Conserving Biodiversity for a Better Future

Kariuki Muigua

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Abstract

Biological diversity is a term used to refer to 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. These resources play a huge role in not only environmental processes but also in provision of ecosystem resources for all living organisms, including human beings. Arguably, if the world is to achieve the sustainable development goals, then the conservation of these resources must be treated with urgency and it also calls for the concerted efforts of all stakeholders and cooperation from all countries, at least at the international level. The world must address the human activities that have been contributing to the degradation of these resources. This paper critically discusses in the context of Kenya some of challenges affecting the environment and offers recommendations on effective conservation of biodiversity for a better future for both the human world and the environment.

1. Introduction

It has rightly been observed that while 'biodiversity can be greatly enhanced by human activities, it can also be adversely impacted by such activities due to unsustainable use or by more profound causes linked to our development models'.[1] This is despite the fact that biodiversity is considered to be very important for sustenance of all forms of life on earth.[2]

It is worth acknowledging that biodiversity is essential not only to the proper functioning of earth systems; it is also key to the delivery of those ecosystem services that are crucial to human dignity and well-being including: the provision of potable water, food and fibers; soil fertility; maintenance of the 'genetic library of biodiversity' – an irreplaceable source of new innovations,

PhD in Law (Nrb), FCIArb (Chartered Arbitrator), LL. B (Hons) Nrb, LL.M (Environmental Law) Nrb; Dip. In Law (KSL); FCPS (K); Dip. In Arbitration (UK); MKIM; Mediator; Consultant: Lead expert EIA/EA NEMA; BSI ISO/IEC 27001:2005 ISMS Lead Auditor/ Implementer; Advocate of the High Court of Kenya; Senior Lecturer at the University of Nairobi, School of Law; CASELAP [June, 2021].

[1] 'Conserving Biodiversity for Life and Sustainable Development | United Nations Educational, Scientific and Cultural Organization' <http://www.unesco.org/new/en/media-services/single-view/news/conserving_biodiversity_for_life_and_sustainable_development/> accessed 29 May 2021; 'Threats to Biodiversity – Biodiversity Clearing House Mechanism' <http://meas.nema.go.ke/cbdchm/major-threats/> accessed 31 May 2021.

[2] Dmitrii Pavlov and Elena Bukvareva, 'Biodiversity and Life Support of Humankind' (2007) 77 Herald of the Russian Academy of Sciences 550.

pharmaceuticals and chemicals; and climate regulation – among others.[3] The concept of ecosystem services was inspired by the desire to give an economic assessment of these functions thus leading to the appearance of the concept of ecosystem services, that is, consideration with regard to their usefulness for humans.[4] Arguably, ecosystem services are divided into four categories namely: provisioning services refer to natural products that are directly used by humans for food, clothing, medicines, tools, or other uses; cultural services provide recreational opportunities, inspiration for art and music, and spiritual value; regulating services include pest control and carcass removal; and supporting services, such as pollination, seed dispersal, water purification, and nutrient cycling, provide processes essential for ecological communities and agricultural ecosystems.[5]

It is against this background that this paper discusses the important role of biodiversity in ensuring that the sustainable development agenda is achieved for the sake of current and future generations. The concept of sustainable development seeks to strike a balance between using ecosystem services to improve human lives and the need to ensure that the environment can comfortably replenish itself, that is, based on the ecocentric approaches to conservation against the anthropocentric approaches only.[6]

2. Biodiversity: Definition and Scope

Notably, *Biodiversity*, a contraction of the phrase "biological diversity," can be traced to the first usage by Walter G. Rosen during a planning meeting for the 1986 National Forum on Biodiversity

[3] 'Conserving Biodiversity for Life and Sustainable Development | United Nations Educational, Scientific and Cultural Organization' <http://www.unesco.org/new/en/media-services/single-view/news/conserving_biodiversity_for_life_and_sustainable_development/> accessed 29 May 2021.

[4] Dmitrii Pavlov and Elena Bukvareva, 'Biodiversity and Life Support of Humankind' (2007) 77 Herald of the Russian Academy of Sciences 550, 551.

[5] Wenny, D.G., Devault, T.L., Johnson, M.D., Kelly, D., Sekercioglu, C.H., Tomback, D.F. and Whelan, C.J., 'The Need to Quantify Ecosystem Services Provided by Birds' (2011) 128 The Auk 1.

[6] Louis J Kotzé and Duncan French, 'The Anthropocentric Ontology of International Environmental Law and the Sustainable Development Goals: Towards an Ecocentric Rule of Law in the Anthropocene' (2018) 7 Global Journal of Comparative Law 5; 'Putting Ecosystems into the SDGs' (*Water, Land and Ecosystems*, 9 October 2015) <https://wle.cgiar.org/news/putting-ecosystems-sdgs> accessed 3 June 2021; Bullock, C. H. "Nature's values: From intrinsic to instrumental. A review of values and valuation methodologies in the context of ecosystem services and natural capital." *National Economic and Social Council* 10 (2017); 'Striking a Balance between Conservation and Development' (*UNEP*, 13 May 2019) <http://www.unep.org/news-and-stories/story/striking-balance-between-conservation-and-development> accessed 3 June 2021; McCartney, M., Finlayson, M., de Silva, S., Amerasinghe, P., & Smakhtin, V., 'Sustainable Development and Ecosystem Services' (2014); Rülke, J., Rieckmann, M., Nzau, J. M., & Teucher, M., 'How Ecocentrism and Anthropocentrism Influence Human–Environment Relationships in a Kenyan Biodiversity Hotspot' (2020) 12 Sustainability 8213.

held in Washington, DC, while the first appearance of the word in the print literature likely occurred with the 1988 publication of the proceedings of the said conference.[7]

The Convention on Biological Diversity defines 'biodiversity' 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".[8]

United Nations Educational, Scientific and Cultural Organization (UNESCO) defines 'biodiversity' as the diversity of all living forms at different levels of complexity: genes, species, ecosystems and even landscapes and seascapes.[9] Biological diversity or biodiversity has also been defined as the variety of the planet's living organisms and their interactions.[10] The term is meant to encompass all of life's variation, expressed in genes, individuals, populations, species, communities and ecosystems.[11]

These definitions are relevant especially in the context of Sustainable Development debate as they reflect the important role that biological diversity can and indeed plays in meeting the essentials of realising Sustainable Development goals such as food security, alleviating poverty, among others.[12] The World Bank argues that while biodiversity provides many instrumental benefits, from food and fuel to recreation, even where biodiversity is not immediately instrumental, it represents global public goods that must be protected, if only for their potential value in the future.[13]

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[7] John Creech, 'Biodiversity Web Resources' <http://www.istl.org/12-fall/internet.html> accessed 29 May 2021; David L Hawksworth and Royal Society (Great Britain), *Biodiversity: Measurement and Estimation* (Springer Science & Business Media 1995).

[8] Article 2, Convention on Biological Diversity.

[9] United Nations Educational, Scientific and Cultural Organization, 'Conserving Biodiversity for Life and Sustainable Development | United Nations Educational, Scientific and Cultural Organization' <http://www.unesco.org/new/en/media-services/single-view/news/conserving_biodiversity_for_life_and_sustainable_development/> accessed 29 May 2021.

[10] Wes Sechrest and Thomas Brooks, 'Biodiversity – Threats' (2002).

[11] Ibid, 1; see also Matta, G., Bhadauriya, G., & Singh, V., "Biodiversity and Sustainable Development: A Review." *Fecundity of fresh water prawn Macrobrachium Assamense Penensularae from Khoh River, India*: 72.

[12] Måns Nilsson, 'Biodiversity's Contributions to Sustainable Development' [2019] Nature Sustainability <https://www.sei.org/publications/biodiversity-contributions-sustainable-development/> accessed 3 June 2021; Gagan Matta, Gaurav Bhadauriya and Vikas Singh, 'Biodiversity and Sustainable Development: A Review' Fecundity of fresh water prawn Macrobrachium Assamense Penensularae from Khoh River, India 72.

[13] Sobrevila, Claudia; Hickey, Valerie, *The Role of Biodiversity and Ecosystems in Sustainable Development. 2010 Environment Strategy Analytical Background Papers*; World Bank, Washington, DC. © World Bank, 2010. https://openknowledge.worldbank.org/handle/10986/27584 License: CC BY 3.0 IGO< accessed 29 May 2021.

3. Biodiversity Conservation: International and National Regulatory Frameworks

3.1. International and Regional Regulatory framework on Biodiversity Conservation

This section highlights some of the main instruments under the international regulatory framework on conservation of biodiversity.

a. Convention on Biological Diversity

The Convention on Biological Diversity (CBD) is the first global agreement to cover all aspects of biological diversity: the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding,[14] and the same was signed at the Earth Summit in Rio de Janeiro, Brazil, in 1992 and entered into force on 29 December 1993.[15]

The main principle that guides the application of CBD is that 'States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.[16]

The CBD calls for cooperation among Contracting States in conservation and sustainable use of biological diversity.[17] As for individual States, the CBD requires them to develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes which should reflect, *inter alia*, the measures set out in this Convention relevant to the Contracting Party concerned; and integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.[18]

[14] Article 1, Convention on Biological Diversity.
[15] Biosafety Unit, 'Welcome to the CBD Secretariat' (8 April 2013) <https://www.cbd.int/secretariat/> accessed 29 May 2021.
[16] Article 3, Convention on Biological Diversity.
[17] Ibid, Article 5.
[18] Article 6, Convention on Biological Diversity.

As for sustainable use of components of biological diversity, CBD requires Contracting States to, as far as possible and as appropriate: integrate consideration of the conservation and sustainable use of biological resources into national decision-making; adopt measures relating to the use of biological resources to avoid or minimize adverse impacts on biological diversity; protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements; support local populations to develop and implement remedial action in degraded areas where biological diversity has been reduced; and encourage cooperation between its governmental authorities and its private sector in developing methods for sustainable use of biological resources.[19]

CBD also requires each Contracting Party to, as far as possible and as appropriate, adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity.[20]

In order to build capacity through research and training, CBD requires all the Contracting Parties, taking into account the special needs of developing countries, to: establish and maintain programmes for scientific and technical education and training in measures for the identification, conservation and sustainable use of biological diversity and its components and provide support for such education and training for the specific needs of developing countries; promote and encourage research which contributes to the conservation and sustainable use of biological diversity, particularly in developing countries, inter alia, in accordance with decisions of the Conference of the Parties taken in consequence of recommendations of the Subsidiary Body on Scientific, Technical and Technological Advice: and in keeping with the provisions of Articles 16, 13 and 20, promote and cooperate in the use of scientific advances in biological diversity research in developing methods for conservation and sustainable use of biological resources.[21] In addition to this, the Contracting Parties should: promote and encourage understanding of the importance of, and the measures required for, the conservation of biological diversity, as well as its propagation through media, and the inclusion of these topics in educational programmes; and cooperate, as appropriate, with other States and international organizations in developing

[19] Ibid, Article 10.
[20] Ibid, Article 11.
[21] Ibid, Article 12.

educational and public awareness programmes, with respect to conservation and sustainable use of biological diversity.[22]

In order to reduce or eliminate adverse impacts on biodiversity, CBD requires States to invest in impact assessment measures and/or procedures. [23]

Notably, Kenya is a signatory to the Convention on Biological Diversity, and thus obligated to consider as well as adopt the Aichi Targets in its national plans and programs on biological diversity conservation.[24]

b. International Convention on Protection of New Plant Varieties

The International Convention on Protection of New Plant Varieties[25] established the International Union for the Protection of New Varieties of Plants (UPOV) as an intergovernmental organization with headquarters in Geneva (Switzerland), to provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society.[26] The UPOV Convention encourages and rewards the ingenuity and creativeness of breeders developing new varieties of plants.[27] The UPOV system establishes basic legal principles of protection by providing the breeders exclusive rights to their plant invention for a specific period of time, while making available the genetic material to others to use in their breeding programs.[28]

[22] Article 13, Convention on Biological Diversity.
[23] Article 14, Convention on Biological Diversity.
[24] Biosafety Unit, 'Main Details' <https://www.cbd.int/countries/profile/?country=ke> accessed 3 June 2021; 'Convention on Biological Diversity | Treaties Database' <http://kenyalaw.org/treaties/treaties/87/Convention-on-Biological-Diversity> accessed 3 June 2021; 'Ministry of Environment and Forestry » Blog Archive » Statement By Kenya On Strategic Plan For Biodiversity 2011-2020' <http://www.environment.go.ke/?p=3091> accessed 3 June 2021.
[25] International Union for the Protection of New Varieties of Plants, *International Convention for the Protection of New Varieties of Plants of December 2, 1961*, as Revised at Geneva on November 10, 1972, on October 23, 1978, and on March 19, 1991, UPOV Publication no: 221(E).
[26] 'International Union for the Protection of New Varieties of Plants (UPOV)' <https://www.upov.int/portal/index.html.en> accessed 5 June 2021.
[27] 'International Convention for the Protection of New Varieties of Plants (UPOV)' <https://www.uspto.gov/ip-policy/patent-policy/international-convention-protection-new-varieties-plants-upov> accessed 5 June 2021.
[28] Ibid.

c. Convention on International Trade in Endangered Species of Wild Fauna and Flora

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)[29] was adopted in March 1973 to regulate worldwide commercial trade in wild animal and plant species in order to ensure that international trade does not threaten the survival of any species.[30] CITES is a legally binding Convention on state parties to the convention, which are obliged to adopt their own domestic legislation to implement its goals.[31] CITES assigns each protected species to one of three lists namely; Appendix I lists endangered species that are at risk of extinction and these species require both import and export permits approved by the "management authority and scientific authority" of the nations involved; Appendix II species are those that are not threatened with extinction but that might suffer a serious decline in number if trade is not restricted and their trade is thus regulated by permit; and Appendix III species are protected in at least one country that is a CITES member and that has petitioned others for help in controlling international trade in that species.[32]

The implementation of CITES requires international co-operation due to the international nature of trade in the affected plants and animals.[33]

d. World Trade Organization Trade-Related Aspects of Intellectual Property Rights (WTO-TRIPs) Agreement

The WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)[34] is considered to be the most comprehensive multilateral agreement on intellectual property (IP) which also plays a central role in facilitating trade in knowledge and creativity, in resolving trade disputes over IP, and in assuring WTO members the latitude to achieve their domestic policy

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[29] United Nations, *Convention* on *International Trade* in *Endangered Species* of *Wild Fauna* and *Flora*, March 3rd, 1973, 993 U.N.T.S. 243.
[30] 'Convention on International Trade in Endangered Species | Description, Members, & Provisions' (*Encyclopedia Britannica*) <https://www.britannica.com/topic/Convention-on-International-Trade-in-Endangered-Species> accessed 6 June 2021.
[31] Ibid.
[32] Kathryn A Saterson, 'Government Legislation and Regulations in the United States' in Simon A Levin (ed), *Encyclopedia of Biodiversity (Second Edition)* (Academic Press 2013) <https://www.sciencedirect.com/science/article/pii/B9780123847195001866> accessed 6 June 2021; 'Convention on International Trade in Endangered Species | Description, Members, & Provisions' (*Encyclopedia Britannica*) <https://www.britannica.com/topic/Convention-on-International-Trade-in-Endangered-Species> accessed 6 June 2021.
[33] 'What Is CITES? | CITES' <https://cites.org/eng/disc/what.php> accessed 6 June 2021.
[34] World Trade Organization, General Agreement on Trade-Related Aspects of Intellectual Property, 1869 U.N.T.S. 299.

objectives.[35] TRIPS Agreement provides the minimum standards of protection that WTO members must grant to copyrights, trademarks, geographical indications, industrial designs, and patents held by nationals of fellow WTO members, as well as exceptions to these minimum standards.[36]

e. International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)

The International Treaty on Plant Genetic Resources for Food and Agriculture[37] was adopted in 2001 with the objectives of conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security.[38] The sustainable use of plant genetic resources for food and agriculture may include such measures as, *inter alia*: strengthening research which enhances and conserves biological diversity by maximizing intra- and inter-specific variation for the benefit of farmers, especially those who generate and use their own varieties and apply ecological principles in maintaining soil fertility and in combating diseases, weeds and pests; and supporting, as appropriate, the wider use of diversity of varieties and species in on-farm management, conservation and sustainable use of crops and creating strong links to plant breeding and agricultural development in order to reduce crop vulnerability and genetic erosion, and promote increased world food production compatible with sustainable development.[39]

f. COP 10 Decision X/2, Strategic Plan for Biodiversity 2011-2020

The *COP 10 Decision X/2, Strategic Plan for Biodiversity 2011-2020*[40], with its *Aichi Targets*[41], were adopted by the United Nations where Parties and other Governments, with the support of intergovernmental and other organizations, as appropriate, were urged to implement the Strategic

[35] '>WTO | Intellectual Property (TRIPS) - Gateway' <https://www.wto.org/english/tratop_e/trips_e/trips_e.htm> accessed 6 June 2021.
[36] 'International: WTO Considers Waiving Certain Intellectual Property Protections for the Prevention, Containment, and Treatment of COVID-19 | Global Legal Monitor' (24 March 2021) <//www.loc.gov/law/foreign-news/article/international-wto-considers-waiving-certain-intellectual-property-protections-for-the-prevention-containment-and-treatment-of-covid-19/> accessed 6 June 2021.
[37] United Nations, International Treaty on Plant Genetic Resources for Food and Agriculture, Food and Agriculture Organization of the United Nations 13 December 2006, 2400 (p.303).
[38] Ibid, Article 1.1.
[39] Ibid, Article 6.2 (b)(f).
[40] 'The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets' <https://www.cbd.int/kb/record/decision/12268> accessed 3 June 2021.
[41] Biosafety Unit, 'Aichi Biodiversity Targets' (18 September 2020) <https://www.cbd.int/sp/targets/> accessed 3 June 2021.

Plan for Biodiversity 2011-2020 whose main mission is to: "take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet's variety of life, and contributing to human well-being, and poverty eradication. To ensure this, pressures on biodiversity are reduced, ecosystems are restored, biological resources are sustainably used and benefits arising out of utilization of genetic resources are shared in a fair and equitable manner; adequate financial resources are provided, capacities are enhanced, biodiversity issues and values mainstreamed, appropriate policies are effectively implemented, and decision-making is based on sound science and the precautionary approach."[42]

The Plan was meant to provide an overarching framework on biodiversity, not only for the biodiversity-related conventions, but for the entire United Nations system and all other partners engaged in biodiversity management and policy development.[43]

g. COP 8 Decision VIII/28, Impact Assessment: Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment

VIII/28. Impact assessment: Voluntary guidelines on biodiversity-inclusive impact assessment is one chapter as part of the Report of The Eighth Meeting of The Parties to The Convention on Biological Diversity, held in Curitiba, Brazil, 20-31 March 2006.[44] The Guidelines provide detailed guidance on whether, when, and how to consider biodiversity in both project- and strategic-level impact assessments and are also an elaboration and refinement of guidelines previously adopted by the CBD (Decision VI/7-A), the Ramsar Convention on Wetlands (Resolution VIII.9) and the Convention on Migratory Species (Resolution 7.2).[45]

[42] Ibid.
[43] Biosafety Unit, 'Strategic Plan for Biodiversity 2011-2020, Including Aichi Biodiversity Targets' (21 January 2020) <https://www.cbd.int/sp/> accessed 3 June 2021.
[44] 'VIII/28. Impact Assessment: Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment Chapter from the Report of the 8th Meeting of The Parties to The Convention on Biological Diversity 2006 - Convention on Biological Diversity Cartagena Documents | Tonga Environment Data Portal' <https://tonga-data.sprep.org/dataset/convention-biological-diversity-cartagena-documents/resource/7712d75d-1173-4707-84ab> accessed 6 June 2021.
[45] 'Biodiversity in Impact Assessment, Background Document to CBD Decision VIII/28: Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment | NBSAP Forum' <http://www.nbsapforum.net/knowledge-base/resource/biodiversity-impact-assessment-background-document-cbd-decision-viii28-0> accessed 6 June 2021.

Notably, Article 14 of the Convention on Biological Diversity (CBD) identifies impact assessment as a key instrument for achieving the conservation, sustainable use and equitable sharing objectives of the Convention.

The Voluntary Guidelines call for the Conduct of Cultural, Environmental and Social Impact Assessments regarding Developments Proposed to Take Place on, or which are Likely to Impact on, Sacred Sites and on Lands and Waters Traditionally Occupied or used by Indigenous and Local Communities.[46]

Parties, other Governments and relevant organizations are to apply the voluntary guidelines on biodiversity-inclusive environmental impact assessment as appropriate in the context of their implementation of paragraph 1 (a) of Article 14 of the Convention and of target 5.1 of the provisional framework of goals and targets for assessing progress towards 2010 and to share their experience, inter alia, through the clearing-house mechanism and national reporting.[47]

h. United Nations Framework Convention on Climate Change, 1994

The United Nations Framework Convention on Climate Change, 1994[48] ultimate objective together with any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.[49]

[46] Para. 1, COP 8 Decision VIII/28, Impact Assessment: Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment.
[47] Ibid, para. 5.
[48] United Nations Framework Convention on Climate Change, 1994, A/RES/48/189.
[49] Ibid, Article 2.

3.2. Kenya's Regulatory Framework on Biodiversity Conservation

This section highlights Kenya's regulatory framework on the conservation of biodiversity and environment in general.

a. Constitution of Kenya 2010

The Constitution of Kenya 2010[50] took bolder steps than its predecessor to not only incorporate environmental conservation and sustainable development issues as a stand-alone chapter but also notably puts emphasis on a rights-based approaches to conservation which require such conservation measures to also focus on the livelihoods and rights aspects of projects, programmes, and activities.[51] It has been argued that adopting rights-based approaches to conservation serves to ensure that the protection of rights and biodiversity conservation are mutually reinforcing.[52] These rights are both procedural and substantive.[53]

The Constitution outlines favourable legislative protection of biodiversity as envisaged in Chapter Five on Land and the Environment, where there is the emphasis on sustainable use of land and other natural resources, including biodiversity as a key principle.[54]

Article 69 of the Constitution is relevant in the quest for biodiversity conservation especially in relation to the obligations of the State in respect of the environment and natural resources management.[55] The provisions of Article 69 are notably comprehensive, addressing a number of cross-sectoral biodiversity concerns outlined by the CBD including issues of benefit sharing, traditional knowledge, elimination of activities harmful to biodiversity and the role of the community in conservation and sustainable use of biodiversity.[56]

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[50] The Constitution of Kenya [Government Printer, Nairobi, 27 August 2010.
[51] See Preamble; Article 10; and Chapter Five of the Constitution of Kenya 2010.
[52] 'Rights-Based Approaches to Conservation' (*IUCN*, 14 December 2015) <https://www.iucn.org/theme/governance-and-rights/about/our-work/governance-and-rights-based-approaches/rights-based-approaches-conservation> accessed 4 June 2021.
[53] Joshua Gellers and Chris Jeffords, 'Procedural Environmental Rights and Environmental Justice: Assessing the Impact of Environmental Constitutionalism' [2015] SSRN Electronic Journal; Dinah Shelton, 'Developing Substantive Environmental Rights' (2010) 1 Journal of Human Rights and the Environment 89; UN Environment, 'What Are Environmental Rights?' (*UNEP - UN Environment Programme*, 2 March 2018) <http://www.unep.org/explore-topics/environmental-rights-and-governance/what-we-do/advancing-environmental-rights/what> accessed 7 June 2021.
[54] The Constitution of Kenya 2010, Article 60, 69.
[55] The Constitution of Kenya 2010, Article 69(1).
[56] Ibid.

The Constitution also altered the legal landscape in Kenya by introducing a devolved system of governance in Kenya, with authority, roles and responsibilities split between the national government and the 47 county governments.[57] Regarding the environment and biodiversity conservation, the National Government is charged with: use of international waters and water resources; protection of the environment and natural resources with a view to establishing a durable and sustainable system of development, including, in particular-(a) fishing, hunting and gathering; (b) protection of animals and wildlife; (c) water protection, securing sufficient residual water, hydraulic engineering and the safety of dams; and (d) energy policy; agricultural policy; and capacity building and technical assistance to the counties.[58]

As for the county governments, they are charged with: Agriculture, including—(a) crop and animal husbandry; (b) livestock sale yards; (c) county abattoirs; (d) plant and animal disease control; and (e) fisheries; control of air pollution, noise pollution, other public nuisances and outdoor advertising; implementation of specific national government policies on natural resources and environmental conservation, including-- (a) soil and water conservation; and (b) forestry; and ensuring and coordinating the participation of communities and locations in governance at the local level and assisting communities and locations to develop the administrative capacity for the effective exercise of the functions and powers and participation in governance at the local level.[59] However, Counties may perform other functions assigned through an Act of Parliament. Notably, some of the functions related to environmental conservation fall within the shared jurisdiction of both national and county levels of government and should, therefore, be performed in a cooperative way.[60]

b. Kenya's Vision 2030

The Vision 2030[61] was launched in 2008 as a long-term development blue print for the country, with the goal of transforming Kenya into "a newly-industrialised, middle-income country

[57] Fourth Schedule to the Constitution of Kenya 2010 on Distribution of functions between National and the county governments.
[58] Fourth Schedule, Part 1, Constitution of Kenya, 2010.
[59] Fourth Schedule, Part 2, Constitution of Kenya, 2010 on distribution of functions between National and the county governments; see also Section 5 of the County Governments Act (2012) which outlines the functions of County Governments.
[60] Article 186, 189, Constitution of Kenya.
[61] Sessional Paper 10 of 2012 on Kenya Vision 2030, Government of Kenya.

providing a high quality of life to all its citizens in a clean and secure environment".[62] The development blueprint acknowledges the environment and all its aspect as an important part of achieving sustainable development and calls for conservation and sustainable use of these resources. The Vision 2030 acknowledges that invasive alien species and lack of a biodiversity inventory and inadequate procedures for access and benefit-sharing for biodiversity resources remain key challenges for the country.[63]

c. Environment (Management and Coordination) Act 1999

The Environmental Management and Co-ordination Act, 1999[64] provides that no person should, without 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 or wetland; excavate, drill, tunnel or disturb the river, lake or wetland; introduce any animal whether alien or indigenous in a lake, river or wetland; introduce or plant any part of a plant specimen, whether alien or indigenous, dead or alive, in any river, lake 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 or wetland; direct or block any river, lake or wetland from its natural and normal course; drain any lake, river or wetland, any other matter prescribed by the Cabinet Secretary on the advice of the Authority.[65]

Overall, EMCA provides for the establishment of an appropriate legal and institutional framework for the management of the environment and for the matters connected therewith and incidental thereto.[66] The Environmental Management and Co-ordination (Amendment) Act 2015[67] was enacted to amend EMCA 1999 and notably introduced further measures on impact assessment and a schedule to outline the development activities that must require impact assessment before they are carried out and to generally align the Act with the current Constitution.[68] The objects of the

[62] Sessional Paper 10 of 2012 on Kenya Vision 2030, Government of Kenya, Office of the Prime Minister Ministry of State for Planning, National Development and Vision 2030.
[63] Chapter 4.6, Vision 2030.
[64] Environmental Management and Co-ordination Act, No. 8 of 1999, Laws of Kenya.
[65] Ibid, sec. 42(1); see also Environmental Management and Co-ordination (Amendment) Act, 2015, sec. 28.
[66] Ibid, Preamble.
[67] Environmental Management and Co-ordination (Amendment) Act, No. 5 of 2015, Laws of Kenya.
[68] Ibid, Second Schedule; Sec. 57A.

devolution of government are—to promote democratic and accountable exercise of power; to foster national unity by recognising diversity; to give powers of self-governance to the people and enhance the participation of the people in the exercise of the powers of the State and in making decisions affecting them; to recognise the right of communities to manage their own affairs and to further their development; to protect and promote the interests and rights of minorities and marginalised communities; to promote social and economic development and the provision of proximate, easily accessible services throughout Kenya; to ensure equitable sharing of national and local resources throughout Kenya; to facilitate the decentralisation of State organs, their functions and services, from the capital of Kenya; and to enhance checks and balances and the separation of powers.[69]

d. Wildlife Conservation and Management Act 2013

The Wildlife Conservation and Management Act 2013[70] was enacted to provide for the protection, conservation, sustainable use and management of wildlife in Kenya and for connected purposes.[71] The implementation of this Act is to be guided by the following principles: wildlife conservation and management should be devolved, wherever possible and appropriate to those owners and managers of land where wildlife occurs; conservation and management of wildlife should entail effective public participation; wherever possible, the conservation and management of wildlife shall be encouraged using an ecosystem approach; wildlife conservation and management should be encouraged and recognized as a form of land use on public, community and private land; benefits of wildlife conservation should be derived by the land user in order to offset costs and to ensure the value and management of wildlife do not decline; wildlife conservation and management should be exercised in accordance with the principles of sustainable utilization to meet the benefits of present and future generations; benefits accruing from wildlife conservation and management should be enjoyed and equitably shared by the people of Kenya.[72]

The Act prohibits "bio-piracy", that is, the exploration of biological resources without the knowledge and non-coercive prior consent of the owners of the resources and without fair

[69] Article 174, Constitution of Kenya 2010.
[70] Wildlife Conservation and Management Act, No. 47 of 2013, Laws of Kenya.
[71] Ibid, Preamble.
[72] Ibid, sec. 4.

compensation and benefit sharing as well as illegal "bio-prospecting" which means the exploration of biodiversity for commercially valuable genetic and biochemical resources.[73]

The related *Wildlife Conservation and Management (Implementation of Treaties) Regulations*[74] were made by the Cabinet Secretary for Environment and Natural Resources under section 109 of the Wildlife Conservation and Management Act, 2013, and require the Kenya Wildlife Service, as the lead agency, in consultation with stakeholders: meet the requirements of the treaties and the implementation of resolutions and decisions; accomplish the requirements of the treaties and the enforcing resolutions; execute the specific decisions directed to Kenya; budget for and make arrangements for the payment of respective annual convention fees; engage in the negotiation of resolutions and decisions that are beneficial and of interest to Kenya; lobby necessary amendments on treaties, decisions and resolutions in the interest of safeguarding Kenya's wildlife; comply with and monitor compliance with international treaties; implement international treaties; monitor and prevent trade that is inconsistent with international treaties in accordance with the Act and the Regulations made under it; confiscate species traded in contravention with any international treaty that Kenya is party to; and take any other necessary measures for the implementation of and enhancing compliance with international treaties.[75] Each county is also to ensure that its legislation conforms with wildlife international treaties to which Kenya is a party.[76]

Similarly, the *Wildlife Conservation and Management (Protection of Endangered and Threatened Ecosystems, Habitats and Species) Regulations, 2017*[77] were made by the Cabinet Secretary for Environment and Natural Resources under section 116 (2) (f) of the Wildlife Conservation and Management Act, 2013, to: implement the classification of ecosystems, habitats and species into the following categories- critically endangered; endangered; vulnerable; protected; and threatened; provide for protection of ecosystems that are threatened or endangered so as to maintain their ecological integrity; provide for the protection of species that are threatened, endangered, vulnerable, or protected to ensure their survival in the wild; implement Kenya's obligations under international agreements regulating international trade in endangered species; and ensure

[73] Ibid, sec. 22.
[74] Wildlife Conservation and Management (Implementation of Treaties) Regulations, 2017 (L.N. No. 241 of 2017).
[75] Ibid, Regulation 3.
[76] Ibid, Regulation 4.
[77] Wildlife Conservation and Management (Protection of Endangered and Threatened Ecosystems, Habitats and Species) Regulations, 2017 (L.N. No. 242 of 2017).

sustainable management and utilisation of biodiversity.[78] The Service is required to: identify the agencies that the Service shall permit to deal with fragile ecosystems; identify the officers and offices that shall regulate access to fragile ecosystems; create corridors and buffer zones and take such measures, as the it considers necessary for the protection of fragile ecosystems; regulate the removal or introduction of any species or genetic material into the ecosystem; and take measures to maintain the natural balance in the ecosystem.[79]

The *Wildlife Conservation and Management (Joint Management of Protected Water Towers) Regulations, 2017*[80] were made by the Cabinet Secretary for Environment and Natural Resources under section 116 of the Wildlife Conservation and Management Act, 2013, makes provision with respect to conservation of protected water towers. The objective of these Regulations is to—ensure conservation of protected water towers; and enhance cooperation between the Service and the lead agencies in management of protected water towers.[81]

e. The Forest Policy, 2020

The overall goal of this Policy[82] is sustainable development, management, utilization and conservation of forest resources and equitable sharing of accrued benefits including the flow of ecosystem services for present and future generations of the people of Kenya. In order to achieve this overall goal, ten per cent of the land area in Kenya should comprise forest cover.[83]

This policy aims at enhancing management of forest resources for conservation of soil, water biodiversity and environmental stability. Additionally, indigenous knowledge and intellectual property rights embodied in forest biodiversity and genetic resources will be harnessed and protected.[84]

[78] Ibid, Regulation 4.
[79] Ibid, Regulation 5.
[80] Wildlife Conservation and Management (Joint Management of Protected Water Towers) Regulations, 2017 (L.N. No. 243 of 2017).
[81] Ibid, Regulation 3.
[82] Republic of Kenya, *Draft National Forest Policy, 2020* (Government Printer, Nairobi, 2020).
[83] Ibid, Para. 3.1.
[84] Ibid, para. 3.2.

f. The Forest Conservation and Management Act, No. 34 of 2016

The *Forest Conservation and Management Act 2016*[85] was enacted to give effect to Article 69 of the Constitution with regard to forest resources and to provide for the development and sustainable management, including conservation and rational utilization of all forest resources for the socio-economic development of forest adjacent communities.[86] The Forest Act 2016 acknowledges community participation in forest governance through establishment of community forest associations with the twin objective of sustainable conservation of forest resources and rural livelihoods.[87]

The *Forest Conservation and Management Act 2016* was enacted to give effect to Article 69 of the Constitution with regard to forest resources; to provide for the development and sustainable management, including conservation and rational utilization of all forest resources for the socio-economic development of the country.[88]

g. Water Act 2016

Water is the basic ingredient for agriculture and survival of all biodiversity. The Constitution acknowledges access to clean and safe water as a basic human right.[89] The Water Act 2016[90] provides for the regulation, management and development of water resources in line with the Constitution. The Act also gives priority to use of abstracted water for domestic purposes over irrigation. The Act provides for establishment of Water Resource User Associations (WRUAs), which are community-based associations for collective management of water resources and resolution of conflicts concerning the use of water resources.[91]

The Act requires the Cabinet Secretary responsible for water, following public participation, to formulate every five years, a National Water Resource Strategy which should contain, among other things, details of- existing water resources and their defined riparian areas; measures for the protection, conservation, control and management of water resources and approved land use for the riparian area; minimum water reserve levels at national and county levels; institutional capacity

[85] *Forest Conservation and Management Act*, No. 34 of 2016, Laws of Kenya.
[86] Preamble, No. 34 of 2016, Laws of Kenya.
[87] Ibid, see Parts IV and V (Sections 30-52).
[88] Preamble, No. 34 of 2016, Laws of Kenya.
[89] Article 43, Constitution of Kenya 2010.
[90] Water Act, No. 43 of 2016, Laws of Kenya.
[91] Ibid, sec. 29.

for water research and technological development; functional responsibility for national and county governments in relation to water resources management and any other matters the Cabinet Secretary considers necessary.[92]

h. Seeds and Plant Varieties Act, Cap 326

This is an Act of Parliament to confer power to regulate transactions in seeds, including provision for the testing and certification of seeds, for the establishment of an index of names of plant varieties, to empower the imposition of restriction on the introduction of new varieties, to control the importation of seeds, to authorize measures to prevent injurious cross-pollination, to provide for the grant of proprietary rights to persons breeding or discovering and developing new varieties, to establish a national centre for plant genetic resources and to establish a Tribunal to hear appeals and other proceedings and for connected purposes.[93]

This Act establishes a National Plant Genetic Resources Centre which shall be responsible for the conservation and sustainable utilization of plant biodiversity in Kenya.

i. Biosafety Act, 2009

Biosafety Act, 2009[94] is an Act of Parliament to regulate activities in genetically modified organisms, to establish the National Biosafety Authority, and for connected purposes.

The objectives of this Act include to facilitate responsible research into and minimize the risks that may be posed by genetically modified organisms; to ensure an adequate level of protection for the safe transfer, handling and use of genetically modified organisms that may have an adverse effect on the health of the people and the environment and to establish a transparent, science-based and predictable process for reviewing and making decisions on the transfer, handling and use of genetically modified organisms and related activities.[95]

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[92] S. 10, Water Act, No. 43 of 2016.
[93] Preamble, Seeds and Plant Varieties Act, Cap 326, Laws of Kenya.
[94] Biosafety Act (No. 2 of 2009), Laws of Kenya.
[95] See also United Nations, *Cartagena Protocol on Biosafety to the Convention on Biological Diversity*, Montreal, 29 January 2000, United Nations, *Treaty Series*, vol. 2226, p. 208. Article 1 thereof outlines the objective of the Protocol as follows:

> *In accordance with the precautionary approach contained in Principle 15 of the Rio Declaration on Environment and Development, the objective of this Protocol is to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological*

j. Climate Change Act No. 11 of 2016

The Climate Change Act[96] is to be applied for the development, management, implementation and regulation of mechanisms to enhance climate change resilience and low carbon development for the sustainable development of Kenya.[97]

The Act is also to be applied in all sectors of the economy by the national and county governments to mainstream climate change responses into development planning, decision making and implementation; build resilience and enhance adaptive capacity to the impacts of climate change; formulate programmes and plans to enhance the resilience and adaptive capacity of human and ecological systems to the impacts of climate change; mainstream and reinforce climate change disaster risk reduction into strategies and actions of public and private entities; mainstream intergenerational and gender equity in all aspects of climate change responses and provide incentives and obligations for private sector contribution in achieving low carbon climate resilient development.[98]

k. Environmental Sustainability Guidelines for Ministries, Departments and Agencies (MDAs)

The Environmental Sustainability Guidelines for Ministries, Departments and Agencies (MDAs)[99] require MDAs in undertaking their mandates, integrate environmental considerations in their operations to fulfil the requirement of a clean, healthy and sustainable environment for all as per article 42 of the Constitution and EMCA through adoption and maintenance of good practices that contribute to the quality of environment on a long-term basis.[100]

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diversity, taking also into account risks to human health, and specifically focusing on transboundary movements.

[96] Climate Change Act No. 11 of 2016, laws of Kenya.
[97] Ibid, preamble.
[98] Ibid, sec. 3.
[99] 'National Environment Management Authority (NEMA) - Environmental Sustainability Guidelines for MDAs' <https://www.nema.go.ke/index.php?option=com_content&view=article&id=110&Itemid=124> accessed 3 June 2021.
[100] Ibid.

l. Environmental Management and Co-Ordination (Conservation of Biological Diversity and Resources, And Access to Genetic Resources and Benefits Sharing) Regulations, 2006

The *Environmental Management and Co-Ordination (Conservation of Biological Diversity and Resources, And Access to Genetic Resources and Benefits Sharing) Regulations, 2006*[101] are to apply to access to genetic resources or parts of genetic resources, whether naturally occurring or naturalised, including genetic resources bred for or intended for commercial purposes within Kenya or for export, whether in in-situ conditions or ex-situ conditions.[102] The Regulations shall, however, not apply to- 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.[103]

The Regulations require Environmental Impact Assessment for activities that may: have an adverse impact on any ecosystem; lead to the introduction of any exotic species; or lead to unsustainable use of natural resources.[104] The Regulations also require the National Environment Management Authority (NEMA), in consultation with the relevant lead agencies, to impose bans, restrictions or similar measures on the access and use of any threatened species in order to ensure its regeneration and maximum sustainable yield as a way to conserve threatened species.[105] NEMA is also tasked with, in consultation with the relevant lead agencies, to identity and prepare an inventory of biological diversity of Kenya, which should include threatened, endangered, or rare species.[106]

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[101] Environmental Management and Co-Ordination (Conservation of Biological Diversity and Resources, and Access to Genetic Resources and Benefits Sharing) Regulations, Legal Notice No. 160 of 2006, Laws of Kenya.
[102] 'National Environment Management Authority (NEMA) - Biodiversity Regulations' <https://www.nema.go.ke/index.php?option=com_content&view=article&id=30&Itemid=170> accessed 3 June 202.
[103] Environmental Management and Co-Ordination (Conservation of Biological Diversity and Resources, and Access to Genetic Resources and Benefits Sharing) Regulations, 2006, sec. 3.
[104] Ibid, Regulation 4(1).
[105] Ibid, Regulation 5.
[106] Ibid, Regulation 6.

m. Environmental Management and Co-Ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009

These Regulations were made under the Environmental Management and Co-ordination Act, 1999, to make provision for the management, conservation and sustainable use of wetlands and wetland resources and the sustainable utilization and conservation of (resources on) river banks, lake shores, and the seashore.[107]

The Environmental Management and Co-Ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009[108] seek to achieve the following in relation to management of wetlands and wetland resources: to provide for the conservation and sustainable use of wetlands and their resources in Kenya; to promote the integration of sustainable use of resources in wetlands into the local and national management of natural resources for socio-economic development; to ensure the conservation of water catchments and the control of floods; to ensure the sustainable use of wetlands for ecological and aesthetic purposes for the common good o all citizens; to ensure the protection of wetlands as habitats for species of fauna and flora; provide a framework for public participation in the management of wetlands; to enhance education research and related activities; and to prevent and control pollution and siltation.[109]

As far as management of river banks, lake shores and sea shore are concerned, the Regulations are meant: to facilitate the sustainable utilization and conservation of resources on river banks, lake shores, and on the seashore by and for the benefit of the people and community living in the area; promote the integration of sustainable use of resources in riverbanks lake shores and the seashore into the local and national management of natural resources for socio economic development; enhance education, research and research related activities; and prevent siltation of rivers and lakes and control pollution or and other activities likely to degrade the environment.[110]

[107] Preamble, Environmental Management and Co-Ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, Legal Notice No. 19 of 2009, Laws of Kenya.
[108] Environmental Management and Co-Ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, Legal Notice No. 19 of 2009, Laws of Kenya.
[109] Environmental Management and Co-Ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009, Regulation 4.
[110] Ibid, Regulation, 16.

Every owner, occupier or user of land which is adjacent or contiguous to a wetland shall, with advice from the Authority, have a duty to prevent the degradation or destruction of the wetland, and should maintain the ecological and other functions of the wetland.[111]

A developer intending to a undertake a project which may have a significant impact on a wetland, river bank, lake shore or the sea shore is required to carry out an environmental impact assessment in accordance with the provisions of the Act.[112]

n. The Integrated Coastal Zone Management Policy 2007

The Integrated Coastal Zone Management Policy 2007[113] paper provides for the development of a coastal zone policy in Kenya and it is intended to guide actions and policies related to the use and management of Kenya's coastal zone resources, including their protection and restoration.[114] The Paper highlighted the fact that major threats facing coastal forests include encroachment for settlement and farming, illegal logging, human wildlife conflict, deforestation and loss of biodiversity mainly attributed to a reduction of forest cover.[115] Thus, the Integrated Coastal Zone Management (ICZM) aims at ensuring that the current and future generations of coastal stakeholders realise their basic needs and improve their quality of life whilst maintaining diverse, healthy and productive coastal ecosystems.[116]

o. Draft National Strategy for Achieving and Maintaining Over 10% Tree Cover By 2022

The Draft National Strategy for Achieving and Maintaining Over 10% Tree Cover By 2022[117] is aligned to the National Forest Program, as a cross-sectoral framework that provides for: broad institutional and multi-stakeholder participation in accelerating the achievement of the Constitutional target of 10% tree cover of the national land area as provided under Article 69 (1) (b) of the Constitution of Kenya 2010; implementation of Presidential Directives that the

[111] Ibid, Regulation 14(1).
[112] Ibid, Regulation 21(1).
[113] Republic of Kenya, *Integrated Coastal Zone Management Action Plan For Kenya* (2007) < https://www.nema.go.ke/images/Docs/Legislation%20and%20Policies/ICZM%20Draft%20Policy%20.pdf. Accessed 29 May 2021.
[114] Ibid, para. 1.1.
[115] Ibid, para. 4.2.
[116] Ibid, para. 12.1.
[117] Republic of Kenya, *Draft National Strategy for Achieving and Maintaining Over 10% Tree Cover By 2022*, May 2019< http://www.environment.go.ke/wp-content/uploads/2019/08/revised-Draft-Strategy-for-10-Tree-Cover-23-5-19-FINAL.pdf> accessed 31 May 2021.

Constitutional target of 10% national tree cover should be achieved by 2022 through among other initiatives the revival of Chief's tree nurseries with technical support of Kenya Forest Service and allocation of 10% Corporate Social Responsibility (CSR) to tree growing; opportunity to achieve national and global commitments with respect to climate change, biodiversity conservation, and land degradation. The government has committed to restore 5.1 million Ha of degraded landscapes as a contribution to the Africa Forest Landscape Initiative (AFR100), 50% reduction of greenhouse gases from the forest sector by 2030 as part of its Nationally Determined Contribution (NDC) to climate change, and to achieve land degradation neutrality by 2030 as a commitment to United Nations Convention to Combat Desertification (UNCCD); shared responsibility towards addressing public concerns with regard to continued deforestation, forest degradation and the need for enhanced protection, conservation and sustainable management of forest resources; enhancing the contribution of the forestry sector towards implementation of the Big 4 Agenda. The environment and forest sector is the foundation upon which the performance of the key primary sectors of the economy is anchored including, manufacturing, energy, health and agriculture.[118] It was estimated that by 2010 the national forest cover stood at 4.18 million Ha, representing 6.99% of the total land area while the gazzetted public forests managed by Kenya Forest Service covered 2.59 million Ha.[119] In 2015, the forest cover was estimated at 7.2% based on the national projection from the 2010 forest cover data.[120] This is below the recommended minimum global standard of 10% thus necessitating Kenya's goal of increasing and maintaining the national tree cover to at least 10% by 2022.[121] Most of the forestland in Kenya has been attributed to change of and use over the years thus shrinking the country's forest cover to below the international accepted standards.[122] This is despite the fact that forests are considered important for the provision of vital ecosystem services to communities living around them,

[118] Ibid, para. 1.1.
[119] Ibid.
[120] Ibid.
[121] https://www.the-star.co.ke/authors/gilbertkoech, 'Why State Wants You to Plant Trees on 10% of Your Land' (*The Star*) <https://www.the-star.co.ke/news/2021-03-14-why-state-wants-you-to-plant-trees-on-10-of-your-land/> accessed 3 June 2021; Anyango Otieno and Jeckoniah Otieno, 'Sh48b Needed to Raise Forest Cover to 10 per Cent' (*The Standard*) <https://www.standardmedia.co.ke/kenya/article/2001394403/sh48b-needed-to-raise-forest-cover-to-10-per-cent> accessed 3 June 2021.
[122] Donald Kipruto Kimutai and Teiji Watanabe, 'Forest-Cover Change and Participatory Forest Management of the Lembus Forest, Kenya' (2016) 3 Environments 20; Sylvester Ngome Chisika and Chunho Yeom, 'Enhancing Ecologically Sustainable Management of Deadwood in Kenya's Natural Forests' (2021) 2021 International Journal of Forestry Research e6647618; Jebiwott, A., Ogendi, G. M., Makindi, S. M., & Esilaba, M. O., 'Forest Cover Change and Ecosystem Services of Katimok Forest Reserve, Baringo County, Kenya'.

contributing immensely to their livelihoods.[123] Natural forests also provide many ecosystem services needed for biodiversity conservation and sustainable management.[124]

p. Kenya Plant Health Inspectorate Service Act, 2012

The Kenya Plant Health Inspectorate Service Act[125] is an Act of Parliament to establish the Kenya Plant Health Inspectorate Service as a regulatory body for the protection of plants, seeds and plant varieties and agricultural produce, to be responsible for administering several other written laws and for matters incidental thereto or connected therewith.

q. The National Spatial Plan (NSP) 2015-2045

The National Spatial Plan aims at creating a spatial planning context that:- enhances economic efficiency and strengthens Kenya's global competitiveness, promotes balanced regional development for national integration and cohesion, optimizes utilization of land and natural resources for sustainable development, creates livable and functional human settlements in both urban and rural areas, secures the natural environment for a high quality of life and establishes an integrated national transportation network and infrastructure system.

The National Spatial Plan 2015-2045 highlights the fact that Kenya's diverse ecosystems and habitats are home to numerous biodiversity which is a result of unique topography, climate, geology, and drainage systems.[126] Furthermore, the various communities with diverse cultural heritages and livelihoods offer Kenya diversity in socio-economic activities such as crop farming, pastoralism, tourism, mining, fishing, water transport, hydro and geothermal power generation and urban entrepreneurships. This has implications on spatial and economic planning.[127]

The international best practices call for the states to link conservation measures with local land use planning in order to achieve a comprehensive approach to habitat and biodiversity preservation.[128] Uncontrolled growth or development may lead to land fragmentation and consequently lead to

[123] Jebiwott, A., Ogendi, G. M., Makindi, S. M., & Esilaba, M. O., 'Forest Cover Change and Ecosystem Services of Katimok Forest Reserve, Baringo County, Kenya'.
[124] Sylvester Ngome Chisika and Chunho Yeom, 'Enhancing Ecologically Sustainable Management of Deadwood in Kenya's Natural Forests' (2021) 2021 International Journal of Forestry Research, 1.
[125] Kenya Plant Health Inspectorate Service Act, No. 54 of 2012, Laws of Kenya.
[126] Republic of Kenya, National Spatial Plan 2015-2045, p.41.
[127] Ibid, p.41.
[128] Theobald, David M., Thomas Spies, Jeff Kline, Bruce Maxwell, N. T. Hobbs, and Virginia H. Dale. "Ecological Support for Rural Land-Use Planning," *Ecological Applications*, Vol.15, no. 6 (2005), pp.1906-1914 at p. 1910.

habitat loss or diminished biodiversity.[129] This calls for connection of land use planning and biodiversity preservation or conservation. There is need for identification of areas that offer particularly high value for conserving biotic resources during planning activities by both county and national governments.[130]

r. Draft National Land Use Policy, 2016

The overall goal of the National Land use Policy 2016[131] is to provide legal, administrative, institutional and technological framework for optimal utilization and productivity of land and land related resources in a sustainable and desirable manner at National, County and local level.

The policy particularly offers a framework of recommendations and principles designed to ensure the maintenance of a land use system that will provide for land-use planning, resource allocation and resource management for sustainable development to promote public good and general welfare; environmental management and sustainable production initiatives in the utilization of land resources; coordination and integration of institutional linkages in planning at sectoral and cross-sectoral levels to foster collaboration and decision making among different land users; optimum utilization of land resources to meet governance, social-economic, political and cultural obligations of the people of Kenya; anchoring land development initiatives that will respond positively to the market demands; integrated framework for the preparation of a National Spatial Plan and review of various land use plans; mainstreaming of gender and special interest groups in land use planning and management; a comprehensive, efficient and affordable computer based land use information management system; an appropriate, accountable and democratic institution for land use conflicts resolution and mitigating problems associated with poor land use.[132]

4. Effective Conservation of Biological Diversity: Prospects and Challenges in Kenya

Biodiversity conservation in developing countries is affected by several challenges which include, *inter alia*, slow economic development, high levels of poverty, unequal land distribution, a highly segmented society, high population increase as well as commercial interests in natural resource

[129] Fetene, Aramde, Kumlachew Yeshitela, and Hayal Desta. "Approaches to Conservation and Sustainable Use of Biodiversity-A Review." *Nature and Science* 10, no. 12 (2012): 51-62 at p.52.
[130] See Theobald, David, and N. Thompson Hobbs, "A framework for evaluating land use planning alternatives: protecting biodiversity on private land," *Conservation Ecology*, Vol. 6, No. 1 (2002).
[131] Republic of Kenya, National Land use Policy 2016 (Government Printer, Nairobi, 2016).
[132] Ibid, Chapter Three.

extraction.[133] Kenya's National Environment Management Authority (NEMA) highlights *drivers of biodiversity loss* as including *both direct and indirect causes* where direct threat includes land use change, habitat destruction, and introduction of invasive alien species, among others, while indirect threats are economic system and policy of the country; unsustainable exploitation of resources and weak management system; gaps in spatial information, and lack of public awareness, to mention but a few (Emphasis added).[134]

This is also highlighted in the country's Sixth national report to the Convention on Biological Diversity[135] dated January 2021 which points out that 'while the Government of Kenya has been making efforts towards biodiversity conservation, land degradation and ecosystem destruction are still witnessed through increasing siltation of water bodies and rivers, waste management, air and water pollution in most of our urban centers mostly due to rapid population growth and urbanization.[136] Efforts to improve the management and conservation of environment and natural resources are affected by impacts of climate change, increasing population, as well as expansion of agriculture and settlements into fragile and water towers ecosystems.[137]

It is, therefore, arguable that unless these challenges are addressed, any efforts towards sustainable use of environmental resources for biodiversity conservation will remain a mirage.

5. Conserving Biodiversity for a Better Future

It has been argued that the key to sustainable development is achieving a balance between the exploitation of natural resources for economic development and conserving ecosystem services that are critical to everyone's wellbeing and livelihoods.[138] This section offers some recommendations on how the world and Kenya in particular can achieve sustainable development agenda through enhanced biodiversity conservation which is a prerequisite to not only healthy environment but also important for replenishing the ecosystem services which meet the basic

[133] Regina Birner and others, 'Prospects and Challenges for Biodiversity Conservation in Guatemala' [2005] Valuation and Conservation of Biodiversity: Interdisciplinary Perspectives on the Convention on Biological Diversity 285.
[134] NEMA, 'Threats to Biodiversity – Biodiversity Clearing House Mechanism' <http://meas.nema.go.ke/cbdchm/major-threats/> accessed 31 May 2021.
[135] Government of the Republic of Kenya, *Kenya Sixth national report to the Convention on Biological Diversity*, Ministry of Environment and Forestry, 2020 < www.environment.go.ke/wp-content/uploads/2021/01/FINAL-REPORT-MOEF-CBD-SIXTH-NATIONAL-REPORT-January-2021.docx> accessed 31 May 2021.
[136] Ibid, p. 15.
[137] Ibid, p. 15.
[138] McCartney, M., Finlayson, M., de Silva, S., Amerasinghe, P., & Smakhtin, V., 'Sustainable Development and Ecosystem Services'. *Sustainable development and ecosystem services* (No. 612-2016-40661).

human needs as captured in the United Nations 2030 Agenda for Sustainable Development Agenda.

5.1. Adoption of Sustainable Agricultural Production methods and Diversification of Livelihoods

The agricultural sector in Kenya comprises the following subsectors: industrial crops, food crops, horticulture, livestock, fisheries and forestry—and employs such factors of production as land, water and farmer institutions (cooperatives, associations).[139] It is estimated that Kenya has an area of about 587,000 km^2 out of which 11,000 km^2 is water. Of the remaining 576,000 km^2 landmass, only about 16 per cent is of high and medium agricultural potential with adequate and reliable rainfall. This potentially arable land is dominated by commercial agriculture with cropland occupying 31 per cent, grazing land 30 per cent, and forests 22 per cent. The rest of the land is used for game parks, urban centres, markets, homesteads and infrastructure.[140]

Arguably, the services provided by biodiversity cover a large spectrum of factors contributing to the generation of agricultural income: crop yield and quality, soil fertility, pest control and pollination.[141] It is also worth pointing out that agricultural environments and landscapes constitute a reservoir of diversity in terms of the number of species and the number of functions useful for agriculture (pollination, recycling of organic matter, amongst others).[142]

Notably, under Kenya's Vision 2030, agriculture is identified as a key sector to deliver the 10 per cent economic growth rate per annum envisaged under the economic pillar. As a result, the Development Blueprint leans heavily towards promotion of a commercially-oriented, and modern agricultural sector, which it plans to accomplish through institutional reforms in agriculture and livestock, increasing productivity of crops and livestock, introducing land use policies for better utilisation of high and medium potential lands, developing more irrigable areas in arid and semi-arid lands for both crops and livestock and improving market access for our smallholders through better supply chain management.[143]

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[139] Republic of Kenya, *Agricultural Sector Development Strategy 2010–2020*, p. 1.
[140] Republic of Kenya, Agricultural Sector Development Strategy, 2010-2020, p. 9. (Government Printer, Nairobi, 2010).
[141] Le Roux, X., Barbault, R., Baudry, J., Burel, F., Doussan, I., Garnier, E., Herzog, F., Lavorel, S., Lifran, R., Roger-Estrade, J. and Sarthou, J.P., 'Agriculture and Biodiversity: Benefiting from Synergies' [2008] Multidisciplinary Scientific Assessment. INRA, Paris.
[142] Ibid, 1.
[143] Sessional Paper 10 of 2012 on Kenya Vision 2030, para. 3.3.

While intensification of agricultural production has the potential to lead to an increase in the productivity of cultivated areas, associated with the use of mineral fertilizers and synthetic pesticides and with the "simplification" of agricultural landscapes resulting from a reduction in the diversity of production systems in order to feed the growing world population,[144] the same has also been cited as one of the main drivers of worldwide biodiversity decline.[145] The adverse effect has been on broad ecosystems and environmental aspects such as freshwater ecosystems which have suffered as excess nutrients from agricultural practices enter surface and ground waters and inefficient irrigation systems deplete water sources,[146] while biological control of pests in arable fields which is an important ecosystem service provided by high-diversity landscapes and species-rich enemy communities can be affected by the intensification of agriculture.[147]

In addition, use of mineral fertilizers and pesticides can lead to degradation of habitat quality at local-field scales, while transformation of perennial habitats (grassland) to arable fields and destructions of field boundaries and hedges can lead to a loss of semi-natural habitats and simplification at landscape scales, including changes in the distribution and supply of resource for many species and the food webs building on them.[148] Soils may also deteriorate as a result of erosion, compaction, loss of organic matter and contamination with pesticides, and in some areas, heavy metals.[149]

Biodiversity is, therefore, important at all levels of the agricultural landscape, from the different soil microbes that help cycle nutrients and decompose organic matter, to wasps and bats that help reduce crop pests, and to birds and insects that pollinate high value crops, biodiversity helps

[144] Le Roux, X., Barbault, R., Baudry, J., Burel, F., Doussan, I., Garnier, E., Herzog, F., Lavorel, S., Lifran, R., Roger-Estrade, J. and Sarthou, J.P., 'Agriculture and Biodiversity: Benefiting from Synergies', p.2.
[145] Kleijn, D., F. Kohler, A. Báldi, P. Batáry, E. D. Concepción, Y. Clough, M. Díaz et al. "On the relationship between farmland biodiversity and land-use intensity in Europe." *Proceedings of the Royal Society of London B: Biological Sciences* 276, no. 1658 (2009): 903-909, p.903.
[146] Geier, Bernward, Jeffrey A. McNeely, and Sue Stolton. "The relationship between nature conservation, biodiversity and organic agriculture." *Stimulating positive linkages between agriculture and biodiversity. Recommendations for building blocks for the EC-Agricultural Action Plan on Biodiversity. European Centre for Nature Conservation, ECNC Technical report series, Tilburg, The Netherlands* (2000): 101-105 at p. 102.
[147] Thies, Carsten, Sebastian Haenke, Christoph Scherber, Janne Bengtsson, Riccardo Bommarco, Lars W. Clement, Piotr Ceryngier et al., "The relationship between agricultural intensification and biological control: experimental tests across Europe." *Ecological Applications* 21, no. 6 (2011): 2187-2196, p. 2187.
[148] Ibid, p. 2187.
[149] Chris Stoate and others, 'Ecological Impacts of Arable Intensification in Europe' (2002) 63 Journal of Environmental Management 337.

farmers successfully grow food and maintain sustainable farm landscapes.[150] Thus, not only does the maintenance of biodiversity help ensure viable crop production, but many organisms and species have come to rely on particular agricultural landscapes for their very survival. That is, agriculture both supports, and is supported by, the maintenance of biodiversity.[151]

5.2. Enhancing Environmental Education in School Curricula

Agenda 21 recognises the role of education in achieving sustainable livelihoods and thus calls for "re-orientation" of all education toward sustainability.[152] It states that both formal education and non-formal education are indispensable to changing people's attitudes so that they have the capacity to assess and address their sustainable development concerns as well as achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective public participation in decision-making.[153]

Environmental education has been defined as a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions.[154] Students are expected to be equipped with the following: awareness and sensitivity to the environment and environmental challenges; knowledge and understanding of the environment and environmental challenges; attitudes of concern for the environment and motivation to improve or maintain environmental quality; skills to identify and help resolve environmental challenges; and participation in activities that lead to the resolution of environmental challenges.[155] Notably, while environmental information is important, environmental education is more than that as it goes beyond the citizens' right to giving their opinion to incorporate: increased public awareness and knowledge of environmental issues;

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[150] GRACE Communications Foundation, Biodiversity, available at http://www.sustainabletable.org/268/biodiversity; see also Benton, T.G., Bryant, D.M., Cole, L. and Crick, H.Q., 'Linking Agricultural Practice to Insect and Bird Populations: A Historical Study Over Three Decades' (2002) 39 Journal of applied ecology 673; Saunders, M.E., Peisley, R.K., Rader, R. and Luck, G.W., 'Pollinators, Pests, and Predators: Recognizing Ecological Trade-Offs in Agroecosystems.' (2016) 45 AMBIO-A Journal of the Human Environment; Wenny, D.G., Devault, T.L., Johnson, M.D., Kelly, D., Sekercioglu, C.H., Tomback, D.F. and Whelan, C.J., 'The Need to Quantify Ecosystem Services Provided by Birds' (2011) 128 The auk 1.

[151] Ibid.

[152] Chapter 36, Agenda 21.

[153] Ibid, para. 36.3.

[154] OA US EPA, 'What Is Environmental Education?' (*US EPA*, 13 December 2012) <https://www.epa.gov/education/what-environmental-education> accessed 3 June 2021.

[155] Ibid.

building up critical thinking capacity; enhanced individuals' problem-solving and decision-making skills; and it does not advocate a particular viewpoint.[156] Environmental education is thus important for creating awareness and understanding about environmental issues which eventually leads to responsible individual and group actions.[157] As far as the role of education in achieving sustainable development is concerned, education is considered to play an important role in ensuring that human beings acquire knowledge, skills, attitudes, and values necessary to shape a sustainable future.[158] Continued enhanced and effective environmental education in Kenyan school curricula is important if Kenyans are to appreciate from their formative years the need to protect and conserve their environment and biodiversity in particular, as a perquisite for achieving sustainable development.[159]

5.3. Adopting Rights-Based Approaches to Biological Diversity Conservation

Rights-based approaches to conservation have been defined to mean "integrating rights norms, standards, and principles into policy, planning, implementation, and outcomes assessment to help ensure that conservation practice respects rights in all cases, and supports their further realisation where possible".[160]

Conservation of ecosystem goods and services is considered important for upholding economic, social and cultural rights, such as the rights to health, an adequate standard of living, freedom from hunger and cultural freedom.[161] The discussion on human rights approaches to conservation is usually informed by the procedural rights, such as to participate in decision making, acquire information and access justice; and the substantive rights, such as to life, personal security, health,

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[156] OA US EPA, 'What Is Environmental Education?' (*US EPA*, 13 December 2012) <https://www.epa.gov/education/what-environmental-education> accessed 3 June 2021.

[157] Beatus Mwendwa, 'Learning for Sustainable Development: Integrating Environmental Education in the Curriculum of Ordinary Secondary Schools in Tanzania.' [2017] Journal of Sustainability Education.

[158] Ibid.

[159] AM Karugu, 'Aspects of Environmental Education in Kenya's Preschool Curriculum' <https://ir-library.ku.ac.ke/handle/123456789/8020> accessed 3 June 2021; see also Unger, Suanne, "Environmental education in Kenya: the need for a community-based biology curriculum in the secondary schools." (1993) *Graduate Student Theses, Dissertations, & Professional Papers*. 7615 < https://scholarworks.umt.edu/cgi/viewcontent.cgi?article=8650&context=etd> accessed 3 June 2021; Matthias Winfried Kleespies and Paul Wilhelm Dierkes, 'Impact of Biological Education and Gender on Students' Connection to Nature and Relational Values' (2020) 15 PLOS ONE e0242004.

[160] 'Rights-Based Approaches to Conservation' (*IUCN*, 14 December 2015) <https://www.iucn.org/theme/governance-and-rights/about/our-work/governance-and-rights-based-approaches/rights-based-approaches-conservation> accessed 4 June 2021.

[161] Campese, J., Sunderland, T., Greiber, T. and Oviedo, G. (eds.), *Rights-based approaches: Exploring issues and opportunities for conservation*. (CIFOR and IUCN. Bogor, Indonesia, 2009), p.1.

an adequate standard of living, education, freedom to practice culture and freedom from all forms of discrimination, amongst others.[162]

Notably, many international human rights instruments and multilateral environmental agreements now recognise rights to participation in environmental decision making, the importance of the environment for sustainable development and substantive rights to a clean and healthy environment.[163] Furthermore, at the national level, many national constitutions, including Kenya's, explicitly recognise rights to a clean or healthy environment and acknowledge the need for environmental protection and conservation as a prerequisite for the fulfillment of other social and economic rights. For instance, the Constitution of Kenya provides that:

> *19. (1) The Bill of Rights is an integral part of Kenya's democratic state and is the framework for social, economic and cultural policies.*
> *(2) The purpose of recognising and protecting human rights and fundamental freedoms is to preserve the dignity of individuals and communities and to promote social justice and the realisation of the potential of all human beings.*

At the international law level, CBD Decision XII/7 2, encourages Parties to give gender due consideration in their national biodiversity strategies and action plans and to integrate gender into the development of national indicators.[164] Adopting a rights-based approach to biodiversity conservation can go a long way in enhancing the rights of both men and women. These rights include both procedural and substantive rights.[165] Procedural rights relate to access to the processes by which people can assert their rights where procedural rights are important in themselves, and also help ensure the realization of substantive rights, including by informing rights-holders and duty-bearers about their respective rights and responsibilities, and giving rights-holders space to make effective claims in systems of mutual accountability.[166] The relevant

[162] Ibid, p. 2.
[163] Ibid, p. 5.
[164] CBD Decision XII/7, para.2.
[165] UN Environment, 'What Are Environmental Rights?' (*UNEP - UN Environment Programme*, 2 March 2018) <http://www.unep.org/explore-topics/environmental-rights-and-governance/what-we-do/advancing-environmental-rights/what> accessed 7 June 2021.
[166] Jenny Springer, Jessica Campese and M Painter, 'Conservation and Human Rights: Key Issues and Contexts. Scoping Paper for the Conservation Initiative on Human Rights' [2011] Unpublished report. Conservation Initiative on Human Rights Working Group, 16-17.

procedural rights conservation include: Right to information[167]; Right to participation[168]; and the right to access to justice (including redress)[169].

On the other hand, substantive rights are defined as rights to the "substance" of human wellbeing (such as rights to life, housing, water and a healthy environment) and contextually include:[170] Right to life;[171] Right to health;[172] Right to an adequate standard of living, including food;[173] Right to water;[174] Right to development;[175] Right to practice one's culture;[176] Right to work;[177] Right to property;[178] and the peoples' right to self-determination, use of natural wealth and resources, and not to be deprived of means of subsistence.[179]

[167] See Article 10 of the Constitution on national values and principles of governance; Article 33 on freedom of expression; Article 35 on access to information; Article 69 on State obligations in respect of the State; *Access to Information Act*, 2016 (No. 31 of 2016), Laws of Kenya.
[168] See Article 10 of the Constitution on national values and principles of governance; Article 33 on freedom of expression; Article 69;
[169] Article 10 of the Constitution on national values and principles of governance; Article 21 on implementation of rights and fundamental freedoms; Article 22 on enforcement of Bill of rights; Article 23 on authority of Courts to uphold and enforce the Bill of Rights; Article 27 on equality and freedom from discrimination; Article 48 on access to justice; Article 70 on enforcement of environmental rights; and Article 159 on judicial authority.
[170] Jenny Springer, Jessica Campese and M Painter, 'Conservation and Human Rights: Key Issues and Contexts. Scoping Paper for the Conservation Initiative on Human Rights' [2011] Unpublished report. Conservation Initiative on Human Rights Working Group.
[171] See Article 26 of the Constitution of Kenya 2010 on right to life; see also the case of *Peter K. Waweru v Republic* [2006] eKLR12 where the Court relied on, inter alia, case law from India to equate right to life to the right to clean and healthy environment.
[172] See Article 42 of the Constitution of Kenya on right to clean and healthy environment; see also Article 43(1) (a) on the economic and social rights which include the right- to the highest attainable standard of health, which includes the right to health care services, including reproductive health care.
[173] See Article 43(1) (b) (c) on the economic and social rights which include the right- (b) to accessible and adequate housing, and to reasonable standards of sanitation; and (c) to be free from hunger, and to have adequate food of acceptable quality.
[174] See Article 43(1) (d) on the economic and social rights which include the right- o clean and safe water in adequate quantities.
[175] See Article 10 of the Constitution on national values and principles of governance; see also Article 27 on the equality and freedom from discrimination; Part 3 of the constitution on the specific application of rights relating to persons with disabilities, youth, minorities and marginalised groups, older members of society and specifically in reference to their right to participate in national development affairs.
[176] See Article 11 of the Constitution of Kenya; Article 32 on freedom of conscience, religion, belief and opinion; and Article 44 on language and culture.
[177] See Article 41 of the Constitution of Kenya on labour relations; Employment Act, 2007, Cap 226; Employment and Labour Relations Court Act, No. 20 of 2011; Labour Relations Act, 2007.
[178] See Article 40 of the Constitution on protection of property rights.
[179] See United Nations. Declaration on the Rights of Indigenous Peoples, 2007; *International Covenant on Civil and Political Rights*, 16 December 1966, United Nations, Treaty Series, vol. 999, p. 171; *International Covenant on Economic, Social and Cultural Rights*, 16 December 1966, United Nations, Treaty Series, vol. 993, p. 3; *Charter of the United Nations*, 24 October 1945, 1 UNTS XVI.

As already pointed out, biodiversity and generally ecosystem services are important in fulfilment of the foregoing substantive rights and hence, any efforts towards conservation of biodiversity should bear this in mind not only for the sake of fulfilling human rights but also to ensure that the benefiting group of persons have the incentive to participate in conservation measures as envisaged under Article 69(2) of the Constitution of Kenya.[180] This is also in line with the Aichi targets of the Convention on Biological Diversity (CBD) which calls upon States to ensure that biodiversity resources are "effectively and equitably managed", where equity or justice is conceptualized in three areas of concern: (i) distribution of costs and benefits from conservation; (ii) procedure referring to participation in decision making; (iii) recognition of social and cultural difference.[181]

Thus, building strategies for the protection of ecosystem services into conservation and land-use planning is essentially the promotion of human survival, and not merely a luxury task.[182] The *Natural Resources (Benefit Sharing) Bill, 2018* is meant to establish a system of benefit sharing in resource exploitation between resource exploiters, the national government, county governments and local communities; and for connected purposes.[183] The legislation is to apply to: sunlight; water resources; forests, biodiversity and genetic resources; wildlife resources; industrial fishing; and wind.[184] Its application is to be guided by the following principles: transparency and inclusivity; revenue maximization and adequacy; efficiency and equity; accountability and participation of the people; rule of law and respect for human rights of the people; and sustainable natural resources management.[185] Once enacted, this legislation has the potential to entrench a rights-based approach to natural resources management in Kenya.

[180] 69. Obligations in respect of the environment:
(2) Every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources;
see also Emily Woodhouse and J Terrence McCabe, 'Well-Being and Conservation: Diversity and Change in Visions of a Good Life among the Maasai of Northern Tanzania' (2018) 23 Ecology and Society.
[181] Emily Woodhouse and J Terrence McCabe, 'Well-Being and Conservation: Diversity and Change in Visions of a Good Life among the Maasai of Northern Tanzania' (2018) 23 Ecology and Society, 52.
[182] Wenny, D.G., Devault, T.L., Johnson, M.D., Kelly, D., Sekercioglu, C.H., Tomback, D.F. and Whelan, C.J., 'The Need to Quantify Ecosystem Services Provided by Birds' (2011) 128 The Auk 1.
[183] Preamble, Natural Resources (Benefit Sharing) Bill, 2018.
[184] Ibid, clause 3.
[185] Ibid, clause 4.

5.4. Effective Pest Control for Biodiversity Conservation

Pests have a negative effect not only on agricultural production but also on biodiversity conservation. It has been observed that the damage caused by pest organisms is one of the most important factors in the reduced productivity of any crop plant species, losses can occur in the field (pre-harvest) and during storage (post-harvest).[186] However, accurate estimates of agricultural losses caused by insects are difficult to obtain because the damage caused by these organisms depends on a number of factors related to environmental conditions, the plant species being cultivated, the socioeconomic conditions of farmers, and the level of technology used.[187] It is important to address the problem of pests if food security and biodiversity conservation are to be achieved. Pest control is part of the ecosystem services that improve and sustain human life.[188]

One of the possible and effective approaches in pest control for biodiversity conservation is the integrated pest control. Integrated Pest Management (IPM) is an ecosystem approach to crop production and protection that combines different management strategies and practices to grow healthy crops and minimize the use of pesticides.[189] IPM has been developed as a way to control pests without relying solely on pesticides.

FAO promotes IPM as the preferred approach to crop protection and regards it as a pillar of both sustainable intensification of crop production and pesticide risk reduction.[190] FAO defines Integrated Pest Management to mean '*the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment. IPM emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms*.'[191]

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[186] Oliveira, C. M., A. M. Auad, S. M. Mendes, and M. R. Frizzas, "Crop Losses and The Economic Impact of Insect Pests on Brazilian Agriculture," *Crop Protection* 56 (2014), pp. 50-54, p.51.
[187] Ibid.
[188] Philpott Stacy M., Biodiversity and Pest Control Services. In: Levin S.A. (ed.), *Encyclopedia of Biodiversity*, second edition, Waltham, MA: Academic Press, 2013, Volume 1, pp. 373-385.
[189] FAO, 'AGP - Integrated Pest Management,' available at http://www.fao.org/agriculture/crops/core-themes/theme/pests/ipm/en/.
[190] Ibid.
[191] 'Plant Production and Protection Division: Integrated Pest Management' <http://www.fao.org/agriculture/crops/thematic-sitemap/theme/pests/ipm/en/> accessed 7 June 2021.

The Protection of Traditional Knowledge and Cultural Expressions Act, 2016[192] was enacted *to provide a framework for the protection and promotion of traditional knowledge and cultural expressions; to give effect to Articles 11, 40 and 69(L) (c) of the Constitution; and for connected purposes*. The Act defines "traditional knowledge" to include *any knowledge contained in the codified knowledge systems passed on from one generation to another including agricultural, environmental or medical knowledge, knowledge associated with genetic resources or other components of biological diversity, and know-how of traditional architecture, construction technologies, designs, marks and indication*s.[193]

Similarly, Aichi Target 18 envisages that by *2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels*.[194]

Farmers should be encouraged to use the least harmful approaches to pest control, including applying indigenous methods of pest control.[195]

5.5. Biodiversity Mainstreaming for Food and Nutrition Security

Biodiversity for food and agriculture includes the variability among living organisms contributing to food and agriculture, including also the forestry and fisheries sectors.[196] The sustainable use of genetic resources for food and agriculture will be the foundation for many of the adaptation strategies required in food and agriculture. Arguably, in order to adapt to climate change, plants

[192] Protection of Traditional Knowledge and Cultural Expressions Act, No. 33 of 2016, Laws of Kenya.
[193] Protection of Traditional Knowledge and Cultural Expressions Act, s.2.
[194] 'Target 18 – Traditional Knowledge and Customary Sustainable Use – Local Biodiversity Outlooks' <https://localbiodiversityoutlooks.net/targets/target-18-traditional-knowledge-and-customary-sustainable-use/> accessed 7 June 2021.
[195] D Grzywacz and others, 'The Use of Indigenous Ecological Resources for Pest Control in Africa' (2014) 6 Food Security 71; 'Cultural Methods of Pest, Primarily Insect, Control' <https://eap.mcgill.ca/publications/eap58.htm> accessed 6 June 2021.
[196] FAO, 'Climate Change and Biodiversity for Food and Agriculture,' Technical Background Document From The Expert Consultation Held on 13 to 14 February 2008, p.1.
Available at http://www.fao.org/uploads/media/FAO_2008a_climate_change_and_biodiversity_02.pdf

and animals important for food security will need to adjust to abiotic changes such as heat, drought, floods and salinity.[197]

Genetic resources are generally seen as the living material that local communities, breeders and researchers use to adapt to changing socio-economic needs and ecological challenges. Maintaining and using a wide basket of genetic diversity at a time of climate change is considered an essential insurance policy for the food and agriculture sectors.[198] Crop genetic diversity is considered a source of continuing advances in yield, pest resistance and quality improvement, and it is widely accepted that greater varietal and species diversity would enable agricultural systems to maintain productivity over a wide range of conditions.[199] It has been argued that maintaining and enhancing the diversity of crop genetic resources is of increasing importance to ensure the resilience of food crop production particularly in light of climate change challenges.[200] One of the ways of promoting food security in the face of climate change is adoption of climate smart agriculture. FAO defines Climate-Smart Agriculture (CSA) as an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate.[201] CSA aims to tackle three main objectives: sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and reducing and/or removing greenhouse gas emissions, where possible. CSA is an approach for developing agricultural strategies to secure sustainable food security under climate change. CSA provides the means to help stakeholders from local to national and international levels identify agricultural strategies suitable to their local conditions.[202]

Pollinators are part of the food production chain and must therefore be taken care of. Experts have warned that climate change will profoundly impact insects, including their physiology (how they live and reproduce), their behaviour and physical features, as well as relationships with other species (like host plants and natural enemies).[203] As a result, immense shifts are predicted in

[197] Ibid.
[198] Ibid, p.3.
[199] Carpenter, Janet E., "Impact of GM crops on biodiversity," *GM crops* 2, no. 1 (2011): 7-23, p.7.
[200] Ibid, P.7.
[201] 'Climate-Smart Agriculture | Food and Agriculture Organization of the United Nations' <http://www.fao.org/climate-smart-agriculture/en/> accessed 7 June 2021.
[202] FAO, "Climate-Smart Agriculture," available at http://www.fao.org/climate-smart-agriculture/en/
[203] 'Insects and Climate Change | Icipe - International Centre of Insect Physiology and Ecology' <http://www.icipe.org/news/insects-and-climate-change> accessed 7 June 2021.

population dynamics, abundance and geographical spread of insects. In turn, these alterations will have positive and negative outcomes for people, livestock and crops, in terms of vulnerability to insect-transmitted diseases, and availability of essential services provided by insects such as pollination and pest regulation.[204] Thus, this must form part of the wider debate in the quest for food and nutrition security.

6. Conclusion

This paper has offered a critical discussion on effective conservation of biodiversity as a way of securing the future both for the sake of human beings as well as all other living organisms. As discussed in the paper, biodiversity is an important part of the efforts towards achieving sustainable development agenda as it is the source of all life and all raw materials required to meet human needs. Any efforts to secure human life for both the present and future generations must, therefore, include conservation of biodiversity as a matter of necessity. Conserving Biodiversity for a Better Future is thus an idea that we must deeply reflect on as a matter of urgency.

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[204] International Centre of Insect Physiology and Ecology *(icipe), 'Insects and Climate Change,'* available at http://www.icipe.org/news/insects-and-climate-change Accessed on 6/06/2021.

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