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Entrenching Biodiversity Impact Assessment in Kenya as a Tool for Enhancing Sustainable Development Agenda

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Abstract

Environmental Impact Assessment is globally considered as an important tool for environmental regulation and management. Impact assessments are performed to determine how particular projects, policies, and programmes will shape the environment. The Environmental Impact Assessment (EIA), according to UNEP, is a tool used to determine the environmental, social, and economic effects of a project before making a decision. It seeks to anticipate environmental effects early in the project planning and design process, identify strategies for minimising negative effects, adapt projects to the local environment, and give predictions and options to decision-makers. It is arguably the most widely used environmental tool globally when determining the potential impact of a project on the environment.

This paper argues that in the most sensitive ecological areas, such impact assessments should include biodiversity impact assessment as the most effective tool in safeguarding the biological diversity that may be found within these areas and also enhancing their conservation. The author argues that the ordinary EIA may not successfully reflect the real effect of the particular project, policy or programme on the biological diversity.

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1. Introduction

The 1992 *Convention on Biological Diversity*¹ defines “biological diversity” to mean the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems.² Every living creature, from people to things we know little about like bacteria, fungi, and invertebrates, is included in biodiversity, not only the species we regard to be uncommon, vulnerable, or endangered.³ The majority of our daily activities depend on biodiversity. There are a variety of practical and fundamental reasons why we cherish biodiversity. Thus, we appreciate biodiversity both for what it offers to us and for its intrinsic worth.⁴

It is for this reason that human activities ought to take into consideration conservation and protection of biodiversity. One of the ways that this may be achieved is through environmental impact assessment exercises during approval of various projects. Environmental Impact Assessment is globally considered as an important tool for environmental regulation and management. Impact assessments are performed to determine how particular projects, policies, and programmes will shape the environment.⁵ The Environmental Impact Assessment (EIA), according to UNEP, is a tool used to determine the environmental, social, and economic effects of a project before making a decision. It seeks to anticipate

¹ United Nations, *1992 Convention on Biological Diversity*, 1760 UNTS 79, 31 ILM 818 (1992). Adopted in Rio de Janeiro, Brazil on 5 June 1992.

² *Ibid*, Article 2.

³ ‘What Is Biodiversity? Why Is It Important? | AMNH’ (*American Museum of Natural History*) <<https://www.amnh.org/research/center-for-biodiversity-conservation/what-is-biodiversity>> accessed 7 November 2022.

⁴ *Ibid*.

⁵ Unit B, ‘What Is Impact Assessment?’ (27 April 2010)

<<https://www.cbd.int/impact/whatis.shtml>> accessed 7 November 2022.

environmental effects early in the project planning and design process, identify strategies for minimising negative effects, adapt projects to the local environment, and give predictions and options to decision-makers. It is arguably the most widely used environmental tool globally when determining the potential impact of a project on the environment.⁶

This paper is informed by the argument that EIA processes and conservation measures as currently carried out in Kenya do not adequately put into account the biodiversity impact assessment aspect of environmental assessments. Biodiversity assessment has been defined as identification and classification of the species, habitats, and communities found in a certain area or region. The main objective is to provide the information needed to determine if management is necessary to protect biological diversity. Assessments also contain information and data that may be applied to scientific research endeavours.⁷

The author argues that with the growing population and development activities, the increasing conversion of biodiversity rich areas into settlement areas to take care of the population and economic needs of the country requires the country to embrace biodiversity impact assessment exercises as part of the conservation efforts and race towards achieving sustainable development agenda.

⁶ Ibid.

⁷ Henderson, A., Comiskey, J., Dallmeier, F. and Alonso, A., "Framework for Assessment and Monitoring of Biodiversity." *Encyclopedia of Biodiversity Online Update 1* (2007)

<https://repository.si.edu/bitstream/handle/10088/20985/nzp_Dallmeier_et_al_2013_Framework_for_Assess_and_Monit_of_Bd_022813.pdf> accessed 7 November 2022.

2. Environmental Impact Assessment in Kenya: Legal and Institutional Framework

Environmental Impact Assessment (EIA) in Kenya is provided for under the 2010 Constitution of Kenya as well as Environmental Management and Coordination Act (EMCA) 1999⁸ and related regulations. International environmental regulatory framework also shapes the domestic framework.

2.1. The Constitution of Kenya 2010

Article 10(1) states that the national values and principles of governance in this Article bind all State organs, State officers, public officers and all persons whenever any of them—applies or interprets this Constitution; enacts, applies or interprets any law; or makes or implements public policy decisions.⁹ These national values and principles include, *inter alia*: good governance, integrity, transparency and accountability; and sustainable development.¹⁰

The Constitution outlines the principles of land policy in Kenya and states that land in Kenya shall be held, used and managed in a manner that is equitable, efficient, productive and sustainable, and in accordance with the principles of, *inter alia*—sustainable and productive management of land resources; and sound conservation and protection of ecologically sensitive areas.¹¹

Article 69 of the Constitution outlines the obligations of the State in respect of the environment as including, to: ensure sustainable exploitation, utilisation, management and conservation of the environment and natural resources, and ensure the equitable sharing

⁸ Environmental Management and Co-ordination Act, No. 8 of 1999, Laws of Kenya, Revised Edition 2019 [1999].

⁹ Article 10 (1), Constitution of Kenya 2010.

¹⁰ Article 10 (2), Constitution of Kenya 2010.

¹¹ Article 60 (1), Constitution of Kenya 2010.

of the accruing benefits; work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya; protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities; encourage public participation in the management, protection and conservation of the environment; protect genetic resources and biological diversity; establish systems of environmental impact assessment, environmental audit and monitoring of the environment; eliminate processes and activities that are likely to endanger the environment; and utilise the environment and natural resources for the benefit of the people of Kenya.¹²

Notably, Article 260 of the Constitution defines “natural resources” to mean the physical non-human factors and components, whether renewable or non-renewable, including, *inter alia*-forests, biodiversity and genetic resources.¹³

2.2. Environmental Management Coordination Act, 1999 (EMCA)

The *Environmental Management Coordination Act (EMCA)*¹⁴ envisages environmental impact assessments (EIA). Indeed, various requirements relating to the implementation of environmental impact assessments (EIA), strategic environmental assessments (SEA), environmental audits (EA), and management activities for air, water, wastes, and noise are included in the Environmental Management and Control Act (EMCA). Conservation of wildlife, management of forests and water resources, as well as worker health and safety, are additional requirements relating to environmental concerns.

¹² Article 69 (1), Constitution of Kenya 2010.

¹³ Article 260, Constitution of Kenya 2010.

¹⁴ Environmental Management Coordination Act, No. 8 of 1999, Laws of Kenya.

Section 42 (1) of EMCA states that no person shall, without the prior written approval of the Authority given after an environmental impact assessment, in relation to a river, lake, sea or wetland in Kenya, carry out any of the following activities: erect, reconstruct, place, alter, extend, remove or demolish any structure or part of any structure in, or under the river, lake, sea or wetland; excavate, drill, tunnel or disturb the river, lake, sea or wetland; introduce any animal, whether alien or indigenous, dead or alive, in any river, lake, sea or wetland; introduce or plant any part of a plant specimen, whether alien or indigenous, dead or alive, in any river, lake, sea or wetland; deposit any substance in a lake, river or wetland or in, on or under its bed, if that substance would or is likely to have adverse environmental effects on the river, lake, sea or wetland; direct or block any river, lake, sea or wetland from its natural and normal course; drain any lake, river, sea or wetland; or any other matter prescribed by the Cabinet Secretary on the advice of the Authority.¹⁵

Section 58 of EMCA provides for EIA and states that ‘notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya, any person, being a proponent of a project, should before for financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the Second Schedule to this Act, submit a project report to the Authority, in the prescribed form, giving the prescribed information and which shall be accompanied by the prescribed fee.’¹⁶ EMCA defines “environmental impact assessment” to mean a systematic examination conducted to determine whether or

¹⁵ S. 42(1), EMCA.

¹⁶ S. 58(1), EMCA.

not a programme, activity or project will have any adverse impacts on the environment.¹⁷

The contents of the reports from environmental impact assessment are provided for the *Environmental (Impact Assessment and Audit) Regulations, 2003*¹⁸. However, it is worth noting that CBD COP 6 Decision VI/7 recognises that although legislation and practice vary around the world, the fundamental components of an environmental impact assessment would necessarily involve the following stages: Screening to determine which projects or developments require a full or partial impact assessment study; Scoping to identify which potential impacts are relevant to assess, and to derive terms of reference for the impact assessment; Impact assessment to predict and identify the likely environmental impacts of a proposed project or development taking into account inter-related consequences of the project proposal, and the socio-economic impacts; Identifying mitigation measures (including not proceeding with the development, finding alternative designs or sites which avoid the impacts, incorporating safeguards in the design of the project, or providing compensation for adverse impacts); Deciding whether to approve the project or not; and monitoring and evaluating the development activities, predicted impacts and proposed mitigation measures to ensure that unpredicted impacts or failed mitigation measures are identified and addressed in a timely fashion.¹⁹

As far as protection of environmentally significant areas is concerned, EMCA provides that the Cabinet Secretary may, in consultation with the relevant lead agencies and in accordance with the Constitution, the

¹⁷ S. 2, EMCA.

¹⁸ Environmental (Impact Assessment and Audit) Regulations, 2003, Legal Notice No. 101 of 2003, Laws of Kenya.

¹⁹ Unit B, 'COP Decision' <<https://www.cbd.int/decision/cop/?id=7181>> accessed 9 November 2022.

Convention on Biological Diversity and other treaties, by notice in the Gazette, declare any area of land, sea, lake, forests or river to be a protected natural environment for the purpose of promoting and preserving specific ecological processes, natural environment systems, natural beauty or species of indigenous wildlife or the preservation of biological diversity in general.²⁰

EMCA defines “biological diversity” to mean the variability among living organisms from all sources including, terrestrial ecosystems, aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, among species and of ecosystems.²¹ It also defines “biological resources” to include genetic resources organisms or parts thereof, populations, or any other biotic component or ecosystems with actual or potential use or value for humanity.²²

Section 50 of EMCA deals with conservation of biological diversity where it provides that the Cabinet Secretary should, on the advice of the Authority, prescribe measures necessary to ensure the conservation of biological diversity in Kenya and in this respect the Authority should: identify, prepare and maintain an inventory of biological diversity of Kenya; determine which components of biological diversity are endangered, rare or threatened with extinction; identify potential threats to biological diversity and devise measures to remove or arrest their effects; undertake measures intended to integrate the conservation and sustainable utilisation ethic in relation to biological diversity in existing government activities and activities by private persons; specify national strategies, plans and government programmes for conservation and sustainable use of biological

²⁰ S. 54(1), EMCA, 1999.

²¹ S. 2, EMCA, 1999.

²² Ibid.

diversity; protect indigenous property rights of local communities in respect of biological diversity; and measure the value of unexploited natural resources in terms of watershed protection, influences on climate, cultural and aesthetic value, as well as actual and potential genetic value thereof.²³

The Act envisages both *in situ* and *ex situ* conservation of biological resources.²⁴ In terms of *in situ* approach to conservation of biological resources, the Act provides that the Cabinet Secretary should, on the recommendation of the Authority, prescribe measures adequate to ensure the conservation of biological resources in situ and in this regard shall issue guidelines for, *inter alia*, land use methods that are compatible with conservation of biological diversity.

It is against the foregoing provisions that NEMA came up with regulations on conservation of biological diversity in 2006²⁵ as per section 147 of the Act.²⁶

²³ S. 50, EMCA.

²⁴ S. 51 & 52, EMCA.

²⁵ Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006.

²⁶ 147. Power to make regulations

(1) The Cabinet Secretary may, on the recommendation of the Authority and upon consultation with the relevant lead agencies, make regulations prescribing for matters that are required or permitted by this Act to be prescribed or are necessary or convenient to be prescribed for giving full effect to the provisions of this Act.

(2) Regulations made under subsection (2) may—

(a) make provisions for the issue, amendment and revocation of any licence;

(b) provide for the charging of fees and levying of charges;

(c) adopt wholly or in part or with modifications any rules, standards, guidelines, regulations, by laws, codes, instructions, specifications, or administrative procedures prescribed by any lead agency either in force at the time of prescription or publication or as amended from time to time.

2.3. Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006

The *Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006*²⁷ are to apply to: (a) the exchange of genetic resources, their derivative products, or the intangible components associated with them, carried out by members of any local Kenyan community amongst themselves and for their own consumption; access to genetic resources derived from plant breeders in accordance with the Seeds and Plant Varieties Act (Cap. 326); human genetic resources; and approved research activities intended for educational purposes within recognized Kenyan academic and research institutions, which are governed by relevant intellectual property laws.²⁸

The Regulations also state that a person shall not engage in any activity that may— have an adverse impact on any ecosystem; lead to the introduction of any exotic species; lead to unsustainable use of natural resources, without an Environmental Impact Assessment Licence issued by the Authority under the Act.²⁹

2.4. Environmental (Impact Assessment and Audit) Regulations, 2003

The Environmental (Impact Assessment and Audit) Regulations, 2003³⁰ are to apply to all policies, plans, programmes, projects and

²⁷ the Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, Legal Notice No. 160 of 2006, Laws of Kenya.

²⁸ Regulation 3, LN No. 160 of 2006, laws of Kenya.

²⁹ Ibid, regulation 4.

³⁰ Environmental (Impact Assessment and Audit) Regulations, Legal Notice No. 101 of 2003, Laws of Kenya.

activities specified in Part IV, Part V and the Second Schedule of the Act.³¹

Regulation 7 (2) thereof provides that the project report submitted under sub regulation 7(1) shall specify — the nature of the project; the location of the project including —(i) proof of land ownership, where applicable; (ii) any environmentally sensitive area to be affected; (iii) availability of supportive environmental management infrastructure; and (iv) conformity to land use plan or zonation plan; and potential environmental impacts of the project and the mitigation measures to be taken during and after implementation of the project. On the other hand, comprehensive project report prepared pursuant to a recommendation under regulation 7 (3) (a), must specify — the nature of the project; the location of the project including — (i) proof of land ownership; (ii) the Global Positioning System coordinates; and (iii) the physical area that may be affected by the project's activities; the activities that shall be undertaken during the project construction, operation and decommissioning phases; a description of the international, national and county environmental legislative and regulatory frameworks on the environment and socio- economic matters; the preliminary design of the project; the materials to be used, products and by-products, including waste to be generated by the project and the methods of their disposal; the potential environmental impacts of the project and the mitigation measures to be taken during and after implementation of the project; an analysis of available alternatives including an alternative (i) project site; (ii) design; (iii) technologies; and (iv) processes, and the reasons for preferring the proposed site, design, technologies and processes; an action plan for the prevention and management of possible accidents during the project cycle; a plan to ensure the health and safety of the workers and

³¹ Regulation 3, LN No. 101 of 2003.

neighbouring communities; the economic and socio-cultural impacts to the local community and the nation in general; a plan to ensure the relocation or resettlement of persons affected by the project; a strategic communication plan to ensure inclusive participation during the study and provide a summary of issues discussed at the public participation forum; an environmental management plan; integration of climate change vulnerability assessment, relevant adaptation and mitigation actions; the project cost; and any other information the Authority may require.³²

As for environmental impact assessment study reports, they must incorporate, *inter alia*, information on — the proposed location of the project; a concise description of the national environmental legislative and regulatory framework, baseline information and any other relevant information related to the project; the objectives of the project; the technology, procedures and processes to be used, in the implementation of the project; the materials to be used in the construction and implementation of the project; the products, by-products and waste generated by the project; a description of the potentially affected environment; the environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated; alternative technologies and processes available and reasons for preferring the chosen technology and processes; analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies; an environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment; including the cost, time frame and responsibility to implement the measures; provision of an action plan for the prevention

³² Regulation 7 (4), LN No. 101 of 2003

and management of foreseeable accidents and hazardous activities in the cause of carrying out activities or major industrial and other development projects; the measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies; an identification of gaps in knowledge and uncertainties which were encountered in compiling the information; an economic and social analysis of the project; an indication of whether the environment of any other state is likely to be affected and the available alternatives and mitigating measures; and such other matters as the Authority may require.³³

In all the above reports, Second Schedule thereof outlines the issues that may, among others, be considered in the making of environmental impact assessments. These issues include, *inter alia*, ecological Considerations such as biological diversity including— effect of proposal on number, diversity, breeding habits, etc. of wild animals and vegetation; gene pool of domesticated plants and animals e.g. monoculture as opposed to wild types. Thus, while biodiversity is mentioned as one of the considerations that may be made during EIA, biological diversity assessment is not substantively provided for.

2.5. Convention on Biological Diversity 1992

The *1992 Convention on Biological Diversity*³⁴ is the international legal framework for the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits resulting from the use of genetic resources, including through appropriate access to genetic resources and through appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate

³³ Regulation 18 (1), LN No. 101 of 2003, Laws of Kenya.

³⁴ United Nations, *1992 Convention on Biological Diversity*, 1760 UNTS 79, 31 ILM 818 (1992). Adopted in Rio de Janeiro, Brazil on 5 June 1992.

funding.³⁵ The CBD offers a powerful worldwide platform for using impact assessment methods to conserve biodiversity. It expressly demands that projects, programmes, and policy choices address biodiversity through impact assessment procedures (Article 14).

Parties must conduct environmental impact assessments (EIAs) for projects that might have a detrimental impact on biodiversity under the Convention on Biological Diversity (CBD). The CBD calls for impact assessments to take biodiversity into account, but it also gives room for a more proactive approach, allowing for the identification of potential for both effect mitigation and biodiversity enhancement.³⁶

3. Biodiversity Conservation: Challenges and Prospects

One of the main worldwide environmental challenges today is the preservation of biological diversity (biodiversity). Therefore, as suggested by the Convention on Biological Diversity, a detailed examination of the consequences of developments on biodiversity has to be included in the process of Environmental Impact Assessment (EIA): Each Contracting Party is required to "implement suitable processes requiring environmental impact assessment of any proposed projects that are expected to have considerable detrimental impact on biological diversity."³⁷

Ecological impact assessments concentrate on both the advantages of biodiversity obtained through ecosystem services as well as the

³⁵ *Ibid*, Article 1.

³⁶ Brooke, C., 'Biodiversity and Impact Assessment,' *prepared for the conference on Impact Assessment in a Developing World Manchester, England, Oct 1998*, RSPB/BirdLife International < <https://www.cbd.int/impact/case-studies/cs-impact-bia-brooke-1998-en.pdf> > accessed 9 November 2022.

³⁷ Davide Geneletti, 'Biodiversity Impact Assessment of Roads: An Approach Based on Ecosystem Rarity' (2003) 23 *Environmental Impact Assessment Review* 343, 344 <<https://linkinghub.elsevier.com/retrieve/pii/S0195925502000999>> accessed 8 November 2022.

spatially constrained biophysical environment and biodiversity as composition, structure, and important activities. It deals with the distribution of space in complicated circumstances marked by ambiguity and opposing actor values. The entire proposal of a project, plan, or programme, its goals, alternate options and their acceptability from the perspective of biodiversity, and knowledge of the biodiversity and ecosystem services it provides are shaped in the process of ecological impact assessment, which is a part of environmental impact assessment (EIA) and strategic environmental assessment (SEA).³⁸

It has been pointed out that despite the fact that 80% of Kenya's population depends on its biological resources for survival, insufficient management of these resources results in a broad range of biological resources. In addition, there is little knowledge of the non-consumptive values of resources, little access to biodiversity data and information, and poor adoption rates for new technologies, including biotechnology.³⁹

According to *Kenya State of Environment Report 2019-2021*⁴⁰, a 2021 publication of the National Environment Management Authority (NEMA) Kenya, currently, it is thought that the nation is home to over 260 species of reptiles, over 250 small mammals, several big animals, over 7,004 kinds of plants, over 25,000 types of invertebrates, over

³⁸ Söderman, T., "Biodiversity and ecosystem services in impact assessment: from components to services," (2012), p. 3

< <https://core.ac.uk/download/pdf/14924073.pdf>> accessed 8 November 2022.

³⁹ Mwenda, A. and Kibutu, T.N., "Implications of the New Constitution on Environmental Management in Kenya' (2012)." *Law, Environment and Development Journal* 8: 76-78.

⁴⁰ National Environment Management Authority, *Kenya State of Environment Report 2019-2021*, 2021, ISBN: 978-9966-1987-0-9 < https://www.nema.go.ke/images/Docs/EIA_1920-1929/NEMA%20SoE%202019-2021.pdf> accessed 7 November 2022.

769 species of fish, and around 1,100 species of birds. The nation's national parks, national reserves, and conservancies are among the places where the biodiversity of the nation is most abundant. In lands used for communal settlement, biodiversity may also be found outside of protected areas.⁴¹

Kenya's conservation efforts are threatened by climate unpredictability, wildlife crime, urban sprawl, and rapid population increase.⁴² It is crucial to analyse how each biophysical change can affect biodiversity by determining whether the change has an impact on one of the following aspects of biodiversity: composition, structure, or key processes. This will help us determine impacts on biodiversity for the ecosystems that are influenced.⁴³

4. Entrenching Biodiversity Impact Assessment in Kenya as a Tool for Enhancing Sustainable Development Agenda

The objective of an environmental impact assessment (EIA) is to provide decision-makers a sense of the anticipated environmental effects of activities that might modify the environment and, if required, to enable for adjustments to be made to these actions to lessen any negative effects.⁴⁴ Arguably, ecological repercussions have frequently received less attention in impact assessments.⁴⁵ EIAs have

⁴¹ Ibid, p. xviii.

⁴² 'Environment | Kenya | U.S. Agency for International Development' (24 May 2022) <<https://www.usaid.gov/kenya/environment>> accessed 8 November 2022.

⁴³ Sloomweg, R., "Biodiversity assessment framework: making biodiversity part of corporate social responsibility." *Impact Assessment and Project Appraisal* 23, no. 1 (2005): 37-46.

⁴⁴ Ritter, C.D., McCrate, G., Nilsson, R.H., Fearnside, P.M., Palme, U. and Antonelli, A., 'Environmental Impact Assessment in Brazilian Amazonia: Challenges and Prospects to Assess Biodiversity' (2017) 206 *Biological Conservation* 161.

⁴⁵ Brooke, C., 'Biodiversity and Impact Assessment,' *prepared for the conference on Impact Assessment in a Developing World Manchester, England, Oct 1998,*

traditionally concentrated on impacts on protected species and ecosystems. Other elements of biodiversity, such as diversity across species and ecosystems, changes through time, species abundance and distribution, and the functional components of biodiversity, have received less attention.⁴⁶

The Conference of the Parties (COP) agreed to establish recommendations for including biodiversity-related problems in environmental impact assessment laws, procedures, and strategic environmental assessment in COP 6 Decision VI/7.⁴⁷ The COP guidelines for incorporating biodiversity-related issues into environmental-impact-assessment legislation or processes and in strategic impact assessment are meant to provide general advice on incorporation of biodiversity considerations into new or existing environmental impact assessment procedures, noting that existing procedures take biodiversity into consideration in different ways.⁴⁸ The framework will need to be improved in order to address how biodiversity may be included into the latter phases of the environmental impact assessment procedure, such as impact assessment, mitigation, evaluation, and monitoring, as well as strategic environmental assessment.⁴⁹ However, depending on their institutional and legal frameworks, individual nations may modify the phases in the approach to suit their needs and wants.⁵⁰

RSPB/BirdLife International < <https://www.cbd.int/impact/case-studies/cs-impact-bia-brooke-1998-en.pdf> > accessed 9 November 2022.

⁴⁶ Ibid.

⁴⁷ Unit B, 'Case Studies - Impact Assessment'

<<https://www.cbd.int/programmes/cross-cutting/impact/search.aspx>> accessed 9 November 2022.

⁴⁸ Unit B, 'COP Decision' <<https://www.cbd.int/decision/cop/?id=7181>> accessed 9 November 2022.

⁴⁹ Ibid.

⁵⁰ Ibid.

Therefore, conducting a biodiversity impact assessment necessitates a more thorough research and analysis of potential effects on an ecological unit and the species and populations that make up its ecosystem. According to the CBD, biodiversity refers to variety at the levels of species (both within and between species) and ecosystems. Therefore, ecological impacts might be viewed as a subset of biodiversity impacts, which focus on the broader interactions between animals and their habitats at the species, community, and ecosystem levels.⁵¹ Because of the challenges that other disciplines, including social impact assessment, have had when attempting to "go it alone," biodiversity impact assessment should thus be viewed as a component of current impact assessment systems rather than being marketed as a distinct entity. The term "biodiversity impact assessment" might be used to bring these concerns to the attention of the impact assessment community because the biodiversity agenda has some momentum.⁵²

In contrast to the conventional EIA strategy of mitigating consequences, this provides a focus on the more advantageous features of biodiversity, looking at the ecosystem perspective, dealing with fragmentation difficulties, and so forth. In addition to protecting endangered species and their ecosystems, biodiversity also entails improving damaged landscapes, halting species extinctions, and establishing new habitats.⁵³

4.1. Biodiversity Monitoring

As a result of a wide range of internal and external stimuli, biodiversity is by its very nature a dynamic component of ecosystems, changing in composition, structure, and functional qualities. The term

⁵¹ Brooke, C., 'Biodiversity and Impact Assessment,' *prepared for the conference on Impact Assessment in a Developing World Manchester, England, Oct 1998*, RSPB/BirdLife International, p.3.

⁵² *Ibid.*, p.3.

⁵³ *Ibid.*, p.3.

"monitoring" refers to the systematic and targeted observation and assessment of current changes in biodiversity in its different forms (genes, species, structures, functions, and ecosystems), often within a specific context defined by, for example, a research topic or a management aim.⁵⁴ There are several purposes for biodiversity monitoring. Feedback on the effectiveness of conservation efforts is provided by observing protected species' population numbers in their protected zones. An early warning system for farmers or medical services can benefit from tracking the spread of hazardous invasive species or contagious organisms. Population management systems may be optimized thanks to monitoring systems at gaming farms. These are but a few instances of the numerous uses available.⁵⁵

4.2. Adaptive Management of Biodiversity Resources

Adaptive management is a process for putting management into practice while learning which management activities are most successful at accomplishing certain objectives.⁵⁶ In other words, adaptive management is a methodical strategy for enhancing resource management by taking lessons from management results.⁵⁷

The evolution of scientific knowledge, as well as numerous societal and political shifts, have all influenced how natural resource management has changed through time. Management's typical objective is to guarantee the continuity of one or more system-of-

⁵⁴ Juergens, N. "Monitoring of biodiversity." *Biodiversity: Structure and Function-Volume I* 1 (2009): 229.

⁵⁵ *Ibid.*

⁵⁶ Department of Planning and Environment, 'Adaptive Management' (*NSW Environment and Heritage*) <<http://www.environment.nsw.gov.au/research-and-publications/our-science-and-research/our-work/adaptive-management>> accessed 8 November 2022.

⁵⁷ 'Adaptive Management' (*Conservation in a Changing Climate*) <<https://climatechange.lta.org/get-started/adapt/adaptive-management/>> accessed 8 November 2022.

interest properties. This is sometimes seen as a necessity for managers to either work to maintain system stability or to preserve certain system linkages and components while permitting or promoting system change. A comprehension of resilience is especially important when taking into account the dynamics of management and system change.⁵⁸

Arguably, EIA procedures should not be different. They should be adoptive to the changing environmental conditions due to climate change and other factors adversely affecting the environment and biological resources. These processes should be expanded to include biodiversity impact assessment especially where the EIA relates to a parcel of land that is rich in biological resources, such as those contemplated under section 42 of EMCA. It has been suggested that in order to take advantage of the role of science and innovation in enhancing biodiversity conservation measures, the challenge for researchers is to change their emphasis from discovery to the science of implementation, while managers and policy-makers must abandon their socio-political norms and institutional frameworks in order to adopt new thinking and effectively use the wealth of potent new scientific tools for learning by doing.⁵⁹ For instance, it has been documented that wetlands are losing their biodiversity more quickly than any other ecosystem and thus, data on species status and risks are necessary to properly manage and conserve the biodiversity of

⁵⁸ Allen, C.R. and Garmestani, A.S., "Adaptive Management." *Adaptive Management of Social-Ecological Systems* (2015): 1, p. 2
<<http://ndl.ethernet.edu.et/bitstream/123456789/67461/1/Craig%20R.%20Allen.pdf>> accessed 8 November 2022.

⁵⁹ Keith, D., Martin, T., McDonald-Madden, E. and Walters, C., "Uncertainty and adaptive management for biodiversity conservation." (2011)
<https://www.sciencedirect.com/science/article/abs/pii/S0006320710004933?via%3Dihub> accessed 8 November 2022.

wetlands.⁶⁰ Thus, biological diversity monitoring offers recommendations for managing biological variety in terms of productivity and conservation. Monitoring analyses changes across time and place and evaluates the state of biological variety at one or more ecological levels.⁶¹

5. Conclusion

It has been suggested that programs for biodiversity monitoring and assessment (BMAP) offer a way to gather and present scientific data for use in managing natural resources. Establishing the objectives is the first step in creating the BMAP programme. The types of species and habitats that should be taken into account as part of the programme are then frequently determined by doing a baseline biological assessment. Following completion of the assessment, trends in biodiversity will be shown in the environment by tracking the chosen indicators and utilising science to offer answers. The results of monitoring operations reveal concerns that call for management methods, such as the need to safeguard vulnerable or endangered species or eradicate invasive non-native species.⁶² Monitoring is a crucial part of an effective adaptive management programme since it is used to evaluate the progress achieved toward achieving management objectives.⁶³

⁶⁰ Stephenson PJ, Ntiamoa-Baidu Y and Simaika JP, 'The Use of Traditional and Modern Tools for Monitoring Wetlands Biodiversity in Africa: Challenges and Opportunities' (2020) 8 *Frontiers in Environmental Science* <<https://www.frontiersin.org/articles/10.3389/fenvs.2020.00061>> accessed 9 November 2022.

⁶¹ Niemelä J, 'Biodiversity Monitoring for Decision-Making' (2000) 37 *Niemelä, J. 2000. Biodiversity monitoring for decision-making. Annales Zoologici Fennici* 37: 307-317.

⁶² Henderson, A., Comiskey, J., Dallmeier, F. and Alonso, A., "Framework for Assessment and Monitoring of Biodiversity." *Encyclopedia of Biodiversity Online Update 1* (2007), p. 545.

⁶³ *Ibid*, p. 545.

If the Sustainable Development Goal 15 of the 2030 Agenda for Sustainable Development which is devoted to “*protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss*” is to be achieved, then biodiversity assessments must become part of environmental management approaches in the country. It is only through such assessments that the true status and impact on biodiversity can be established. It is important that given that a legislative requirement for an environmental impact assessment based on environmental considerations does not ensure that biological diversity will be taken into account, it should be taken into account to include biodiversity criteria in either current or future screening criteria. This is especially important where EIA processes are to be carried out in ecologically sensitive areas. It has thus been suggested that there is a need to solve the two key issues that biodiversity conservation poses for impact assessment, namely: First, current impact assessment techniques must be enhanced to address biodiversity impacts; second, they need to be broadened to give additional positive advantages for biodiversity.⁶⁴ If these goals for biodiversity and impact assessment are to be accomplished, changes must be made at all levels of impact assessment, including legal requirements, standards, training, and impact assessment practice.⁶⁵

⁶⁴ Brooke, C., ‘Biodiversity and Impact Assessment,’ *prepared for the conference on Impact Assessment in a Developing World Manchester, England, Oct 1998*, RSPB/BirdLife International, p.4.

⁶⁵ *Ibid*, p. 6.

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