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Mobility-induced loss and damage and vulnerability: An integrated policy approach for Africa

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Abstract: The concept of loss and damage (L&D) has increasingly gained attention in global climate discussions and is anticipated to cause displacement and increase vulnerability and implications for human rights. However, there is limited analysis on how the L&D caused by climate mobility connects with vulnerability, and the appropriate policy response to address the linkages. This article demonstrates the interfaces and advocates the need for an integrated policy approach to address mobility induced by L&D in Africa.

Key words: climate change; displacement; human rights; integrated policy approach; loss and damage; vulnerability

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1 Introduction

The concept of loss and damage (L&D) is the actual and/or potential manifestation of impacts associated with climate change in developing countries that negatively affect human and natural systems.[1] It is both a policy mechanism and the sum of impacts inflicted by climate change and extreme events.[2] These include economic losses such as loss of property, assets, infrastructure, agricultural production and/or revenue, and those that are difficult to quantify in economic terms, such as degraded health, losses induced by human mobility, loss of cultural heritage, and loss of indigenous and local knowledge.

The concept of L&D started in 1991 when the small island developing states (SIDs) demanded compensation for the losses that had occurred due to climate change. It then became a formal part of the United Nations (UN) Framework Convention on Climate Change (UNFCCC) since the establishment of the Warsaw International Mechanism (WIM).[3] The insufficiencies in the mitigation and adaptation efforts, evidence of the increasing global warming[4] and the concerns about historical responsibility have raised several queries relating to environmental injustices caused by climate change.[5]

Climate change is a result of long-term accumulation of greenhouse gases (GHGs) that cause a rise in global temperatures and effects including drought, sea level rise, floods and wild fires.[6] Although other factors such as natural disasters and changes in land use also cause environmental problems,[7] climate change is the major cause of environmental destruction, including biodiversity loss.[8] Estimates reveal that desertification due to drought alone affects over 4 billion hectares of land in more than 164 countries, and directly impacts approximately 1,5 billion

1 E Calliari 'Loss and damage: A critical discourse analysis of parties' positions in climate change negotiations' (2018) 21 *Journal of Risk Research* 725-747, https://doi.org/10.1080/13669877.2016.1240706 (accessed 5 September 2023).

2 E Boyd and others 'Loss and damage from climate change: A new climate justice agenda' (2021) 4 *One Earth* 1365-1370, https://doi.org/10.1016/j.oneear.2021.09.015. (accessed 4 September 2023).

3 E Boyd and others 'A typology of loss and damage perspectives' (2017) 7 *Nature Climate Change* 723-729, https://doi.org/10.1038/nclimate3389 (accessed 23 September 2023).

4 E Roberts & S Huq 'Coming full circle: The history of loss and damage under the UNFCCC' (2015) 8 *International Journal of Global Warming* 141, https://doi.org/10.1504/IJGW.2015.071964 (accessed 3 October 2023).

5 C Zimm & N Nakicenovic 'What are the implications of the Paris Agreement for inequality?' (2020) 20 *Climate Policy* 458-467, https://doi.org/10.1080/14693062.2019.1581048 (accessed 7 October 2023).

6 MF Akorede and others 'Mitigating the anthropogenic global warming in the electric power industry' (2012) 16 *Renewable and Sustainable Energy Reviews* 2747-2761, https://doi.org/10.1016/j.rser.2012.02.037 (accessed 6 October 2023).

7 AR Khavarian-Garmsir and others 'Climate change and environmental degradation and the drivers of migration in the context of shrinking cities: A case study of Khuzestan province, Iran' (2019) 47 *Sustainable Cities and Society* 101480, https://doi.org/10.1016/j.scs.2019.101480 (accessed 8 September 2023).

8 DW Sintayehu 'Impact of climate change on biodiversity and associated key ecosystem services in Africa: A systematic review' (2018) 4 *Ecosystem Health and Sustainability* 225-239, https://doi.org/10.1080/20964129.2018.1530054 (accessed 25 September 2023).

people globally.[9] The consequences of climate change may worsen to the level that even if global temperature is maintained below 2°C, or 1,5°C, compared to pre-industrial levels, significant impact will still be felt on the biodiversity.[10]

The biodiversity which is the main component of the environment, is very fundamental in supporting the livelihood of mankind. For instance, the ecosystem which is the functional unit of biodiversity supplies multiple services such as the provision of a habitat, fuel wood, food, timber, medicinal plants, and cultural and environmental sustaining functions.[11] These services serve as a source of employment and livelihood for billions of people in the world.[12] However, the ecosystem is threatened by the escalating loss of biodiversity.[13] Environmental degradation and loss of ecosystem services may deteriorate living conditions and force people to be displaced.

For instance, flooding associated with mud slide[14] and drought associated with desertification and land degradation have displaced many people in Eastern and Western Africa.[15] Migration can occur within or across countries. Without adequate measures and global action, up to 216 million people in six world regions could be affected by climate-induced migration and internal displacement by 2050.[16] Migration may increase environmental degradation especially when it is associated with over-population, insecurity and scarcity of resources.[17] These may limit access to essential needs such as food, water, forest resources, and land for cultivation, therefore increasing the rate of vulnerability of specific groups of

9 S Berberoglu and others 'Spatial and temporal evaluation of soil erosion in Turkey under climate change scenarios using the Pan-European Soil Erosion Risk Assessment (PESERA) model' (2020) 192 *Environmental Monitoring and Assessment* 491, https://doi.org/10.1007/s10661-020-08429-5 (accessed 15 September 2023).

10 MS Evans & B Munslow 'Climate change, health, and conflict in Africa's arc of instability' (2021) 141 *Perspectives in Public Health* 338-341.

11 CN DeLoyde & WE Mabee 'Ecosystem service values as an ecological indicator for land management decisions: A case study in Southern Ontario, Canada' (2023) 151 *Ecological Indicators* 110344, https://doi.org/10.1016/j.ecolind.2023.110344 (accessed 16 September 2023).

12 R Panwar, H Ober & J Pinkse 'The uncomfortable relationship between business and biodiversity: Advancing research on business strategies for biodiversity protection' (2023) 32 *Business Strategy and the Environment* 2554-2566, https://doi.org/10.1002/bse.3139 (accessed 25 September 2023).

13 D Roe, N Seddon & J Elliott 'Biodiversity loss is a development issue' (2021) *International Institute for Environment and Development*, https://pubs. iied. org/pdfs/17636IIED.pdf (accessed 19 September 2023).

14 M Call & C Gray 'Climate anomalies, land degradation, and rural out-migration in Uganda' (2020) 41 *Population and Environment* 507-528, https://doi.org/10.1007/s11111-020-00349-3 (accessed18 September 2023).

15 A Vrieling and others 'Early assessment of seasonal forage availability for mitigating the impact of drought on East African pastoralists' (2016) 174 *Remote Sensing of Environment* 44-55, https://doi.org/10.1016/j.rse.2015.12.003 (accessed 13 September 2023).

16 K Neef, E Jones & J Marlowe 'The conflict, climate change, and displacement nexus revisited: The protracted Rohingya refugee crisis in Bangladesh' (2003) *Journal of Peacebuilding and Development* 15423166231190040, https://doi.org/10.1177/15423166231190040 (accessed 20 September 2023).

17 Evans & Munslow (n 10).

people, including women, children, the elderly, Indigenous Peoples, persons with disabilities and youths.[18]

The people who are displaced by climate change are exposed to several risks, including loss of cultural land, conflict and insecurity, loss of cultural heritage,[19] loss of life, loss of freedom of choice, and inaccessibility to public services.[20] These may violate their rights including the right to life, food, water, good health, good living conditions, and access to social and cultural rights.[21] Several policies and regulatory frameworks have been put in place to address some of these human rights issues. However, most of the policies under UNFCCC focus more on the migrants with less focus on those who remain but are also vulnerable.[22]

Vulnerability to climate change displacement may increase when adaptation actions are unaffordable,[23] or not physically or technically possible,[24] socially difficult,[25] or not sufficient to prevent the associated problems.[26] The Intergovernmental Panel on Climate Change (IPCC) estimates that between 3.3 and 3.6 billion people live in contexts that are highly vulnerable to climate change[27] with the majority located in conflict-prone and fragile-prone areas.[28] Although more (80 per cent) greenhouse gases are emitted by developed countries,[29] African countries are disproportionally vulnerable to the long-lasting

18 S Jodoin, A Savaresi & M Wewerinke-Singh 'Rights-based approaches to climate decision-making' (2021) 52 *Current Opinion in Environmental Sustainability* 45-53, https://doi.org/10.1016/j.cosust.2021.06.004 (accessed 11 September 2023).

19 Intergovernmental Panel on Climate Change (IPCC) *Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (2023), https://doi.org/10.1017/9781009325844 (accessed11 September 2023).

20 K Warner and others 'Climate change, environmental degradation and migration' (2010) 55 *Natural Hazards* 689-715, https://doi.org/10.1007/s11069-009-9419-7 (accessed 21 August 2023).

21 MM Naser and others 'Policy challenges and responses to environmental non-migration' (2023) 2 *Npj Climate Action* 5, https://doi.org/10.1038/s44168-023-00033-w (accessed 17 May 2024).

22 As above.

23 T Afifi and others 'Climate change, vulnerability and human mobility: Perspectives of refugees from the East and Horn of Africa' (2012) United Nations University, Institute for Environment and Human Security 1 *Climate Change* (5 September 2023).

24 As above.

25 S Barrett and others 'Assessing vulnerabilities to disaster displacement' (2021) *Policy* 1.

26 R Byrnes & S Surminski 'Addressing the impacts of climate change through an effective Warsaw international mechanism on loss and damage' (2019) *London School of Economics Grantham Institute on Climate Change and the Environment* 16.

27 H Lee and others ''Climate change 2023: Synthesis report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (The Australian National University, 2023), https://doi.org/10.59327/IPCC/AR6-9789291691647 (accessed 2 October 2023).

28 P Läderach and others 'Climate finance and peace – Tackling the climate and humanitarian crisis' (2021) 5 *The Lancet Planetary Health* e856-858, https://doi.org/10.1016/S2542-5196(21)00295-3 https://doi.org/10.1016/S2542-5196(21)00295-3 (accessed 20 September 2023).

29 MGJ Den and others 'Countries' contributions to climate change: Effect of accounting for all greenhouse gases, recent trends, basic needs and technological progress' (2013) 121 *Climatic Change* 397-412, https://doi.org/10.1007/s10584-013-0865-6 (accessed 23 September 2023).

impacts spread all over the world.[30] This has increasingly raised ethical issues relating to justice, rights, welfare, virtue, political legitimacy and interaction between humanity and nature.[31] The Paris Agreement (PA) was therefore adopted to address some of these inequality issues.[32] However, technological, financial and gaps in assessing non-economic losses still limit its operations. Knowledge on the linkages between climate change, displacement and L&D is crucial for informing new policy developments that would help to reduce the associated problems.

There has been recognition of the effects of climate-induced displacement on human rights. However, there is limited information about specific interfaces that exist between L&D caused by climate mobility and the vulnerable groups and also the appropriate policy that links to them. Therefore, this article describes losses and damages caused by climate displacement and explores linkages to selected human rights legal/policy instruments and agreements that protect the rights of vulnerable groups such as children, women, the disabled, the youth, Indigenous Peoples, and people in disaster-prone areas.

2 Connecting the dots

2.1 Climate change, the environment and ecosystem services

The environment is an interconnected system that comprises physical, social, cultural and biological elements that form biodiversity. The biological environment that encompasses the evolutionary, ecological and cultural processes for the sustenance of life on earth[33] is diverse in terms of gene, species

30 A Chaudhury 'Role of intermediaries in shaping climate finance in developing countries – Lessons from the Green Climate Fund'a new consortium for dedicated funding set up under the United Nations Framework Convention on Climate Change (UNFCCC (2020) 12 *Sustainability* 5507; G Althor, JEM Watson & RA Fuller 'Global mismatch between greenhouse gas emissions and the burden of climate change' (2016) 6 *Scientific Reports* 20281, https://doi.org/10.1038/srep20281 (accessed 2 October 2023).the extent to which this leads to inequity between GHG emitters and those impacted by the resulting climate change depends on the distribution of climate vulnerability. Here, we determine empirically the relationship between countries' GHG emissions and their vulnerability to negative effects of climate change. In line with the results of other studies, we find an enormous global inequality where 20 of the 36 highest emitting countries are among the least vulnerable to negative impacts of future climate change. Conversely, 11 of the 17 countries with low or moderate GHG emissions, are acutely vulnerable to negative impacts of climate change. In 2010, only 28 (16%).

31 Zimm & Nakicenovic (n 5).as do the historical and current emissions of greenhouse gases (GHGs

32 As above.

33 SE Andres and others 'Defining biodiverse reforestation: Why it matters for climate change mitigation and biodiversity' (2023) 5 *Plants, People, Planet* 27-38, https://doi.org/10.1002/ppp3.10329 (accessed 25 September 2023).which may create perverse outcomes when designing schemes and projects. Here, we review how the concept of biodiversity is defined and applied in reforestation projects, and restoration more broadly. Improved transparency around the use of the term biodiversity is urgently needed to provide rigour in emerging market mechanisms, which seek to benefit the environment and people. Reforestation to capture and store atmospheric carbon is increasingly championed as a climate change mitigation policy response. Reforestation plantings have the potential to provide conservation co-benefits when

and ecosystem.[34] The ecosystem, being the major functional unit of biodiversity consisting of biotic and abiotic components that interacts with each other within and beyond their ecological niches, is fundamental to mankind.[35] Whereas 70 per cent of Africa's population derives their livelihood from agriculture,[36] over 80 per cent relies solely on traditional medicine derived from plants for their primary healthcare needs.[37] However, the environment, including biodiversity, is increasingly deteriorating worldwide. Evidence shows increasing extinction rates and decreasing global trends for the large majority of nature's contributions to the survival of humankind.[38]

The ecosystem supplies multiple services required to meet human needs and sustain livelihoods. These include provisioning services such as feed, fuel wood, food, timber; regulating services including disease and climate regulation; supporting services such as soil formation, nutrient retention; and cultural services, for instance, recreation and ecotourism.[39] These services serve as a source of employment and livelihood for billions of people in the world,[40] but the degradation of biodiversity has limited its ability to provide these services.[41] Although other factors such as natural disasters and changes in land use also cause environmental problems,[42] climate change is the major cause of environmental destruction, including biodiversity loss.[43]

For example, slow onset such as droughts and extreme climate events such as storm surges, sea level rises and floods have caused the extinction of species, loss of habitat, bleaching of coral reefs, loss of vegetation cover, loss of soil fertility,

diverse mixtures of native species are planted, and there are growing attempts to monetise biodiversity benefits from carbon reforestation projects, particularly within emerging carbon markets. But what is meant by 'biodiverse' across different stakeholders and groups implementing and overseeing these projects and how do these perceptions compare with long-standing scientific definitions? Here, we discuss approaches to, and definitions of, biodiversity in the context of reforestation for carbon sequestration. Our aim is to review how the concept of biodiversity is defined and applied among stakeholders (e.g., governments, carbon certifiers and farmers

34 GMA Bermudez & P Lindemann-Matthies 'What matters is species richness' – High school students' understanding of the components of biodiversity' (2020) 50 *Research in Science Education* 2159-2187, https://doi.org/10.1007/s11165-018-9767-y (accessed 25 September 2023).

35 J Sadeghi and others 'Microbial community and abiotic effects on aquatic bacterial communities in north temperate lakes' (2021) 781 *Science of the Total Environment* 146771, https://doi.org/10.1016/j.scitotenv.2021.146771 (accessed 8 October 2023).

36 AJ Fernando 'How Africa is promoting agricultural innovations and technologies amidst the COVID-19 pandemic' (2020) 13 *Molecular Plant* 1345-1246, https://doi.org/10.1016/j.molp.2020.08.003 (accessed 16 September 2023).

37 S Dubale and others 'Phytochemical screening and antimicrobial activity evaluation of selected medicinal plants in Ethiopia' (2023) 15 *Journal of Experimental Pharmacology* 51-62, https://doi.org/10.2147/JEP.S379805 (accessed 25 September 2023).

38 M Wagner 'Business, biodiversity and ecosystem services: Evidence from large-scale survey data' (2023) 32 *Business Strategy and the Environment* 2583-2599, https://doi.org/10.1002/bse.3141 (accessed 8 October 2023).

39 DeLoyde & Mabee (n 11).

40 Panwar and others (n 12).

41 Roe and others (n 13).

42 Khavarian-Garmsir and others (n 7).

43 Sintayehu (n 8).

air and water pollution, acidification and eutrophication.[44] These have declined agricultural productivity, threatened food security and environmental quality.[45] The degradation of the ecosystems may lead to scarcity in natural resources, deteriorate living conditions and cause displacement of people.[46] For instance, floods associated with mud slides and drought associated with desertification and land degradation have caused a shortage of ecological resources such as timber, fuel wood and food, and caused many people in Eastern and Western Africa to migrate.[47] Migration may lead to population growth that results in over-exploitation of resources and conflicts.[48] These may further increase loss of biodiversity, destruction of food systems, loss of cultural heritage[49] and deterioration of human health, among others.[50]

Today, over 85 per cent of the world population lives in a state of ecological overshoot.[51] Lack of vegetation cover is associated with soil erosion, loss of soil nutrients, loss of soil moisture, reduction in agricultural productivity and food insecurity.[52] Whereas 28 out of the 37 countries that rely on food aid come from Africa, more than 226 million people in Africa are starving, and 40 to 50 per cent live below the poverty line.[53] Indigenous Peoples who take care of over 40 per cent of the total global land area providing refuge for approximately 80 per cent of the earth's biodiversity, provide a good opportunity for environmental protection.[54]

44 M Guillermo, F Fraga & M Harsdorff 'The future of work in a changing natural environment: Climate change, degradation and sustainability' *ILO Research Paper Series, Geneva: International Labour Office*, 2018; R Pinto, VND Jonge & J C Marques 'Linking biodiversity indicators, ecosystem functioning, provision of services and human well-being in estuarine systems: Application of a conceptual framework' *Ecological* (2014) 36 *Indicators* 6440-655, https://doi.org/10.1016/j.ecolind.2013.09.015(accessed 8 October 2023).

45 P D'Odorico & S Ravi 'Land degradation and environmental change' (2016) *Biological and Environmental Hazards, Risks, and Disasters* 219-227, https://doi.org/10.1016/B978-0-12-394847-2.00014-0 (accessed 15 September 2023).

46 E Ferris 'Research on climate change and migration: Where are we and where are we going?' (2020) 8 *Migration Studies* 612-625, https://doi.org/10.1093/migration/mnaa028 (accessed 6 October 2023).

47 Vrieling and others (n 15); D Hummel 'Climate change, land degradation and migration in Mali and Senegal – Some policy implications' (2016) 5 *Migration and Development* 211-233, https://doi.org/10.1080/21632324.2015.1022972 (accessed 25 September 2023); Call & Gray (n 14).

48 Evans & Munslow (n 10).

49 IPCC (n 19).

50 A Fugiel and others 'Environmental impact and damage categories caused by air pollution emissions from mining and quarrying sectors of European countries' (2017) 143 *Journal of Cleaner Production* 159, https://doi.org/10.1016/j.jclepro.2016.12.136 (accessed 6 October 2023).

51 Z Langnel and others 'Income inequality, human capital, natural resource abundance, and ecological footprint in ECOWAS member countries' (2021) 74 *Resources Policy* 102255, https://doi.org/10.1016/j.resourpol.2021.102255 (accessed 11 September 2023).

52 P Panagos, P Borrelli & D Robinson 'FAO calls for actions to reduce global soil erosion' (2020) 25 *Mitigation and Adaptation Strategies for Global Change* 789-790, https://doi.org/10.1007/s11027-019-09892-3 (accessed 15 September 2023).

53 SAO Adeyeye and others 'Africa and the nexus of poverty, malnutrition and diseases' (2023) 63 *Critical Reviews in Food Science and Nutrition* 641-656, https://doi.org/10.1080/10408398.2021.1952160 (accessed 16 September 2023).

54 A Normyle, M Vardon & B Doran 'Aligning indigenous values and cultural ecosystem services for ecosystem accounting: A review' (2023) 59 *Ecosystem Services* 101502, https://doi.org/10.1016/j.ecoser.2022.101502 (accessed 16 September 2023).

However, their knowledge is not adequately documented and, therefore, is being eliminated.[55]

Despite the existing environmental policies and environmental programmes in Africa, the increasing rate of global warming is anticipated to increase environmental degradation, exacerbate displacement and the rate of vulnerability on the continent.[56]

2.2 Climate mobility and specific vulnerable groups

Climate migration and its associated problems have increased the vulnerability of women, children, the elderly, Indigenous Peoples, persons with disabilities and the youth.[57] According to IPCC, vulnerability refers to the degree to which a system is susceptible to and unable to cope with the adverse effects of climate change.[58] Under UNFCCC, vulnerability is measured by adaptation matrix against parameters such as adequacy and effectiveness of adaptation support.[59]

Vulnerability may occur when adaptation actions are unaffordable,[60] not physically or technically possible,[61] socially difficult,[62] or not sufficient to prevent the issues.[63] Vulnerability due to climate change may take several paths and have resultant effects on migrants, host communities, and the people who remain. For instance, occurrences of flooding associated with loss of assets,[64] and droughts associated with shortages of water, pasture and land degradation may force people to abandon their ancestral land.[65] Although migration can be an effective climate change adaptation strategy, it is also associated with several environmental risks. For instance, in Karamoja, North Eastern Uganda, mobility is used to access water and pasture, but also to control diseases and parasites. However, the livestock herders interface with several insecurity threats.[66] When this happens, women, children and the disabled who remain behind are exposed to security risks as they

55 S Muwanga and others 'Influence of agro-pastoral activities on land use and land cover change in Karamoja, Uganda' (2020) 12 *Journal of Agricultural Science* 266, https://doi.org/10.5539/jas.v12n9p266. (accessed 1 May 2023).
56 O Serdeczny and others 'Climate change impacts in sub-Saharan Africa: From physical changes to their social repercussions' (2017) 17 *Regional Environmental Change* 1585-1600, https://doi.org/10.1007/s10113-015-0910-2 (accessed 28 August 2023).
57 Jodoin and others (n 18).
58 L Christiansen, G Martinez & P Naswa (eds) *Adaptation metrics – Perspectives on measuring, aggregating and comparing adaptation results* (2018).
59 As above.
60 Afifi and others (n 23).
61 As above.
62 Barrett and others (n 25).
63 Byrnes and Surminski (n 26).
64 A Kassegn & E Endris 'Review on socio-economic impacts of "triple threats" of COVID-19, desert locusts, and floods in East Africa: Evidence from Ethiopia' (2021) 7 *Cogent Social Sciences* 1885122, https://doi.org/10.1080/23311886.2021.1885122 (accessed 13 September 2023).
65 Vrieling and others (n 15).
66 Muwanga and others (n 55); D Abrahams 'Land is now the biggest gun: Climate change and conflict in Karamoja, Uganda' (2021) 13 *Climate and Development* 748-760, https://doi.org/10.1080/17565529.2020.1862740 (accessed 18 September 2023).

may not be able to defend themselves. Migration requires economic and physical capacities that everyone may not have, and because of inadequate opportunities, incapabilities and more exposure to security threats, women, children and elderly people usually are those left behind in the face of, climate migration crisis.[67]

When climate migration associates with over-population,[68] it may lead to over-utilisation of resources that cause an increase in ecosystems degradation.[69] Linking to their responsibilities, women are more vulnerable to ecosystem degradation as they greatly depend on environmental resources such as water, firewood and other forest products to support family needs.[70] Their limited access to resources, including land, information, and the likelihood of being unemployed, further constrain them. Poor people are equally vulnerable to ecosystems degradation as they are disproportionately dependent on biodiversity to meet their day-to-day livelihood needs.[71]

The degradation of biodiversity[72] may reduce yields and lead to food insecurity and malnutrition,[73] which is felt more by women and children who are exposed to high mortality rates.[74] The Food and Agricultural Organisation (FAO) estimates that the number of people suffering hunger may increase from 60 million in 2014 to 840 million by 2030.[75] Indigenous Peoples have vast knowledge on biodiversity and agro-ecology,[76] which are crucial for adaptation and improving food production. However, climate displacement detaches them from traditional systems that may lead to loss of cultural identity, causing them to lose their vast knowledge.[77] The young generation is also threatened as meeting their future resource needs may be difficult owing to the increasing rate of environmental destruction and global warming.[78]

67 N Chindarkar 'Gender and climate change-induced migration: Proposing a framework for analysis' (2012) 7 *Environmental Research Letters* 025601, https://doi.org/10.1088/1748-9326/7/2/025601 (accessed 13 September 2023).

68 A Hendrixson & B Hartmann 'Threats and burdens: Challenging scarcity-driven narratives of "overpopulation"' (2019) 101 *Geoforum* 250-259.

69 D'Odorico & Ravi (n 45).

70 P Figueiredo & PE Perkins 'Women and water management in times of climate change: Participatory and inclusive processes' (2013) 60 *Journal of Cleaner Production* 188-194, https://doi.org/10.1016/j.jclepro.2012.02.025 (accessed 12 September 2023).

71 Roe and others (n 13).

72 TT Nguyen and others 'Security risks from climate change and environmental degradation: Implications for sustainable land use transformation in the Global South' (2023) 63 *Current Opinion in Environmental Sustainability* 101322, https://doi.org/10.1016/j.cosust.2023.101322 (accessed 9 October 2023).

73 FAO, IFAD, UNICEF, WFP and WHO *The state of food security and nutrition in the world 2021* (2021), https://doi.org/10.4060/cb4474en (accessed 12 September 2023).

74 N Rees and others *The coldest year of the rest of their lives: Protecting children from the escalating impacts of heatwaves* (2022).

75 FAO and others (n 73).

76 MA Altieri & CI Nicholls 'Agroecology: A brief account of its origins and currents of thought in Latin America' (2017) 41 *Agroecology and Sustainable Food Systems* 231-237, https://doi.org/10.1080/21683565.2017.1287147 (accessed1 March 2023).

77 JK Maldonado and others 'The impact of climate change on tribal communities in the US: Displacement, relocation, and human rights' (2013) 120 *Climatic Change* 601-614, https://doi.org/10.1007/s10584-013-0746-z (accessed 9 October 2023).

78 Naser and others (n 21).

Addressing the increasing rate of vulnerability to climate displacement[79] is difficult but may improve with the formulation and implementation of policies and programmes that protect the integrity and diversity of nature, and those that ensure equitable, ecological and sustainable use of natural resources.[80] The integration of a human rights-based approach in any climate change adaptation and mitigation measure is key.

2.3 Climate mobility and key human rights

Climate migration may cause adverse impacts on social environmental rights of vulnerable people. These may include the right to a safe and healthy environment, security, freedom of movement, right to food, water, cultural identity and sense of place. Human rights and the environment are interrelated, interconnected, and mutually responsive as they both address the well-being of humanity, meaning that, a safe and healthy environment is necessary for the full enjoyment of fundamental human rights.[81] The majority of the African population rely on environmental resources such as wood products, food, medicinal plants, water, land, cultural heritage, and habitat for sustenance of their livelihoods.[82] However, climate change has deteriorated the biodiversity that underpins these services, caused a decline in ecosystem services,[83] and displaced many people.[84]

The growing evidence of biodiversity degradation that is associated with loss of a safe environment has increased concerns and debates around biodiversity conservation and has also given birth to several policy instruments. The UN Convention on Biological Diversity (CBD) provides for biodiversity conservation.[85] Article 24 of the African Charter on Human and Peoples' Rights (African Charter) recognises the need for the rights of all people to a general satisfactory environment favourable to their development.[86] The preamble 4 to the African Leaders Nairobi Declaration on Climate Change and Call to Action (DCCCA) calls for the successful implementation of Sham el-Sheik (COP 27) decision at the Arab Republic of Egypt, while preambles 22 and 24 call for the

79 L Szboova '*Climate change, migration and rural adaptation in the near East and North Africa region* (2023), https://doi.org/10.4060/cc3801en (accessed 16 September 2023).
80 MA Hossen and others 'Governance challenges in addressing climatic concerns in coastal Asia and Africa' (2019) 11 *Sustainability* 2148, https://doi.org/10.3390/su11072148 (accessed 9 September 2023).
81 P Pathak 'Human rights approach to environmental protection' (2014) 7 *OIDA International Journal of Sustainable Development* 17.
82 DeLoyde & Mabee (n 11).
83 EMC Santos and others 'Mainstreaming revisited: Experiences from eight countries on the role of national biodiversity strategies in practice' (2023) 16 *Earth System Governance* 100177, https://doi.org/10.1016/j.esg.2023.100177 (accessed 19 September 2023).
84 Vrieling and others (n 15); Hummel (n 47).
85 United Nations Convention on Biological Diversity (CBD) Rio de Janeiro, 5 June 1992.
86 African Charter on Human and Peoples' Rights, adopted 27 June 1981, OAU Doc CAB/LEG/67/3 rev. 5, 21 ILM 58 (1982), entered into force 21 October 1986 (African Charter).

operationalisation of the L&D fund as agreed in COP 27 and integration of biodiversity in national plans and processes respectively.[87]

The Cancun Declaration on Mainstreaming the Conservation and Sustainable use of Biodiversity for Well-Being highlights the need to live in harmony with nature, and stresses out the need for additional efforts to ensure implementation of the Convention on Biological Diversity and facilitate closer collaboration with other initiatives adopted by international community.[88] The Kunming Declaration (KD) recognises the progress made under the 2011-2020 strategic plan of biodiversity, but is deeply concerned that the progress has been insufficient to realise some biodiversity targets, thus the ongoing biodiversity loss possesses risks to human health, social security and culture prosperity, and jeopardises the achievement of sustainable development goals (SDGs).[89]

The implementation plan of Sharm el-Sheik (COP 27) decision recognises the growing gravity , scope and frequency of L&D associated with adverse effects of climate change including forced displacement, and expresses the financial costs associated with L&D for developing countries, causing debt burden and impairing the Sustainable Development Goals (SDGs).[90] Violations of rights to a safe environment, mainly due to biodiversity loss, may also be linked to violations of other human rights and well-beings, thus requiring integrated policy approaches and implementation.

Human rights violations can take place even before people leave their countries of origin. These may include difficulties in accessing travel permits, interfering with the right to freedom of movement[91] that may violate the rights to social protection and social security. Article 9(2)(f) of the Kampala Convention on Internally Displaced Persons (CIDP) guarantees freedom of movement and choice of residence of internally-displaced persons (IDPs), except where the restriction on such movements is necessary, justified and appropriate to the requirements of ensuring security for the IDPs or maintaining public security, order or public health.[92] However, in most cases climate refugees are normally hosted in specified locations known as camps.

87 African Leaders Nairobi Declaration on Climate Change and Call to Action (DCCCA).
88 Cancun Declaration on Mainstreaming the Conservation and Sustainable Use of Biodiversity and Wellbeing (DMCSUBW) UNEP/CBD/COP/13/24 6 December 2016.
89 Kunming Declaration 'Ecological civilisation: Building a shared future for all life on earth' (KD) CBD/COP/15/5/Add.1 13 October 2021.
90 Report of the Conference of the Parties serving as the meeting of the parties to the Paris Agreement on its 4th session, held in Sharm el-Sheikh from 6 to 20 November 2022, FCCC/PA/CMA/2022/10 17 March 2023.
91 P Oberoi & E Taylor-Nicholson 'The Enemy at the gates: International borders, migration and human rights' (2013) 2 *Laws* 169-186, https://doi.org/10.3390/laws2030169 (accessed 9 October 2923).
92 African Union Convention for the Protection and Assistance of Internally Displaced Persons in Africa (Kampala Convention), adopted by the Special Summit of the African Union held in Kampala, Uganda, 23 October 2009.

Climate migration may cause insecurity especially in situations of severe resource scarcity that may lead to loss of assets. This threatens the right to social protection. Article 7 of the Protocol to the African Charter on Human and Peoples' Rights of Citizens to Social Protection guarantees social protection of migrants, and article 4 guarantees social insurance.[93] Even with these policies in place, many people lose assets due to climate-associated migration, especially when migration occurs on a voluntary basis. For instance, host communities in Northern Uganda suffer losses of assets including livestock to Karamojongs as they temporarily migrate with their livestock in search of water and pastures.[94]

When climate migration causes a population increase, it may lead to over-utilisation, reduction in ecosystem services and contamination of some natural resources. For instance, the lack of access to safe and clean water is a common problem at almost all refugee settlements. Linked to their responsibility, women are more affected as they experience difficulties in accessing water for their families. Article 15 of the Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa (African Women's Protocol) ensures that women have the right to clean drinking water.[95] However, approximately 1,1 billion people lack access to clean water supplies and more than 2,6 billion people lack access to basic sanitation.[96]

A reduction in ecosystem services, including water shortages, may weaken agricultural production, hence leading to food insecurity that violates the right of access to food. Article 11 of the International Covenant on Economic, Social and Cultural Rights (ICESCR) recognises the right of everyone to an adequate standard of living for themselves and their families, including food and freedom from hunger.[97] Because agricultural production may cause environmental degradation, the realisation of article 11 will require an improvement in the methods of production, conservation and distribution of food through making full use of technical and scientific knowledge, dissemination of knowledge on principles of nutrition and reforming agrarian systems for efficient use of natural resources. A similar point can be made of article 15(b) of the African Women's Protocol which also recognises the rights of women to nutritious food.[98] However, recent data reveals that more than two billion people lack regular access to safe, nutritious and sufficient food, and an estimated 821 million people are not able

93 Protocol to the African Charter on Human and Peoples' Rights on the Rights of Citizens to Social Protection and Social Security (2022).
94 Abrahams (n 66).
95 Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa, adopted 11 July 2003, entered into force 25 November 2005 (African Women's Protocol).
96 JN Maduelosi & MU Ezuluofor 'Education as a vaccine against girl child bullying' (2023) 4 *British Journal of Multidisciplinary and Advanced Studies* 1.
97 International Covenant on Economic, Social and Cultural Rights, adopted by General Assembly Resolution 2200A (XXI) (ICESCR).
98 African Women's Protocol (n 95).

to acquire sufficient food to meet the minimum dietary energy requirement.[99] This makes it difficult to achieve the SDG to eradicate poverty by 2030.

Food and water shortages may increase the likelihood of illness and death, which violates the right to good health and the right to life. The right to good health is protected in article 12 of ICESCR which provides that all people have a right to the enjoyment of the highest standard of physical and mental health.[100] The right to life is protected in article 4 of the African Charter which notes that every human being is entitled to respect for their life and the integrity of their person,[101] and in article 9 of the Kampala Convention which calls for the protection of the right to life during settlement.[102] Despite the existence of all the above-mentioned provisions, many people still die due to food shortages and contamination. For instance, two million people die every year due to water contamination.[103]

Climate displacement may increase government expenditures, and the need for more human capital and technological advancement diverts the states' attention from other development priorities to climate actions, therefore leading to a violation of the right to development which is protected in article 55(a) of the Charter of the United Nation (UN Charter), which calls for the promotion of economic growth and social progress and development,[104] article 1 of ICESCR which recognises that all people are entitled to economic, social and cultural development,[105] and article 3 of the Declaration on the Human Right to Development (DHRD) which recognises that states have the primary responsibility for the creation of national and international conditions favourable to the realisation of the right to development.[106]

Despite these policy frameworks, vulnerability to climate displacement remains alarming. The challenges in addressing climate change are increasingly becoming urgent with the window of opportunity seemingly closing due to the anticipated greater impact at a 2 degree Celsius. For instance, a 50 to 80 per cent cut in emissions by 2050 has been proposed as a means to limit GHG

99 A Allee, LR Lynd & V Vaze 'Cross-national analysis of food security drivers: Comparing results based on the Food Insecurity Experience Scale and Global Food Security Index' (2021) 13 *Food Security* 1245-1261, https://doi.org/10.1007/s12571-021-01156-w (accessed 27 May 2024).
100 ICESCR (n 97).
101 African Charter (n 86).
102 Kampala Convention (n 92).
103 AY Rosinger & A Brewis 'Life and death: Toward a human biology of water' (2020) 32 *American Journal of Human Biology* e23361, https://doi.org/10.1002/ajhb.23361 (accessed 27 May 2024).
104 Charter of the United Nations (adopted 26 June 1945, entry into force 24 October 1945) 1 UNTS XVI (UN Charter).
105 ICESCR (n 97).
106 Declaration on the Right to Development Resolution adopted by the General Assembly, A/RES/41/128, 4 December 1986.

abundance below 500 ppm CO 2-eq.[107] The realisation of the weakness of the current mitigation and adaptation measures, evidence of the increasing rise in global temperature, and concerns about the historical responsibility has caused long-term international debates that called for negotiation for a more equitable sustainable growth pathway.[108]

3 Integrated policy approach driven by the Paris Agreement

The integrated policy approach broadly refers to a process of embedding cross-cutting policy issues across compartmentalised, fragmented and siloed policy systems, and this may involve the integration of new policy issues into old policy processes.[109] The Paris Agreement (PA) is a legally-binding international treaty on climate change that was adopted by 196 parties at the conclusion of the twenty-first UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015 after a long period (nearly 17 years) of negotiation.[110] It is the second global climate change treaty formed after the establishment of the Kyoto Protocol in 1998, but the first international treaty to dedicate an entire article to loss and damage.[111]

The agreement was notable for creating a unanimous, legally-binding accord in some key areas of climate change in spite of the complexity and difficulties relating to differing needs of developed and developing countries.[112] In particular, the PA addressed equity through establishing common but differentiated responsibilities and respective capabilities as a basic principle that requires developed countries to take the lead in curbing emissions.[113] The Kyoto Protocol previously had setbacks because countries, including the United States of America, did not ratify it, Russia and Japan did not join the second commitment period and countries including Canada withdrew from it due to different views regarding the developed and developing countries. As a replacement for the Kyoto Protocol, the PA has transformed the international climate regime from

107 J Ming-Suet Ng and others '"Genes, meet gases": The role of plant nutrition and genomics in addressing greenhouse gas emissions' in D Edwards & J Batley (eds) *Plant genomics and climate change* (2016) 149-172, https://doi.org/10.1007/978-1-4939-3536-9_7 (accessed 6 October 2023).

108 Zimm & Nakicenovic (n 5).

109 K Skagen & E Lerum Boasson 'Climate policy integration as a process: From shallow to embedded integration' (2024) 26 *Journal of Environmental Policy and Planning* 279-294, https://doi.org/10.1080/1523908X.2024.2334707 (accessed 27 May 2024).

110 SN Seo 'Beyond the Paris Agreement: Climate change policy negotiations and future directions: Beyond the Paris Agreement' (2017) 9 *Regional Science Policy and Practice* 121-140, https://doi.org/10.1111/rsp3.12090 (accessed 17 August 2023).

111 J Kreienkamp & L Vanhala 'Climate change loss and damage' (2017) *Global Governance Institute* 1-28 (accessed 7 October 2023).

112 D Hoad 'The 2015 Paris Climate Agreement: Outcomes and their impacts on small island states' (2016) 11 *Island Studies Journal* 315-320, https://doi.org/10.24043/isj.351 (accessed 10 August 2023).

113 Zimm & Nakicenovic (n 5).

a 'regulatory' to a 'catalytic and facilitative' model.[114] It provides an inclusive framework and relies on the concept of self-differentiation, based on the notion that each country is individually best placed to assess its capabilities in relation to mitigation policies.[115]

The treaty was therefore launched as a landmark international agreement whereby all nations agreed to take responsibility in reducing GHG emissions for the first time. However, it is based on voluntary emission reduction pledges, hence no legal framework binds party members' voluntary pledges.[116] At its core are the nationally determined contributions (NDCs) that specify national pledges to reduce GHG emissions and adapt to climate change in a sustainable manner.[117] Article 7(14) and article 14 of the treaty require all parties to do a regular global stock take of progress, while article 13 requires parties to make transparent frameworks to track progress on the implementation of their NDCs, and article 13 emphasises adaptation actions.[118] Parties are therefore obligated to create a five-yearly assessment of observed adaptation to track progress and enable appropriate future commitments.[119]

As also prioritised by the 196 parties to the Convention on Biological Diversity, the inclusion of actions for addressing biodiversity loss by the parties to PA in their NDCs provides an essential opportunity to combat biodiversity loss as different ecologies are unique and may require specific actions.[120] Addressing direct and indirect drivers of biodiversity loss requires integrated policy approaches and coherent implementation.[121] Despite the progress so far, the global stock take, which should have been concluded at COP 28, is anticipated to be far from reaching the goal due to the inconsistencies in pledges made provided by the NDCs.[122] Furthermore, the current adaptation reporting requirements are not sufficient to enable countries to provide complete, transparent or

114 T Hale '"All hands-on deck": The Paris Agreement and non-state climate action' (2016) 16 *Global Environmental Politics* 12-22, https://doi.org/10.1162/GLEP_a_00362 (accessed 7 October 2023).

115 J Bednarek 'Is the EU realising an externally just green transition? An analysis of the carbon border adjustment mechanism from the perspective of the common but differentiated responsibilities principle' (2023) *SSRN Electronic Journal*, https://doi.org/10.2139/ssrn.4434079 (accessed 7 October 2023).

116 Seo (n 110).

117 C Tolliver, AR Keeley & S Managi 'Drivers of green bond market growth: The importance of nationally determined contributions to the Paris Agreement and implications for sustainability' (2020) 244 *Journal of Cleaner Production* 118643, https://doi.org/10.1016/j.jclepro.2019.118643 (accessed 7 October 2023).

118 A Lesnikowski and others 'What does the Paris Agreement mean for adaptation?' (2017) 17 *Climate Policy* 825-831, https://doi.org/10.1080/14693062.2016.1248889 (accessed 16 August 2023).

119 EL Tompkins and others 'Documenting the state of adaptation for the global stocktake of the Paris Agreement' (2018) 9 *WIREs Climate Change*, https://doi.org/10.1002/wcc.545 (accessed 16 August 2023).

120 JS Simmonds and others 'Moving from biodiversity offsets to a target based approach for ecological compensation' (2020) 13 *Conservation Letters* e12695.

121 Santos and others (n 83).

122 T Ourbak & L Tubiana 'Changing the game: The Paris Agreement and the role of scientific communities' (2017) 17 *Climate Policy* 819-824, https://doi.org/10.1080/14693062.2017.1348331 (accessed 7 October 2023).

consistent reports of their adaptation activities.[123] The UNFCCC recognises that achievement of the NDCs depends greatly on the availability of financial and technological support to developing countries.

Supported by article 9, PA's obligation for developed country parties to provide financial support to assist developing country parties with mitigation and adaptation efforts led to the agreement to mobilise not less than $100 billion annually.[124] Serving as the fourth session, decisions 2 and 3 of the PA established the new fund for responding to loss and damage, and decision 4 established a transitional committee to assist on the operationalisation of the new funding arrangements for responding to loss and damage.[125] However, the committee still lacks clarity on the sources and scope of the application of the new funding arrangements.[126]

Yet, Africa faces financial deficits. Between about $1.3 trillion and $1.6 trillion, averaging $1.4 trillion, will be needed between 2020 and 2030 to implement Africa's climate action commitments and NDCs, while accessing the current fund is difficult for vulnerable communities due to application complexities and delays in disbursement.[127] The existing financial opportunities should be transformed to enable the timely disbursement of funds. For the new funding arrangements, more clarity should be given to the transition committee to guide them on the scope and mode of application of the funds. A policy arrangement that protects the rights of groups in vulnerable situations, such as Indigenous Peoples, the youth, persons with disabilities and women, is key. Such a policy approach also requires the inclusion and prioritisation of biodiversity enhancement actions in the NDCs of states.[128]

4 Conclusion

The challenges in addressing climate change are increasingly becoming urgent with windows of opportunity seemingly closing due to its anticipated greater impacts. L&D is associated with climate change in developing countries and

123 J Ellis & S Moarif 'Identifying and addressing gaps in the UNFCCC reporting framework' OECD/IEA Climate Change Expert Group Papers, vol 2015/07, OECD/IEA Climate Change Expert Group Papers (1 November 2015), https://doi.org/10.1787/5jm56w6f918n-en (accessed 7 October 2023).

124 JA Leggett 'The United Nations Framework Convention on Climate Change, the Kyoto Protocol, and the Paris Agreement: A summary' UNFCCC, New York 2 (2020) (accessed 5 October 2023) Paris Agreement (PA).

125 As above. Decision 2/CMA.2 'Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts and its 2019 review' 2021; Decision -/CMA.3 'Glasgow Climate Pact' 2022; Decision; Decision 2/CMA.4 'Funding arrangements for responding to loss and damage associated with the adverse effects of climate change, including a focus on addressing loss and damage' FCCC/PA/CMA/2022/10/Add.1.

126 Leggett (n 24).

127 V Songwe, N Stern & A Bhattacharya 'Finance for climate action: Scaling up investment for climate and development' Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science, London.

128 Jellis & Moarif (n 123).

negatively affects human and natural systems. More importantly, as the article has illustrated, it has occasioned displacement in different parts of Africa. This development has implications for groups such as women, children, the youth, elderly and Indigenous Peoples mostly in developing countries that are highly dependent on climate-sensitive resources and with low technological, financial and adaptive capacities. The need to address mobility induced by L&D requires an integrated policy approach and a coherent implementation strategies in Africa.