TOWARDS THE REALIZATION OF SUSTAINABLE DEVELOPMENT GOALS ON BIODIVERSITY THROUGH THE APPLICATION OF PRECAUTIONARY PRINCIPLE IN NIGERIA'S EXTRACTIVE INDUSTRY*

Abstract

The necessity of biodiversity conservation as a pathway to sustainable development accounts for its mainstreaming as a cardinal component of the sustainable development goals (SDGs). The symbiotic affinity between mineral resources hubs and biodiversity constitutes a source of tension between the ends of resource exploitation and the aspiration for biodiversity conservation. Employing the analytical model as methodology and survey of relevant literature as source of data, this study situates Nigeria's rich biodiversity profile in the context of the negative resource extraction and consumption patterns which combine to threaten the actualization of the SDGs otherwise known as Agenda 2030, in the country. The study found that over exploitation of natural resources and weak environmental governance regime accentuate biodiversity loss in the extractive sector with serious implications for intergenerational equity. The article recommends the adoption of the precautionary approach to mineral resources extraction as a framework of affirmative action for biodiversity conservation and the realization of the SDGs.

Keywords: Biodiversity, Sustainable Development Goals, Extractive Industry, Conservation, Precautionary Principle.

1. Introduction

Biodiversity refers to the quantity and variety of living organisms habituating a given geographical space.[1] The term 'biodiversity' first entered the science lexicon in 1988[2], but it was at the 1992 United Nations Convention on Biodiversity that the concept was first formally defined as 'the variability among living organisms from all sources including, *interalia*, terrestrial, marine and other aquatic systems and the ecological complexes of which they are part'.[3] Regarded as the true essence of natural life,[4]

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[1] D. Olawuyi, *Principles of Nigerian Environmental Law* (Ado Ekiti: Afe Babalola University Press, 2015), 289.

[2] B.C. Anwadike, *Current Investigations in Agriculture and Current Research*, 8 April 2020, 1110. Dio:10.32474/CIACR.2020.08.000293.

[3] Convention on Biological Diversity, article 2. This instrument entered into force on 29 December 1993, 1760 UNTS 79; 31 LM 818 (1992).

[4] A.T. Bello and J. Amadi, *Journal of Geoscience and Environmental Protection,* 2019 (7): 354-371, also available at<https://doi.org.10.4236/gep.2019.78024>, accessed on 24th May, 2024.

biodiversity is indispensable for the socio-economic survival of humankind.[5] This article situates Nigeria's biodiversity practices in the extractive sector in the context of the Sustainable Development Goals (SDGs). The methodology employed is descriptive and analytical by which relevant literature on the subject is examined within the backdrop of the biodiversity components of the Sustainable Development Goals.

Conscious of the transnational consequences of Nigeria's failure to achieve the biodiversity component of the now rested Millennium Development Goals, we contextualize the country's rich biodiversity endowments within the negative resource extraction and consumption patterns to foreground the threat to the realization of Agenda 2030 in the country. We argue that over exploitation of natural resources and weak environmental governance architecture rooted in lack of political will have accelerated the pace of biodiversity loss in the extractive sector with dire consequences for sustainable development. We make a case for the adoption of the precautionary approach to mineral resources extraction as a modality of affirmative action for biodiversity conservation and the realization of the SDGs. The article contributes to the literature on sustainable development and the application of the precautionary principle in stemming the tide of biodiversity loss. The paper is structured into five integrated parts with the first part as the introduction which examines the nature of biodiversity and its importance to the survival of humankind. The second part underscores the rich biodiversity profile of Nigeria and the factors that cause its rapid depletion. The third part of the article locates the paradoxical affinity between biodiversity and mineral resources and identifies such affinity as the source of tension between the ends of resource exploitation and biodiversity conservation. The fourth part of the article sues for the adoption of the precautionary approach to resource extraction as an affirmative action for biodiversity conservation. The fifth part is the conclusion of the article, which also embodies the recommendations towards the realization of the SDGs.

The importance of biodiversity derives from the fact that there can be no ecosystem in the absence of requisite symbiotic biological resources.[6] Similarly, humankind cannot exist exclusive of other ecological components necessary for the provision of food, medicine, raw materials, and essential goods and services.[7] The necessity of biodiversity conservation as a pathway to sustainable development accounts for its mainstreaming as a cardinal component of the Sustainable Development Goals (SDGs).[8] Conceptually, sustainable development is defined as 'development that meets the needs of the present

[5]B.C. Anwadike (n3), 1109.
[6] A.T. Bello and J. Amadi, [n5] 369.
[7]*Ibid*.
[8] Knowledge Hub, 'Why Biodiversity Matters: Mapping the Linkages between Biodiversity and the SDGs', available at<www.sdg.llsd.org, accessed on 16 July 2019.

generation without compromising the ability of future generations to meet their own needs'.[9] The aim of sustainable development being to address the variegated aspirations of humankind for better life without exceeding the carrying capacity of environmental resources,[10] it coheres with the cause of biodiversity conservation which is oriented to judiciously utilize and carefully maintain biological resources to meet inter-generational needs.[11] The Sustainable Development Goals were conceived as a transformation pathway for the actualization of the 2030 Agenda on Sustainable Development.[12] The SDGs were adopted at the United Nations Summit on Sustainable Development in New York in 2015 as a successor to the defunct Millenium Development Goals (MDGs).[13] Made up of 17 goals and 169 targets, the SDGs is 'a universal, integrated and trans-formative vision for a better world.[14] To effectively implement the development strategies and report progress towards the realization of the 17 SDGs, the United Nations further established a Global Indicator Framework (GIF) woven around 232 SDG indicators.[15] To the extent that the Sustainable Development Goals are integrated,[16] it is plausible to state that the scope of biodiversity underpins virtually all the 17 SDGs because biodiversity and wealthy ecosystems provide the requisite resources and ecosystem services upon which economic growth and other sectoral activities depend.[17] At the recent United Nations Conference on Biodiversity, it was stressed that the interconnectivity between biodiversity and the SDGs will inform the development of the post-2020 global diversity plan of action.[18]

However, beyond the general connection between biodiversity and the SDGs, the specific SDG goals which directly relate to the conservation of biological diversity are goals 12,

[9] World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987), 43.

[10] J.A. Ogbodo,*et al.*, 'Analyzing the Progress, Pitfalls and Prospects for Attaining Environmental – Related Sustainable Development Goals in Nigeria', *Animal Research International,* 2021, 18(1): 3990-4004, available at<https://www.ajol.info>view>, accessed on 16 July 2019.

[11] B. C. Anwadike, [n. 2], 1109.

[12] Ogbodo *et al.*, [n 10], 3990.

[13] United Nations, *Transforming Our World: the 2030 Agenda for Sustainable Development,* resolution adopted by the General Assembly on 25 September 2015, A/RES/70/L.

[14] Secretary – General of the United Nations at the Launching of the New Development Paradigm, *2015 Summit of Heads of Government*.

[15]M. Paganini,*et al,* 'Open Earth Observations for Sustainable Urban Development', *Remote Sensing,* 12(10):1646,<https://doi.org/10.3390/rs1210646>, accessed on 24 June, 2024.

[16] Secretary General of United Nations, [n. 14].

[17] Knowledge Hub [n 8].

[18] CBD Parties in the UN Biodiversity Conference held in Sharm El-Sheikh Egypt in November 2018 underlined the linkages between biodiversity and SDGs and stressed that the SDG Policy brief on the post-2020 framework will be developed with such linkages in mind.

14 and 15.[19] These biodiversity related goals are impacted by the extractive industry. Goal 12 with thematic focus as 'Ensure Sustainable Consumption and Production Patterns'[20] exhorts countries to practice sustainable and efficient use of natural resources through environmentally sound management of chemicals and wastes etc.[21] Goal 14 which focuses on Marine and Fresh Water Protection[22] emphasizes the need to protect and conserve water resources to safeguard plant and animal species which depend on such habitats along with the people whose livelihoods are dependent on them[23]. This is more so because biological diversity thrives on aquatic resources.[24] Goal 15, which focuses on the Protection of Terrestrial Ecosystems, Forests and Halting Biodiversity Loss addresses the necessity of sustainable forest management to stem the tide of forest dissipation along with its biological resources[25]. Having regard to its biodiversity richness, the extractive sector is an important player in the attainment of the SDGs.[26] Mining, for instance, possesses serious industry-based threats to biological resources.[27] It affects biodiversity at multiple spatial scales such as landscape devastation and other operations connected with mineral beneficiation.[28] Similarly, the development of the energy sector in general and the operations of the oil and gas industries, in particular, bear negative impacts on biodiversity and allied Sustainable Development Goals.[29] In Nigeria, for instance, unsustainable industrial activities have devastated the biodiversity of the

[19] D.S. Olawuyi and O. Olusegun, 'Achieving the United Nations Sustainable Development Goals on Biological Diversity in Nigeria: Current Issues and Future Directions'*Global Journal of Comparative Law*, February 2018, 7(1):37-60(43) Doi:10.1163/221190x-00701003.

[20] United Nations, (n13).

[21] V. Kumar, "Mining and the Sustainable Development Goals" *Extraction Industry & Sustainable Development,* Proceeding of the National Conference on Extractive Industry and Sustainable Development Organised by the Asia-Pacific Institute of Corporate Sustainability and Responsibility held on 9 September 2017 at New Delhi, India.

[22] United Nations, (n 13).

[23] WWF Global, "Conserving Freshwater Habitats". <http://wwf.panda.org/what_we_do/how-we-work/our_global_goals/water/freshwater_protection/>

[24] Olawuyi and Olusegun, [n 19], 45.

[25] Green Biz, "Sustainable Development Goal 15:Protect Terrestrial Ecosystems" <https://www.greenbiz.com/article/sustainable-development-goal-15-protect-terrestrial-ecosystems>

[26] A.O. Akinsulore and Ogechukwu M. Akinsulore, 'Sustainable Development and the Exploitation of Bitumen in Nigeria: Assessing the Environmental Laws Faultlines'. *Beijing Law Review,* March 2021, (12) 113-138(118). https://doi.org/10.4236/blr.2021.121007.

[27] L.J. Sonter, S.H. Ali, and James E.M. Watson, 'Mining and Biodiversity: Key Issues and Research Needs in Conservation Science',*Proceedings of the Royal Society B,* 5 December 2018. https://doi.org/10.1098/rspb.1926

[28] *Ibid*, 2.

[29] John Kilani, "Sustainable Development Goals, Extractive Industries and the Energy Nexus - Insights in the MENA Region", *Journal of Sustainable Development Law and Policy,* 2020,Vol 11(1): 185-209.

Niger Delta region and rendered it into one of the five most severely damaged petroleum ecosystems in the world.[30]

The Sustainable Development Goals constitute a soft law instrument which does not bind the parties. However, it provides a normative framework on environmental protection and sustainable utilization of biological resources.[31] Owing to Nigeria's failure to achieve the biodiversity objectives of the Millennium Development Goals (MDGs)[32] which precursed it, the Sustainable Development Goals provide an opportunity to determine how the SDGs can facilitate the protection of Nigeria's threatened biodiversity.[33] The country signed the Convention on Biological Diversity (CBD) in 1994 committing itself to the tripartite objectives of the instrument: biodiversity conservation, sustainable use of biological resources, and fair and equitable sharing of resources accruing from the use of genetic resources.[34]

In spite of the fact that Nigeria began the implementation of the SDGs in 2015[35] including its biodiversity component, the country's rich ecological endowments are seriously under threat on account of over exploitation and misuse.[36] Nigeria's lack of progress in the implementation of the SDGs since 2015[37] is also attributable to a confluence of such factors as lack of clarity on environmental investments,[38] over dependence on biodiversity resources and unsustainable extraction of natural resources, among others.[39] There are also some aspects of extractive industry operations that cause avoidable pollution and loss of biodiversity, but are allowed to thrive 'due to environmental negligence, disrespect for biodiversity and lack of political will'.[40]

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[30] A. A. Kadafa, "Environmental Impact of Oil Exploration in Niger Delta of Nigeria", *Global Journal of Science Frontier Research and Earth Sciences,* 2012, Vol 12(3): 19-28.

[31] David Forsythe, *Human Rights in International Relations* (Cambridge: Cambridge University Press, 2006), 12.

[32] Balakrishna Pisupati and Emilie Warner, *Biodiversity and the Millenium Development Goals* (IUCN Regional Biodiversity Programme, 2003), 7-22.

[33] Olawuyi and Olusegun, [n 9], 41.

[34] Anwadike, [n 2], 1109-1110.

[35] Y. Kale, "Nigeria: Sustainable Development Goals (SDGs) Indicators", *Baseline Report 2016,* Office of the Senior Special Assistant to the President on SDGs, Abuja and the National Bureau of Statistics, Abuja Nigeria, 2017. <https://www.nigeriastat.gov.ng>... [pdf].

[36] Anwadike, [n 2] 1110.

[37] Gbodo,*et al.,* [n 10], 3995.

[38] United Nations, *About the Sustainable Development Goals,* United Nations, New York, 2020. <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

[39] Federal Government of Nigeria, *Fifth National Biodiversity Report,* December 2015. https://www.cbd.int>world[pdf].

[40] N. Zabbey, 'Impacts of Extractive Industries on the Biodiversity of the Niger Delta Region, Nigeria', Paper presented at a 3-day National Workshop on Coastal and Marine Biodiversity Management in Calabar, Cross River State Nigeria, 7-9 September 2004, available at<https://studylib.net>, accessed on 9th June 2024 Biodiversity.

In the face of increasing human impact on the environment and the realization that science and human knowledge cannot provide 'definitive evidence of all forms of harm associated with extractive activities',[41] the adoption of the precautionary approach is considered necessary and urgent for the realization of the SDGs.[42] Having regard to the major threats to biological resources and the poor understanding of their negative impacts,[43] the application of the precautionary approach to biodiversity conservation is imperative because it shifts the balance in decision-making towards 'prudent foresight' for the mitigation of uncertain harm or potential threats.[44]From this perspective, the precautionary approach to species conservation constitutes a vista of affirmative action which addresses the antipodal relationship between natural resource use and habitat destruction.[45]

2. Nigeria: A Profile in Biodiversity

Nigeria is generously endowed with biodiversity.[46] The level of endemism and species richness of Nigeria is comparable to any other highly endowed region of the world.[47] Reputed as the richest bio-resource endowed country in the African continent,[48] Nigeria's biodiversity richness is attributable to its complex topography, favourable climate and a wide range of habitats.[49] Consistent with the dictum that 'difference matters'[50] the study of biodiversity is rooted in the Linnaean taxonomy of sorting all living things into categories based on seven hierarchical levels: kingdom, phyla, class, order, family, genus and species.[51] Nigeria has endemic flora of 91 species in 44 families with the Rubiaceae family having the highest composition.[52] According to Nigeria's National Biodiversity

[41] R. Cooney, 'The Precautionary Principle in Biodiversity Conservation and Natural Resource Management: An Issues Paper for Policy-Makers, Researchers and Practitioners', *International Union for Conservation of Nature and Natural Resources*, Policy and Global Change Series 2, 2004,<https://ls.iun.org>files[pdf], accessed o 9th June 2024.

[42] Decision VII/12, Annex II, Practical Principle 12, Convention on Biological Diversity.

[43] Cooney, [n 41], 2.

[44] *Ibid*, 5.

[45] J. Chen, 'Diversity in a Different Dimension: Evolutionary Theory and Affirmative Action's Destiny', *Ohio State University Journal*, 1998, Vol. 59:811-913, available at<https://core.ac.uk>pdf>, accessed 9th July, 2024.

[46] Federal Ministry of Environment of Nigeria, 'National Biodiversity Action Plan 2016-2020 (2015)', 1-10 available at <https://www.cbd.int/doc/world/ng-nbsap-v2-en.pdf>, accessed on 9th June, 2024.

[47] Federal Government of Nigeria, [n 39].

[48] Federal Government of Nigeria, 'Nigeria's Path to Sustainable Development through Green Development Economy'*Country Report to the Rio+20 Summit*, June 2012, available at<https://sustainabledevelopment.un.org>....pdf>, accessed on 9th June, 2024.

[49] Anwadike, [n 2], 1110.

[50] Chen, [n 45], 830.

[51] British Broadcasting Corporation (BBC), 'How Does Understanding Biology Help us Classify Organisms? *Linnaean System of Classification*, July, 2022, available at<https:www.bbc.co.uk/bitesize>, accessed on 19th May 2024.

[52] Anwadike, [n 2], 1110.

Strategy and Action Plan 2006, the country possesses over 5000 documented species of plants, 22090 species of animals (inclusive of insects), 889 species of birds, and 1489 species of micro-organisms.[53]

As a globally known hotpot for primate species, some of the varieties in Nigeria are found in the Gulf of Guinea forests around Cross River State and adjacent parts of Cameroon.[54] Some of the endemic birds and mammals include three species of monkey: the white throated monkey (cercopithecus erythrogaster), red colobus of the Niger Delta (procolobus pennantii epieni), and sclater's guenon (Cercopithecus sclateri) as well as three bird varieties: the Anambra waxbill (Estrilaa poplipaia), the Jos indigo bird (viduamaryae), and the Ibadan alimbe (malimbus idadanensis).[55] A study carried out in Nigeria in 1992 listed 135 reptile species, 109 amphibian species and 648 fish species.[56] However, according to the International Union for the Conservation of Nature (IUCN) Redlist Index, an appreciable number of the ecosystem species are either threatened or endangered.[57]

In spite of its richness in biological diversity, Nigeria has only 27 nationally protected areas among which include Obudu plateau and Aifi forest in Cross River State, Gashaka-Gumti in Taraba state, Akassa forest in Bayelsa state and the Chad Basin National Park among others.[58] Other categories of biodiversity-related parks are situate at old Oyo; Cross River; Gashakamti; Okomu; Chad Basin; Kainji Lake; and Kumuku National Park.[59] These national parks represent major Nigerian ecosystems such as rain forest, montane forests, freshwater wetlands/lakes, Guinea savanna, Sudan savanna and Sahel savanna.[60] Also worthy of note are 27 bird areas, 11 Ramsar sites, 2 World Heritage sites (at Sukur Kingdom and Osun Osogbo Grove), 94 Forest Reserves, 32 Games Reserves, 1 Biosphere Reserve and Several sacred groves at various levels of protection.[61] Among the richest biodiversity hubs in Nigeria is the coastal and marine environment of the Niger Delta covering an area of 70,000km^{2,} which makes it one of the largest wetlands in the world.[62] Similarly, the mangrove forests of Nigeria rank as the largest in Africa and the

[53] Federal Government of Nigeria, [n 48], 49.
[54] *Ibid*.
[55] *Ibid.*
[56] *Ibid.*
[57] Kale, [n 35], 44.
[58] Nigeria Conservation Foundation (NCF), *Nigeria Conservation Foundation Annual Report,* 2002.
[59] Anwadike, [n 2], 1110.
[60] O. Imarhiagbe *et al.,* 'A Review of Biodiversity Conservation Status of Nigeria', *Journal of Wildlife and Biodiversity*, 2020, 4(1):73-83. Doi:10.22120jwb.2019.11550.1096.
[61] Anwadike, [n 2], 1110.
[62] Federal Government of Nigeria, [n 48], 22.

third largest in the world.[63] The values of biodiversity are often classified into three overlapping categories: commodities ecological services and aesthetics.[64]

With a population strength of 206, 139, 139, 589 as at 2020[65] (calculated on the basis of the approved annual growth rate of 3.2% from the 2006 National Population Census figure of 140 million),[66] biodiversity, commands premium value in Nigeria. This is because biological resources constitute the source of food, raw materials, wide ranging goods and services, genetic materials for sundry purposes, commercial products as well as aesthetic and cultural values.[67] Apart from being a source of food and medicine, biodiversity is also important as a provider of ecosystem services which include the decomposition of waste, pollination, water purification, moderation of floods and replenishment of soil nutrients.[68] Nigeria being mainly an agrarian society with substantial rural population, more than 70% of the people living in the rural areas not only depend on biodiversity resources for their food supplies and nutritional support[69], but also rely on traditional plant-based medicines for basic healthcare.[70]

In spite of its strategic utility, Nigeria's rich biological resources are increasingly under threat owing to a combination of such factors as oil pollution, over exploitation of plant and animal species, climate change and weak institutional and regulatory regime.[71] In 2013, for instance, the International Union for the Conservation of Nature (IUCN) stated that a total of 309 species were threatened in Nigeria including different plants varieties, birds, mammals, reptiles, amphibians and fishes.[72] It has also been reported that in the last 20 years, about 128 species of bird and 95 species of mammals have disappeared in Nigeria[73]. In conjunction with sundry anthropogenic activities, the loss of biodiversity in Nigeria is also attributable to political and socio-economic causes.[74] These factors are underpinned by the shortage of institutional capacity and necessary political will to

[63] *Ibid.*
[64] Chen, [n 45], 876.
[65] World Meters, "Countries in Africa: 54", *Worldometers* 2020 Dadax Limited, USA., available at<https://www.worldometers.info/geography/how-many-countries-in-africa>, accessed on 19th May 2024.
[66] Ogbodo *et al.*, [n 10], 3992.
[67] Federal Government of Nigeria, [n 39], 2.
[68] Imarhiagbe,*et al.,* [n 60], 78.
[69] Federal Government of Nigeria, [n 39], 2.
[70] Olawuyi and Olusegun, [n 19], 47.
[71] A.A. Kana, 'Legal Framework for the Regulation of National Parks in Nigeria', 4 *Nasarawa State University Law Journal,* 2011, 103.
[72] IUCN, 'Red List of Threatened Species, 2013', available at<http://www.iucnredlist.org/>, accessed on 19th May 2024.
[73] Clearing House Mechanism of Nigeria, 'The Main Threats to Biodiversity in Nigeria' (2015). <http://www.chm-cbd.com.ng/index.php/en/biodiversity/main-threats-to- biodiversity-in-nigeria>
[74] Olawuyi and Olusegun, [n 19], 40.

integrate biodiversity conservation into development planning in addition to other biodiversity-unfriendly economic activities.[75] Other factors that accelerate the pace of biodiversity loss and wildlife depletion in Nigeria include unsustainable agricultural practices by way of bush burning, fuel wood collection, grazing, hunting and logging, among others.[76] The loss of biological resources in Nigeria is further accentuated by invasive species and pollution, crude oil and solid mineral exploration and exploitation, canalization, deforestation, desert encroachment and sundry civil engineering construction works.[77]

One of the most important indices for measuring the environmental condition of a country is the volume of land area covered by forest and trees.[78] In Nigeria, the forest area which forms part of the total land area of the country declined from 9.9% in 2010 to 7.7% in 2015 indicating a progressive worsening of the country's environmental quality over the years[79]. Records show that in the last three decades, about 43% of the forest ecosystem in Nigeria has been lost due to anthropogenic activities.[80] Worryingly, Nigeria is reported to have the highest rate of deforestation in Africa coupled with the loss of primary forest for which over 25,000 ha of the gazeted forest are lost annually to de-reservation.[81] Another source of biodiversity loss in Nigeria is habitat fragmentation which "refers to the disconnectivity or 'breakdown' of large contiguous habitats into smaller, isolated patches"[82] thereby undermining species interactions and overall ecosystem relationships.[83] Alien invasive species also contribute to biodiversity loss by damaging or modifying ecosystem processes in ways that often lead to the extinction of native species or displacing native flora from their natural habitats with negative consequences.[84]

Regardless of consensus that there is progressive depletion of biodiversity in Nigeria due to a combination of several factors,[85] it seems impossible, to determine the extent of such

[75] Clearing House Mechanism, [n 74].
[76] Ajao Adeyinka, "Harnessing Nigeria's Biological Diversity in an Integrated Approach to National Development", *10Journal of Research in National Development,* (2012), 42.
[77] Anwadike, [n 2] 1110.
[78] Kale, [n 35], 44.
[79] *Ibid*
[80] Federal Government of Nigeria, [n 39], 49.
[81] *Ibid.*
[82] Imarhiagbe *et al.,* [n 60], 79.
[83] *Ibid.*
[84] Prabhat Kumar Rai and J. S. Singh, 'Invasive Alien Plant Species: their Impact on Environment, Ecosystem Services and Human Health', *Ecological Indicators,* 111(2020): 1-21(3), available at<https://doi.org/10.1016/j.ecolind.2019.106020>, accessed on 19th June 2024.
[85] J. Aguilera, 'The Numbers are Just Horrendous,almost 30,000 Species Face Extinction because of Human Activity', *Time.* (2019). https://time.com/5629548/almost30000species-face-extinction-new-report

depletion on account of inadequate data to accurately capture the country's biodiversity status.[86] The situation is not peculiar to Nigeria because as a matter of fact, 'biologists do not know to the nearest order of magnitude, how many species exist on earth'.[87] The explanation for the absence of exactitude in that 'large swaths of biodiversity including the abyssal benthos of the deep sea and soil bacteria elude reliable quantification'.[88] In the face of such uncertainty, it is difficult to measure the absolute amount of biodiversity vanishing annually.[89] In the final analysis, however, it is acknowledged that human activity has increased the rate of pollution and species extinction more than the forces of natural selection[90]. The corollary of the foregoing is that in Nigeria (and elsewhere), the extractive sector is one of the crucial centres of human activity with far reaching consequences on biodiversity and the realization of the Sustainable Development Goals.[91] This is because the commercial exploitation of the natural resource endowments of countries inevitably leads to the disturbance of the ecosystem thereby compromising biodiversity in pursuit of economic goals.[92] The examination of the linkage between the extractive industry and biodiversity in relation to the SDGs is the thrust of the next section of this article.

3. The Extractive Industry as a Driver of Biodiversity Loss

The fact that mineral resources exist in all significant biodiversity hubs[93] undergirds the tension between extraction and conservation.[94] The twin factors of human population growth and technological advancement accentuate such tension.[95] This realization informed the mainstreaming of biological diversity discourse in the energy and mining sectors as an important agenda for the post-2020 strategic plan for biodiversity.[96] Within the extractive sector, almost all components of oil and gas exploration and exploitation, for instance, impact negatively on the ecosystem and local biodiversity.[97] For instance,

[86] Imarhiagbe *et al.,* [n 60], 81.
[87] E.O. Wilson, *The Diversity of Life* (Harvard: Harvard University Press, 2010), 273.
[88] Chen, [n 45], 863.
[89] Wilson, [n 88], 280.
[90] *Ibid.*
[91] C. Sonesson,*et al.,* 'Mapping Mining to the Sustainable Development Goals: A Preliminary Atlas', *World Economic Forum* (2016), 5.
[92] Akinsulore and Akinsulore, [n 26], 116.
[93] N. Butt,*et al.,* 'Biodiversity Risks from Fossil Fuel Extraction", *Science* 342 (2013):425-426 doi:10.1126/*science*.237261.
[94] S.H. Ali *et al.,*'Mineral Supply for Sustainable Development Requires Resource Governance". *Nature 543* (2017):367-372. doi:10.1038/nature21359.
[95] O. Vidal,*et al.,* 'Metals for Low Carbon Society'*National Geoscience* 6(2013):894-896. doi: 10.1038/ngeo1993.
[96] World Economic Forum, *Mapping Mining to the Sustainable Development Goals: An Atlas.* United Nations Development Programme, Columbia Center on Sustainable Development, IUN Sustainable Development Solutions Network.
[97] Federal Government of Nigeria, [n 39], 17-18.

dynamite shooting in the process of oil exploitation destabilizes sedimentary materials, increases turbidity and reduces photosynthetic activity on account of reduced light penetration.[98] Furthermore, mining impacts on biodiversity in direct and indirect pathways[99] such as landscape devastation during site preparation as well as during beneficiation processes.[100] Being an inherently destructive industry, mining activities generally expose the habitats of living things to unrefined materials[101] which cumulatively pose danger to flora and fauna.[102] It is also the case that mineral supply chains often have extensive but subterranean impacts on biodiversity.[103]

It is to be noted that different mining methods affect biodiversity in different ways[104] while the extraction of different materials requires the application of different techniques with differential impacts on biodiversity.[105] The environmental impact of industrial or large scale mining differs from that of small-scale artisanal mining.[106] In situations where mineral substrates co-evolved with biota, for instance, mining operations may permanently remove the entire ecosystem with dire consequences for biodiversity.[107] In Nigeria, the environmental burdens associated with mining activities are evident in all the mining communities in the country.[108] The country is ranked among the nations in Africa with the highest known deposits of precious metals and stones[109] with over 450 mineral occurrences[110] the exploitation of which threatens biodiversity over multiple scales.[111] In addition to their negative environmental externalities, solid mineral mining in Nigeria has

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[98] *Ibid.*

[99] K.G. Raiter,*et al.,*'Under the Radar: Mitigating enigmatic ecological impacts', *Trends Ecol. Evol*, 29 (2014):635-644 doi:10.1016j.tree.2014.09.003.

[100] Sonter,*et al.*, [n 27].

[101] Dontalaa,*et al.,* 'Environmental Aspects and Impacts, its Mitigation measures of Corporate Coal Mining'*Global Challenges, Policy Framework and Sustainable Development for Mining of Mineral and Fossil Energy Resources,*available at <www.sciencedirect.comprocediaEarth>, accessed on 19th June 2024.

[102] A.F. Ali, 'Environmental Issues and the Prospects of Mining in Nigeria'*Dutse Journal of Pure and Applied Science* 2018, 4(2):531-539, available at<https://fud.edu.ng>dujopas>, accessed on 19th June 2024.

[103] E.F. Lambin, *et al.*, 'The Theory of Supply-chain Initiatives in Reducing Deforestation'*Nat. Clim. Change* 8(2018):109-116.doi:10.1038/s41558-017-0061-1.

[104] Sonter,*et al.*, [n 27].

[105] GP/Asner,*et al.,* 'Elevated Rates of Gold Mining in the Amazon Revealed through High Resolution Monitoring',*Proc. Natl. Acad. Sci.USA*, 110 (2013) :18454-18459. doi:10.1073/pnas.1318271110.

[106] *Ibid.*

[107] P. Erskine,*et al.,* 'Sustaining Metal-loving Plants in Mining Regions',*Science* 337(2012):1172-1173.

[108] World Bank Group, 'Assessment of the Environmental Regulatory Framework of the Mining Sector.'*Economic Research*, 2021, (4):1-20, available at<https://openknowledge.worldbank.org/handle/10986/2017, accessed on 20th June 2024.

[109] M.S Musa, 'Mid-Term Report for the Minerals and Metal Sector' 2013,*Ministry of Mines and Steel Development*, Abuja, Nigeria.

[110] Federal Government of Nigeria, [n 48], 29.

[111] Sonter,*et al.*, [n 27], 6.

led to abandoned and unreclaimed mine sites which adversely affect the mining communities, the environment and biodiversity.[112]

Similarly, the exploration and exploitation of oil in the Niger Delta region and other coastal areas have given rise to gas emissions and other pollutants from the petroleum industry with considerable environmental devastation, forest degradation and consequential biodiversity loss.[113] The process of burying oil and gas pipelines in the Niger Delta is also acknowledged as a source of biodiversity fragmentation of the ecosystems.[114] On account of the location of Nigeria's oil industry in the mangrove forests, the exploration activities of numerous oil companies have intensified the fragmentation and deforestation of the mangrove ecosystem[115] which is worsened by recurrent incidents of oil spillage.[116] The recognition of the importance of biodiversity as a life support system and positive business performance in the oil and gas sector,[117] coupled with the fact that mining is a major economic activity in Nigeria upon which the people's socio-economic livelihood depends,[118] the need to mainstream biodiversity conservation in development planning towards the realization of the SDGs becomes imperative.[119]

In response to the threat to the species and the ecosystems, and inspired by the global commitment to sustainable development,[120] the United Nations Organization at its Conference on Environment and Development in Rio de Jenairo in 1992 adopted the Convention on Biological Diversity (CBD) which entered into force in December 1993.[121] As the main biodiversity governance instrument in the global arena, the CBD exhorts parties to introduce measures to avoid or minimize biodiversity depletion in the exploitation of natural resources.[122] Nigeria has ratified over 30 global environmental

[112] Federal Government of Nigeria, [n 47], 22.
[113] *Ibid.*
[114] *Ibid.*
[115] F. Ajani and A Pudie, 'Review of Industrial Activities: A Threat to Biodiversity and Ecotourism Development, in Delta State, Nigeria',*Journal of Agriculture and Life Sciences,* 2019.6(1):8-20. doi:10.30845/jals.v6n1p2.
[116] R. Hoff, 'Oil Spills in Mangroves: Planning and response Considerations',*US Department of Commerce, National Oceanic and Atmospheric Administration* (NOAA), 2010.
[117] Anwadike, [n 2], 1109.
[118] Federal Government of Nigeria, [n 48], 29.
[119] Knowledge Hub, [n 8].
[120] L. Boisson de Chazournes, 'Introductory Note to the Convention on Biological Diversity', *Audiovisual Library of International Law,* 2009,available at <https://legal.un.org>cpbcd>cpbcd>, accessed on 20th June 2024.
[121] The birth of the Convention on Biodiversity followed the Convening of an Ad-Hoc Working Graoup of Experts on Biodiversity by the United Nations Environment Programme (UNEP) in 1988 which later became known as the Intergovernmental Negotiating Committee whose work culminated in the adoption of the Agreed text of the Convention on Biological Diversity in Nairobi on 22 May 1992.
[122] Article 14, Convention on Biological Diversity, 1993. <https://www.cbd.int>...

conventions[123] and is equally affiliated to several global institutions and organizations concerned with the environment.[124] The adoption of the Convention on Biodiversity constitutes a veritable instrument for the attainment of the Sustainable Development Goals whose objectives are to guide the exploitation of mineral resources for the survival of humankind.[125] The promotion of the objectives of the SDGs by resource-rich countries enables them to leverage the extractive sector linkages for economic diversification and environmental protection.[126]

For the extractive industry to contribute to the realization of Sustainable Development, the sector must adopt resource extraction methods that encourage the creation of shared values and multifaceted benefits.[127] The causal relationship between mineral extraction and biodiversity loss is underscored by the fact that the incessant devastation of mangroves and forests around the sea and freshwater bodies in oil producing areas makes flooding a recurrent environmental disaster in Nigeria.[128] Among other negative impacts, flooding reduces the quality of natural water bodies, pollutes the aquatic ecosystem and adversely affects the reproductive and survival capacity of aquatic animals contrary to the ideals of SDG-14.[129] Also, by transporting invasive plant materials into non-native areas, killing or displacing endemic wild animals, flooding affects the realization of SDG-15 which aims at preventing the introduction of invasive alien species on land water ecosystem.[130] Similarly, crude oil pollution and gas flaring, which are common in Nigeria, exert deleterious impacts on mangrove forests leading to biodiversity loss which SDG-15 seeks to prevent.[131]

Notwithstanding that each of the 17 SDGs has a principal thematic focus, they are, however, integrated and remarkably, 'biodiversity and ecosystems feature prominently

[123] L. Atsegbua and Dinmowe Akpotaire, *Environmental Law in Nigeria Theory and Practice* (Ethiopia: Ababa Press Ltd, 2003), 78.
[124] Anwadike, [n 2], 1113.
[125] Akinsulore and Akinsulore, [n 26], 114.
[126] L. Sachs and N. Maennling, 'Resource Resilience: How to Break the Commodities Circle.'*World Politics Review,* 2015(1)6.
[127] J. Kilani, 'Sustainable Development Goals, Extractive Industries and the Energy Nexus – Insights in the Mena Region'*Journal of Sustainable Development Law and Policy,* 2020(11):1.
[128] Ogbodo *et al.,* [n 10], 3995.
[129] A.J. Echendu, 'The Impact of Flooding on Nigeria's Sustainable Development Goals (SDGs)',*Ecosystem Health and Sustainability,* 2020 6(1):1, available at<https://doi.org/10.1080/20964129.2020.1791735>, accessed on 20th June 2024.
[130]*Ibid.*
[131] Interfaith Rainforest Initiative, 'How Protecting Tropical Forests can Prevent Coronaviruses and other Emerging Diseases',*Interfaith Forest Initiative, United Nations Environment Programme (UNEP),* New York, USA,available at <https://www.interfaithrainforest.org/s/interfaith_forestpandemics_primer_ENG.pdf>, accessed on 20th June 2024.

across many SDGs and associated targets'.[132] For instance, biodiversity is directly relevant to the realization of SDG-1 on ending poverty and SDG-8 focusing on decent work and economic growth[133] because biodiversity is central to many economic activities, including those connected to crops and livestock, agriculture, forestry and fisheries.[134] As shown in the Strategic Plan for Biodiversity [2011-2020] and its Aichi Biodiversity Targets, biodiversity is a key factor for the achievement of SDG-2 on food security and improved nutrition and SDG-3 on health and well-being respectively because all food systems depend on biodiversity and ecosystem while many medicines are derived from biological products.[135]

Similarly, biodiversity is relevant to the achievement of SDG-11 on safe and inclusive human settlements because it underpins the delivery of basic services, and SDG-12 on sustainable consumption and production patterns because all goods and services require the transformation of several natural resources with implications on biodiversity status.[136] Furthermore, biodiversity is crucial to the achievement of SDG-13 on combating climate change because among other things, ecosystems such as forests, rangelands, croplands, peatlands and wetlands represent significant carbon stores whose conservation is critical to the fulfillment of the UN Framework on Climate Change.[137] Given the importance of biodiversity to the realization of the SDGs[138] and the fact that the extractive industry is a biodiversity hub,[139] the absence of seriousness in the implementation of domestic and international laws on biodiversity in Nigeria[140] foreshadows the potential non-realizability of Agenda 2030 in the country.[141] The situation is not helped by the fact that the Environmental Impact Assessment Act,[142] which is the principal legal instrument for the integration of biodiversity conservation into sectoral programmes in Nigeria[143] does not possess a standard methodology for incorporating wildlife issues in the country's

[132] Secretariat of the Convention on Biological Diversity, 'Biodiversity and the 2030 Agenda for Sustainable Development – Technical Note', *Biodiversity Secretariat, World Trade Centre*, Montreal Canada, 2017, available at<http://www.cbd.int>, accessed on 20th June 2024.
[133] Knowledge Hub, [n 8].
[134] Secretariat of the Convention on Biological Diversity, [n 132], 1.
[135] *Ibid.*
[136] *Ibid.*
[137] *Ibid.*
[138] *Ibid.*
[139] Butt,*et al.,* [n 94]
[140] Olawuyi and Olusegun, [n 19], 41.
[141] Ogbodo,*et al.,* [n 10], 3999.
[142] The Environmental Impact Assessment Act was originally promulgated into law as Decree No. 86 of 1992 by the Military Government in Nigeria and Codified as an Act of Parliament following the return of civil rule in Nigeria in 1999.
[143] Federal Government of Nigeria, Nigeria: *First National Biodiversity Report*, 23 July, 2001 (p. 23),available at <http://www.cbd.int/doc/world/ng-nr-01-en.pdf>, accessed on 20th June 2024.

extractive industry[144]neither does it consider issues of ethnodiversity.[145] The cumulative effect of the inadequacy of existing mining impact assessment regimes to capture the full scope of mining related impacts on biodiversity[146] is that there is now a serious magnitude of biodiversity crisis[147] which in Nigeria, requires a measure of affirmative action to redress it. This is the focus of the next section of the article.

4. The Precautionary Principle as Affirmative Action for Biodiversity: The Agenda 2030 Trajectory

Despite the upsurge of international efforts to concretize the ideals of Sustainable Development Goals at the national levels for which Nigeria joined other members of the global community to adopt the SDGs in 2015, little or no progress has been made in realizing the post-2015 agenda on biodiversity or other related SDGs.[148] Apart from Nigeria's ratification of the Convention on Biological Diversity in 1994, it has also enacted or ratified a member of other municipal, regional and global instruments on biodiversity conservation including the Endangered Species Control of International Trade and Traffic Act) Act, 1985;[149] Sea Fisheries Act, 1992,[150] Inland Fisheries Act, 1992,[151]. ater Resources Act, 1993,[152] and National Parks Service Act, 1999[153]. Others are the National Environmental Standards and Regulations Enforcement Agency Act (NESREA), 2007[154] and the African Convention on the Conservation of Nature and

[144] M.K. Hamadina,*et al.,* 'Impact Assessment and Biodiversity Considerations in Nigeria: A Case Study of Niger Delta University Campus Project on Wildlife in Nun River Forest Reserve',*18/2 Management of Environmental Quality: An International Journal,* 2007.

[145] A. Ingelson and C. Nwapi, 'Environmental Impact Assessment Process for Oil, Gas and Mining Projects in Nigeria: A Critical Analysis',*Environment and Development Journal,* 2014. 10(1):35-56, available at<http://www.lead-journal.org/content/14035, accessed on 20th June 2024.

[146] Sonter,*et al.,* [n 27], 3

[147] S. Maxwell,*et al.* "The ravages of guns, nets and bulldozers", *Nature,* 2016 *(*536*): 143-145 doi:10.1038/536143a.*

[148] Olawuyi and Olusegun, [n 19], 50.

[149]This Act was reviewed in 2016 and contains important guidelines on biodiversity. However, the penalty regime under the Act is rather low and does not accord with contemporary realities.

[150] This instrument prohibits the use of explosives, poisonous or noxious substances in taking fish within Nigerian waters. Section 6 of the Act is similar to Article 10(a) of the Convention on Biological Diversity as they both provide for the incorporation of biodiversity conservation and sustainable use in national planning.

[151] This instrument focuses on the protection of the water habitat and its species.

[152] The Act is targeted at improving the quantity and quality of water resources. Sections 5 and 6 of the Act authorizes pollution prevention plans and regulations to protect fisheries, flora and fauna.

[153] This instrument is concerned with the establishment of protected areas for resource conservation and national ecosystem balance.

[154] This is the main national instrument for environmental protection in Nigeria. However, by section 7 of the NESREA Act, environmental matters connected to oil and gas are exempted from the purview of the agency and this is considered a major shortcoming of the Act.

Natural Resources,[155] among others. One of the most recent efforts by Nigeria towards the implementation of the SDGs in general and biodiversity conservation in particular is the establishment of the National Biodiversity Strategies and Action Plans (NBSAPS) under the Convention on Biological Diversity as a pathway to the entrenchment of the norms of the convention.[156] In spite of the laudable intentions of the Action Plans which contains 14 national targets on the protection of biological diversity, it, however, fails to address many legal and institutional obstacles facing biodiversity conservation within the ambit of sustainable development in Nigeria.[157] Similarly, the National Environmental Standards and Regulations Enforcement Agency Act which has the primary responsibility to enforce cross-sectoral compliance with national and international laws, guidelines and standards on biodiversity conservation and sustainable development, is seriously handicapped as its purview does not include the oil and gas sector[158] with the effect that it is constrained from monitoring the effect of oil production on biodiversity.

In the face of the existing number of domestic and international instruments and agencies on Biodiversity Conservation in Nigeria, it seems clear that there is no shortage of aspiration to realize the objectives of species protection in country. What is in short supply, however, is commensurate action by way of implementation of biodiversity protection plans and policies in Nigeria.[159] With little or no concrete achievements on ground, the profusion of domestic instruments and the ratification of various international conventions, treaties and action plans are of no moment if they are not backed up with actual implementation.[160] To achieve the Sustainable Development Goals in Nigeria particularly Goals 12, 14 and 15 which are directly connected with biodiversity conservation, it is necessary not only to integrate biodiversity values into planning and decision-making process but also to ensure the implementation of development prgrammes in ways that do not threaten biodiversity.[161] To do so requires a good dose of political will[162] in the form of affirmative action for species conservation[163] because

[155] The instrument imposes obligations on state parties to adopt measures to ensure resource conservation, utilization and development of soil, water and ecosystem species.
[156] Olawuyi and Olusegun, [n 19], 50.
[157] *Ibid.*
[158] O.O. Amokaye, *Environmental Law and Practice in Nigeria (*7th Edition) (Lagos: MIJ Professional Publishers, 2014), 131.
[159] J. Amakiri, 'Environmental Management: Biodiversity Conservation and Sustainable Development', A Paper Presented at the workshop on Biodiversity Conservation and the challenges of Climate Change at the University of Uyo, Nigeria, 2016.
[160] United Nations Environment Programme (UNEP), *Africa Environmental Outlook: Past Present and Future Perspective* (England: Earth Print Ltd, 2002).
[161] United Nations, 'Goal 15: Sustainably Manage Forests, Combat Desertification, Halt and Reverse Land Degradation, Halt Biodiversity Loss' available at<http://www.un.org/sustainabledevelopment/biodiversity/> accessed on 20th June 2024.
[162] Olawuyi and Olusegun, [n 19], 52.

threats to biodiversity are affected not only by socio-economic factors, but also by prevailing political contexts.[164] In consideration of the political undercurrent of biodiversity conservation, the precautionary approach is arguably the most potent instrument for ecosystem and species protection.

While the original meaning of the term 'affirmative action (AA)' refers to the remediation of 'institutional discrimination',[165] the contemporary usage of the term has become so elastic that there is currently no consensus among scholars and policy makers about the range of policies covered by the term.[166] This article is oriented to the liberal application of the term as referring to 'targets and goals'[167] which Chowdhury, *et al.,* [2020] schematized as a 'set of ethically driven policies aimed at providing special opportunities to a historically disadvantaged group…'[168] to foster capacity for competition and diversity. From this perspective, the precautionary principle can be viewed as a modality of affirmative action for biodiversity conservation in line with the Sustainable Development Goals. The explanation for this is that the precautionary approach as a vehicle of conservation and affirmative action address issues of parasitism, competition and habitat destruction.[169] As Cooney has noted, 'precautionary decisions are necessarily political' because the value attached to different threats to the species are determined by contending interests.[170] The effect is that where the interests of powerful stakeholders are at stake, the resistance to the precautionary principle will be stronger and the chances of adopting it as an approach to species conservation will be remote.[171] The precautionary principle is a response to the uncertainty surrounding the potentiality of environmental threats which have often discouraged timely action to protect the environment[172] by exhorting that lack of scientific certainty about environmental harm

[163] Anwadike, [n 2], 1110.
[164] Sonter,*et al.,* [n 27], 3.
[165] Chen, [n 45], 822.
[166] S. Kuitunen, 'Affirmative Action: Meaning, Intentions and Impacts in the Big Picture', *United Nations University World Institute for Development Economics Research,* Mach 2022, available at<https://doi.org/10.35188/UNU-WIDER/2022/163-1>, accessed on 20th June 2024.
[167] P.H. Schuck, 'Affirmative Action: Past, Present and Future',*Yale Law and Policy Review,* 2002, 20(1):1-96 available at <https://dx.doi.org/10.2307/4316605>, accessed on 20th June 2024.
[168] S.M. Chowdhury *et al.,* 'Heterogeneity, Leveling the Field, and Affirmative Action in Contests',*SSRNElectronic Journal,* 2020, available at <https://dx.doi.org/10.2139/ssrn.3655727>, accessed on 20th June 2024.
[169] Chen, [n 45], 885
[170] Cooney, [n 41], 37.
[171]*Ibid.*
[172] Sonter [n 27], 3.

should not be used as an excuse to avoid taking action to prevent that damage.[173] As an approach to environmental protection and risk management, the precautionary principle provides guidance for the avoidance of serious or irreversible harm under conditions of uncertainty.[174] The principle recognizes that delaying action until there is compelling evidence of harm may make it extremely costly if not impossible to avert such threat. As a tool for ecosystems and species protection, the precautionary principle was given a shot in the arm at the 1992 Earth Summit of which Principle 15 of the Rio Declaration exhorted a precautionary approach to biodiversity conservation. The Convention on Biological Diversity also mandates the precautionary approach to the protection of biological diversity.[175]

The adoption of precautionary approach to biodiversity conservation in the extractive sector has become urgent because all aspects of mineral resource extraction involve biodiversity loss.[176] Following the confirmation by the Nigeria Conservation Foundation that there is a steady increase in biodiversity loss in Nigeria,[177] it is only reasonable that the precautionary approach be adopted in resource extraction having become an integral principle in sustainable development practice.[178] The logic of precaution is that by guarding against serious or irreversible damage to the natural resource base, the capacity of future generations to provide for their own needs is guaranteed thereby linking it to inter-generational equity which is part of sustainable development.[179] Furthermore, the wisdom of precaution is that it is a balancing tool[180] between environmental protection and the wholesale prioritization of economic development in minerals exploitation which remain the bane of biodiversity conservation in Nigeria.[181] The necessity of precaution in Nigeria's extractive sector is further strengthened by the fact that at present, the Convention on Biological Diversity and the Intergovernmental Platform on Biodiversity

[173] J.F. Pinto-Bazurco, 'The Precautionary Principle', *International Institute for Sustainable Development Earth Negotiations Bulletin,* October 2020, available at<https://www.iisd.org>deep-dive>p…>, accessed on 20th June 2024

[174] Psychology, 'Understanding and Applying the Precautionary Principle to Deep Sea Minerals Mining in the Pacific Islands Region: A Socio-cultural and Legal Approach', *Psychology* (2012), 147 Corpus ID: 201104888, available at<https://www.sprep.org>cir1...[pdf]>, accessed on 20th June 2024.

[175] The Preamble to the CBD, 1992 exhorts a precautionary approach to biodiversity. It should not escape attention that both Principle 15 and the CBD have their roots to the Erath Summit in Rio.

[176] Federal Government of Nigeria, [n 39], 17-18.

[177] Federal Government of Nigeria, [n 39], 10.

[178] Cooney, [n 41], 2.

[179] *Ibid.*

[180] Pinto-Bazurco, [n 75], 7.

[181] A.S. Daura, 'Keynote Address', Nigeria Conservation Foundation (NCF) 20th Anniversary Public Lecture Series No: 2, NCF, Nigeria, 2020.

and Ecosystem Services have not provided coherent guidelines as to where conservation and mining can co-exist and where conservation is needed exclusively.[182]

In spite of the merits of the precautionary approach, it has, however, faced serious criticisms for the ambiguity of its content,[183] the difficulty in arriving at a reasonable parameter for rational decision-making,[184] its concentration on unknown and indeterminate risks as well as being a hindrance to scientific innovation,[185] among others. Notwithstanding these criticisms, there is consensus that the purpose of precaution is not to provide a rigid protocol for making decisions about risks and uncertainties, but a general guide for the preparation of precautionary policies to give the benefit of doubt in favour of environmental protection.[186] Having regard to the weak environmental governance of Nigeria's mineral resources (a feature of many emerging economies),[187] the realization of the SDGs in general and those on biodiversity in particular requires the integration and entrenchment of ecosystem and biodiversity values in development planning[188] through a deliberate precautionary approach in mineral resource exploitation.

5. Conclusion

Biodiversity is the true essence of natural life which is indispensable for the socioeconomic survival of humankind. The importance of biodiversity derives from the fact that there can be no ecosystem in the absence of symbiotic biological resources because human survival is dependent on other ecological resources necessary for food, medicine and raw materials. The importance of biodiversity conservation accounts for its mainstreaming in the Sustainable Development Goals.

Otherwise known as Agenda 2030, the SDGs are made up of 17 goals and 169 targets adopted in 2015 as a successor to the defunct Millennium Development Goals (MDGs). The nexus between biodiversity and sustainable development is that virtually all vistas of human existence are undergird by biological resources which explains why each of the 17 SDGs has a biodiversity trajectory. It also explains why biodiversity conservation is a

[182] Sonter,*et al.,* [n 27], 7.
[183] J. Morris, *Rethinking Risk and the Precautionary Principle* (Oxford: Butterworth-Heinemann), 2000.
[184] P. Sandin, 'Five Charges Against the Precautionary Principle',*Journal of Risk Research,* 2002, do.10.1080/1366987011007329.
[185] G.E. Marchant,*et al.,* 'Impact of Precautionary Principle on Feeding Current and Future Generations'. *Council for Agricultural Science and Technology,* 2013, Ames, Iowa, Issue Paper 52, available at<http://www.cast-science.org/download.cfm?PublicationID=276208>, accessed on 20th June 2024.
[186] B.K. Marshall and J.S. Picou, 'Postnormal Science, Precautionary Principle, and Worst Cases: The Challenge of Twenty-first Century Catastrophes',*Sociological Inquiry,* 2008. 78(2):230-247. doi:10.1111j.1475-682X-2008.00236.X.
[187] S.H. Ali *et al.,* 'Mineral Supply for Sustainable Development Requires Resource Governance',*Nature,* 2017(543):367-372. doi:10.1038/nature21359.
[188] United Nations, [n 69].

categorical imperative in the convoluted matrix of decision-making, development planning and projects implementation. Helped by a combination of complex topography, favourable climate and variegated habitats, Nigeria is generously endowed with biological resources about which it is reputed as the richest bioresource endowed country in Africa and among the highest in the world.

Much of Nigeria's biological resources are, expectedly, located within its equally rich mineral resources sector, the exploitation of which sustains a contrapuntal tension between resource extraction and biodiversity conservation. Such tension not only threatens the realization of the biodiversity objectives of the SDGs but also threatens to abort the overall sustainable development aspirations of the country. To stem the tide of biodiversity loss and realize the SDGs in the country, the adoption of the precautionary approach to resource exploitation especially in the extractive sector, is considered urgent and imperative. This will, among others, restrict human activities affecting biodiversity and ensure strict enforcement of regulatory standards.