy is to enable information flow from the BW-NEA project to all stakeholders. The aim is therefore to engage stakeholders and raise awareness about the assessment results and their intended use.

2. Outcomes of Strategy

The strategy's vision statement has been adapted from that of the Kunming- Montreal Global Biodiversity Framework (2022): *A Botswana living in harmony with nature where biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services sustaining a healthy planet and delivering benefits essential for all the people by 2050*⁶⁶. It is intended to inform, raise awareness, and engage all stakeholders on the NEA process and its outcomes.

3. Communication Objectives

The objective of the communication strategy is to gather, package and successfully disseminate information and knowledge about the BW-NEA, using appropriate communication channels to all stakeholders at different levels.

4. Target Audiences

Stakeholders involved (directly and indirectly) in the BW-NEA process, are segmented into different stakeholder categories which include policy makers (civil service), academics, non- governmental organizations (NGOs),

international organizations, local communities, utilisers of ecosystems services, media and the general public who are interested in the outputs from the assessment.

The diverse stakeholders involved in the assessment and information sharing will include the following:

- a. **Policymakers:** will need to know about assessment issues that will inform and give policy direction on biodiversity issues and ecosystem services.
- b. **Civil Service:** They are the implementers of government policies in general. They need information that can be used to advise policymakers accordingly.
- c. **Academia/Researchers:** will collect needed NEA data for analysis and presentation of results.
- d. **Local Village Governance Structures (Kgosi, VDC, Communities and TK holders)**
- e. **General public:** is important as it can legitimize NEA results and close information gaps required to improve the assessment.
- f. **NGOs and CBOs,** provide advocacy services and take part in the socio-economic development of society, improving communities, and promoting citizen participation in ecosystem services available.
- g. **Private Sector:** This is the sector that is important in driving privately owned socio-economic development initiatives.
- h. **Media houses:** They provide information sharing and publicity. The media also provide criticism and debate to ensure that information is tested and examined from all points of view.
- i. **Parastatal Organizations:** These are government entities that provide service which falls outside the domain of civil service.
- j. **Youth:** They are the young men and women who can design and produce products from ecosystem services for improving their livelihoods. They can provide peer education on available ecosystem services and mentorship.
- k. **Local communities and TK holders:** these are local community members living adjacent key ecosystems and have traditional knowledge associated with their use, decision making and management. These include traditional

⁶⁶ <https://www.cbd.int/gbf/vision/#:~:text=The%20vision%20of%20the%20Kunming,benefits%20essential%20for%20all%20people.%E2%80%9D>

leaders, traditional doctors association/spiritual(religious)/faith-based organisations and local people associations who use diverse ecosystems for services which provide human well-being, health, livelihoods, and survival at the local level.

i. International organisations provide support in generating knowledge related to the use of ecosystem services to decision-makers and the public. They build political support and convince potential donors of the benefits of conservation and sustainable use of ecosystems.

m. Project Management (UNEP-WCMC): They provide technical and financial support for the BW-NEA process.

5. Key Messages per Target Audience

a. Policymakers: They can be segmented from local (village level), to district and national levels respectively. They play different roles as far as policymaking and implementation are concerned. It is therefore necessary to design BW-NEA messages targeted to different segments of policymakers. At the national legislature level (Cabinet and members of parliament) the key messages are those which address key policy questions relating to the BW-NEA process. They also need recommended programs/projects and their justification from the BW-NEA reports. At the district level, this involves the elected council members who represent their respective political wards. They (as political representatives of the people) interpret and provide guidance in the implementation of national policies at the district level. The key messages at this level would be the intended development projects/programmes in the respective district. At the village level, the local leadership act as opinion leaders who legitimise the implementation of policies related to national ecosystems services. These local leaders cooperate with local-level civil servants to implement government development initiatives, and in this case, those relating to biodiversity and ecosystem services.

b. Civil Service: As planning and implementing agencies of government development programmes, they need information relating to the status and trends of Botswana's biodiversity and ecosystem service. This will enable them to advise parliament and cabinet accordingly. Such information will allow them to undertake informed policy formulation.

c. Academia/ researchers: The key messages required will be the research process (methodologies) followed to collect data during the BW-NEA process. They will be interested in the data analysis techniques used and will be keen to read the reports and publications associated with the NEA.

d. Communities/users of natural resources: At this level, the key messages are the type of projects that will impact their lives and livelihoods which have been prioritised for the particular ecosystem falling in their localities.

e. General public: They need information that can create awareness among them about the importance of ecosystem services available in their areas. They are likely to develop an interest in utilising some of the services in the area.

f. NGOs and CBOs: The main messages are that these stakeholders relate to the projects on ecosystems services identified which they will use to design socio-economic interventions targeting particular social groups.

g. Private Sector: These are stakeholders who would be interested in investing or venturing into ecosystems service that fit their business interests.

h. Media houses: They publicise through reporting the policy issues, implementation issues and status of projects implemented at both local and national levels and interrogate their legitimacy where necessary. They need information relating to all these aspects for onward publicity.

i. Local communities and TK holders (including Traditional Doctors Association/Spiritual(religious) organization): These groups are interested in information relating to provisional and cultural ecosystems services.

- j. **Parastatal Organizations:** These include Botswana Tourism Organization, Brand Botswana and Business Botswana, among others. They also need to be furnished with information relating to potential investment in ecosystem services identified.
- k. **Youth:** The critical information needed by them should relate to investment in ecosystem services. The youth constitute the largest segment of the Botswana population as well as being the current and future workforce. Therefore, the need for information that relates to potential for innovation, product value chain development and marketing as well as sustainable natural resources management.

6. Communication Channels per Target

The communication channels relating to each of the target groups are as suggested below.

- a. **Policymakers:** The appropriate communication channels will be policy briefs, cabinet memoranda, and presentations to relevant parliamentary sub-committees and full council meetings. At the village level, the use of the local Kgotla system to convey needed information and knowledge will be adopted.
- b. **Civil Servants:** Will require BW-NEA reports and participate in workshops. The use of Information Communication Technologies (ICT) systems such as websites, electronic mail and other databases will be the appropriate communication channels.
- c. **Academia/ researchers:** The main method of communication will be through Information Communication Technologies (ICT) systems such as websites, electronic mail and databases, where attachments of relevant data and information can be sent and uploaded. Workshops and conferences are useful to convey scientific information related to BW-NEA findings.
- d. **Communities/users of natural resources:** Use flyers, pamphlets, and factsheets for those who are literate. In addition, Kgotla meetings where subject matter specialists of ecosystem services, as well as opinion leaders such as members of parliament and councillors present to communities, will be worthwhile for those who may be illiterate. Radio and television broadcasts will also be used to reinforce the messages from other sources. Dissemination workshops may also be appropriate for specific associations and groups.
- e. **NGOs and CBOs:** The main channel to convey messages in this group are BW-NEA reports, presentations during their annual general meetings and presentations to the National Environmental Education Committee. Data visualization infographics can be used to present consolidated data about particular ecosystems and their associated services. ICT systems are also useful to share information with these stakeholders.
- f. **Private Sector:** These are stakeholders who would be interested in investing or venturing into ecosystems service that fit their business interests. ICT systems, Fact sheets about ecosystems services. Presentations during the annual conference of Business Botswana and other business fora.
- g. **Media houses:** Training workshops on the BW-NEA background and processes. Other channels include press briefings, press releases, and media invitations to all BW-NEA activities. Establish media partners in the process.
- h. **Local communities and TK holders (including Traditional Doctors Association/ Spiritual(religious) organization):** Traditional communication channels are critical for these groups. Kgotla meetings, presentations during their associations meetings (where they exist), and short report translated into Setswana.
- i. **Parastatal Organizations:** These include Botswana Tourism Organization, Brand Botswana and Business Botswana among

others. They can be given copies of reports of BW-NEA findings.

- j. **Youth:** Social media platforms can be created (Facebook pages, Twitter etc), and infographics, and full BW-NEA reports can be shared with them. Enrolling youth in data collection, analysis and write-up stages of the BW-NEA process.

7. Activities and Outputs

The inputs of the communication strategy are drawn from the BW-NEA activities and tasks as set out in Figure 3. There are activities, milestones and outputs which have been identified and these need to be communicated and promoted through different communication channels for them to be successfully carried out. These have been identified and shared with the Public Relation Office (PRO) of MET and the Communications and Marketing office of the implementing agency (BUAN) so that they are ready to effectively publicise them. The inputs will be operationalised into communication activities, which include means to create awareness of the targeted stakeholders through different communication channels such as print, audio-visual and electronic media including visual aids where applicable.

8. Branding Guidelines.

Branding is critical for the success of the BW-NEA process. The following branding strategies are suggested.

- a. The letterheads and memoranda templates with appropriately arranged logos are a starting point for publicising the BW-NEA project.
- b. Printed apparel, which is shared with stakeholders during consultative workshops, dialogues and other fora
- c. On-line brandings such as the NEA Initiative website and social media platforms
- d. Use of offline branding such as flyers, labelled pens and notebooks

9. Monitoring and Evaluating

Monitoring and evaluation of a communication

strategy is necessary to establish whether the strategy and its inputs were effectively and efficiently executed. Monitoring of the communication strategy helps to quantify the following:

- a. **What has been done** – activities undertaken to operationalise the strategy
- b. **When it has been done** -The time when the activities were undertaken
- c. **How it has been done**- The communication channels/methods used to execute the activities
- d. **Who has been reached** – whether the planned target audience has been reached.

The evaluation plan assesses program achievements by addressing the following.

- a. The extent to which the activities in the communication strategy met their objectives.
- b. Establish whether activities were well executed or not in the communication strategy.
- c. Identify options which could have been better adopted or used to improve the execution of the strategy.

Appendix 7: Botswana National Ecosystem Assessments Capacity Needs

Category/Responsibility	Capacity Building Need
Project Management Unit (DEA-BUAN Coordinating Team)	<ol style="list-style-type: none"> 1. Financial Management and Reporting according to UNEP-WCMC 2. Project management (Tracking progress, monitoring inputs etc) 3. Forums/strategies to promote science-policy interface for the project from beginning to end to create a culture of research informed policy making. 4. Conducting Dialogues
Authors (Coordinating Authors, Lead Authors, Contributing Authors, Reviewers)	<ol style="list-style-type: none"> 1. Style of writing for Assessments Technical Reports 2. Translation/style of writing for policy makers devoid of technical jargon 3. Familiarisation with global processes linked to the NEA e.g. (IPBES processes) 4. Publications (journal articles)
Data management	<ol style="list-style-type: none"> 1. Suitable big data storage facility/infrastructure with open access and regularly updated beyond the NEA end period to curb current bureaucracies of accessing data
Technical subjects	<ol style="list-style-type: none"> 1. UNEP-WCMC Preferred methods for economic valuation of ecosystem services 2. Pollinators
Local Knowledge	<ol style="list-style-type: none"> 1. How to build consensus on local languages when translating scientific terms into local dialects to efficiently send the message across 2. Citizen science (engage communities in key outcomes of the project)
Communications	<ol style="list-style-type: none"> 1. Small scripts for different platforms 2. Newsworthy articles (how to write summaries) 3. Success stories pamphlets 4. Info archives/documentation (electronic and non-electronic) - repository

BW-NEA
UPDATED SCOPING REPORT 2023

BUAN

BOTSWANA UNIVERSITY OF
AGRICULTURE AND NATURAL RESOURCES

Inspiring Sustainable Growth

Botswana University of Agriculture and Natural Resources

Private Bag 0027, Gaborone, Botswana

Telephone: (+267) 3650100 | **Fax:** (+267) 3928753

Website: www.buan.ac.bw



D.E.A

DEPARTMENT OF ENVIRONMENTAL AFFAIRS
MINISTRY OF ENVIRONMENT AND TOURISM

SUPPORTED BY



Federal Ministry
for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection

IKI



INTERNATIONAL
CLIMATE
INITIATIVE

based on a decision of
the German Bundestag

IN PARTNERSHIP WITH



UN  **WCMC**
environment
programme

 **BESNet**
Biodiversity and Ecosystem Services Network

NEA NATIONAL
ECOSYSTEM
ASSESSMENT
INITIATIVE

 **unesco**