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Research article

Biodiversity, Ecomusicology and Fostered Nominal Ecology

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Abstract

The trajectory of different nations of the world has recently been fixated on climate actions and sustainability. The African continent has joined the train too, as countries begin to take strides toward the United Nations' Sustainable Development Goals on sustainable society and climate action. Thus, it becomes necessary to inquire about the viability of a combination of the traditional beliefs and cultural ethos with ecological projects, in achieving these sustainable development goals. Could the already established indigenous systems in Africa be of practical contribution to the protection of biodiversity, environmental sustainability, and other climate actions? Could these already institutionalised and ethnographic programmes engender inclusive climate activity? Nigeria boasts of diverse ecological and biocentric indigenous beliefs, cultures and practices. One of such is the Osun-Osogbo sacred grove. This grove is a concentration of flora and fauna diversity, which has been preserved for years and has also been rooted in spiritual and physical beliefs. Some of the fauna species found in this grove are the African Civet, African giant Snail, and African giant Rat, among others which include Aves. Some flora species include African teak, Camwood, Palm tree, bamboo, and a host of others. Also, music has played a major role in the advocacy for conservation and environmental protection. Singing some songs at the Osun-Osogbo grove and during the Osun-Osogbo festival ensures orientation, sensitisation and promotion of eco-friendly habits, thereby serving ecomusicological purposes. This study therefore focuses on the Osun-Osogbo grove and indigenous values to present a possible sustainable society. Thus, as a response to climate change, this paper draws on these values and the Osun-Osogbo grove to propose conservationism, and artificial cultivation of biodiversity for climate change adaptation, mitigation and resilience, using indigenous methods.

Keywords: biodiversity, climate change, great green wall, conservationism, ecomusicology

SUSTAINABLE DEVELOPMENT GOALS **Climate Action, Life on Land**

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Introduction

There are continuous shreds of evidence of climate change. "Global temperatures have steadily risen over the last century, and according to scientists, 2005 was the warmest year on record, and the warming trend is expected to continue through the 21st century and beyond" (Olaniyi, Ojekunle & Amujo, 2013, p. 58). As the earth gets warmer, there are attending extreme weather events such as flooding, heat waves, cyclones, droughts, etc. More terrible consequences of these events include loss of biodiversity, extinction of plant and animal species including aquatic life. The climate situation in Africa is an example. According to Al-Zu'bi et al (2022), "the past decades highlight that climate change poses major threats to biodiversity, ecosystems and ecosystem services in Africa, with impacts expected to increase. Scenarios predict fast-paced extinction of species, loss of natural habitats and ecosystem services, and shifts in the distribution and abundance of species during the twenty-first century" (p. 1081). Perhaps it may sound more serious to establish that, "the earth has experienced five mass extinctions before the one we are living through now, each so complete a wiping of the fossil record that it functioned as an evolutionary reset…" (Wallace-Wells, 2023, p. 8). This puts the totality of human existence in grave danger. In yet another way, this underscores the actuality of climate migration and climate displacement. For instance, "concern over the negative impact of climate change has strengthened fears that environmental degradation and demographic pressures will displace millions of people in Africa and create serious social upheaval" ("The Impact of Climate Change," 2023, p. 1). Among the human societies, there has been increase of wildfires, rise in sea level caused by melting of glaciers and sea ice, ocean acidification, drought, flood, heatwaves, air pollution, etc. This in the long term may result into environmental degradation, poverty, social insecurity, water scarcity, forceful displacement, migration, increase in disease spread and food insecurity, which is already being recorded across many regions. The Food and Agriculture Organization of the United Nations (FAO) records that, "in spite of the considerable progress made during the last several decades in reducing hunger, as of 2015 almost 800 million people are chronically undernourished. An estimated 161 million children under five years are stunted.

Also, Globally, 500 million people are obese and over two billion people lack the essential micronutrients they need to lead healthy lives" ("Climate Change and Food Security," 2015, p. ix). The Global Report on Food Crises of the World Food Programme, reveals that, "in 2020 approximately 98 million people suffered from acute food insecurity and needed humanitarian assistance in Africa, which is an almost 40% increase from 2019" ("State of the Climate in Africa," 2020, p. 22). "Climate change is also likely to affect biodiversity and the ecosystem goods and services that we rely on for human health. Changes in temperature and rainfall may also affect the distribution of disease vectors, e.g., those of malaria and dengue, and the incidence of diarrhoeal diseases" (A. Haines, Kovatsa, Campbell-Lendrumb and Corvalan, 2006, p. 586). As claimed, "these and other climate change impacts are diminishing human and environmental wellbeing, and will reduce them further unless 'drastic measures to achieve as quickly as possible zero net greenhouse gas emissions' are taken" (Goklany, 2021, p. 1).

One of the measures which this paper brings to the fore and emphasises is, conservationism through indigenous cultural systems. Interestingly among Africans, and for example, amidst the Yoruba people of Nigeria, this reflects in the traditional religion and cultural canons which are often expressed through activities such as music, folklore, etc. The Yorubas and Africans in general,

use singing and music to promote values, such as animism, conservationism, preservationism, biocentrism, and healthy eco-relationship.

Misconceptions on Climate Change

There have been various contestations around the causes of climate change, which are categorised into "natural and man-made causes" (Crowley, 2000; Paehler, 2007, as cited in Onoja, Dibua & Enete, 2011, p. 470). As corroborated and elaborated by Ojekunle et al. 2014, there are two major factors responsible for climate change, and these are: "natural processes (bio-geographical) and human activities (anthropogenic). The extraterrestrial or extragenic factors include solar radiation quantity (sunspot), quality (ultra violet radiation change) and meteor… A high solar quality and quantity and period of perihelion (when the earth is nearest to the sun), result in heating up of the earth surface which lead to global warming" (Ojekunle et al. 2014, p. 1). However, researches conducted over the years show that, human activities are responsible hugely for global warming or climate change. "Human activities, especially the burning of fossil fuels since the start of the Industrial Revolution have increased atmospheric CO_2 concentrations by about 40%. More than half of the increase has occurred since the 1970s" (The National Academy of Sciences, 2009; The Royal Society, 2014, as cited in Berlie, 2018, pp. 145-146). Also, "apart from the industrial revolution, other anthropogenic activities include excessive agricultural operations, which further involve the high use of fuel-based mechanization, burning of agricultural residues, burning fossil fuels, deforestation, national and domestic transportation sectors, etc." (Huang et al. 2016, as cited in Abbass et al. 2022, p. 42541). "About 5.4 billion metric tons of carbon is released into the atmosphere annually from the burning of fossil fuel. About 1.6 billion metric tons of carbon is in addition emitted into the atmosphere by deforestation for agricultural and other land use purposes" (Aizebeokhai, 2009, p. 872). All of these indict us – humans. "The Intergovernmental Panel on Climate Change (IPCC) (2014) indicates that if GHG emissions continue to rise at their current pace, the world will be negatively affected by a rise in sea levels, shifts in growing seasons, loss of biodiversity and increased frequency and intensity of extreme weather events, such as heat waves, storms, floods and droughts" (Godfrey & Tunhuma, 2020, p. 4). Therefore, while the debate remains among the climate change or anthropogenic global warming deniers, the "skeptics" (Berlie, 2018, p. 151), or the scientists and environmental activists who name humans as the climate change culprits, one thing is sacrosanct: these other mentioned causers cannot drive a move towards a reversal of the climate menace. Automatically, it leaves the onus of climate action/agency with us – humans.

Climate change is a global issue that also affects everyone, though unequally. According to Lisa Woynarski, "the urgency of climate change and its associated effects have created an ecological imperative for all fields to address" (p. 2). Scientific efforts like the use of renewable energy, carbon capture, storage and utilization, negative emissions technologies, soil carbon sequestration, direct air carbon capture and storage, ocean fertilization, ocean alkalinity enhancement, marine sky brightening, stratospheric aerosol injection, etc (Fawzy, Osman, Doran & Rooney, 2020, pp. 2074-2086), are being made, researchers in the fields of education, architecture, business, and other disciplines, must contribute their quotas too, and across all nations. As stated in the 2015 Paris

Agreement, concerted efforts must be made by all nations to ensure that the average global temperature is reduced and limited to 1.5ºC ("The Paris Agreement," 2016, p. 3).

According to a study conducted by Calverley and Anderson (2022), "a 50% chance of meeting the 1.5°C target requires all developing countries to cease coal production (and, by extension, consumption) by 2040. For oil and gas, the same study estimated that all countries would need to eliminate oil and gas production between 2034 and 2050" (as cited in Laan & Maino, 2022, p. 1). The sad reality however remains that, there are many countries whose mainstays are crude oil and the sustenance of their collective and individual economies are dependent upon the fossil fuel business. According to Shrivastava, Kasuga & Grant, 2023, within these petrostates, "the oil industry is fighting fiercely to weaken and delay carbon reduction policies" (p. 2). The reality of the oil industry business brings to the fore the difficulty in achieving this consensus of phasing out fossil fuel soon enough, or its impossibility at all. For example, in Nigeria, "about 80% of the government income, 90-95% of the export earnings and more than 90% of the foreign exchange revenues evolve from the oil sector" (Olaniyi, Ojekunle & Amujo, 2013, p. 57), thus, positioning the country as "the sixth largest exporter of oil in the world" (Onyema, 2018, p. 189). Today, oil fields are still owned and operated by indigenous and international oil companies in Nigeria. In essence, the many individuals feeding fat from the continuous damage of the ecosystem would surely find it difficult to let go or diversify to eco-friendly alternatives.

Thus, while we think about decarbonisation and cutting down methane emission, which is also a contributor to the GHG menace and creation of ozone holes, we must embrace all options available, from scientific to indigenous. In this regard, it is germane to be cognizant of climate resilience, adaptation, recovery and mitigation. A good way to go is the conservation and cultivation of artificial ecologies. As humans are affected by climate change, it must be noted that, global biodiversity is also a chronically affected victim "because it is the fastest emerging cause of species loss" (Abbass et al. 2022, p. 42545). Thus, guarding against biodiversity loss is non-negotiable. No doubt, this will serve purposes of environmental sustainability, species protection and conservation, decarbonisation and sliming the chances of extreme weather events (EWE) such as floods, heat waves, tropical cyclones, desertification, etc. As a result, no measure or option should be jettisoned. A critical focus on fostered nominal and indigenous ecologies may be a magic for climate survivalism – a brace or forestall of climate crises and disasters, especially in Africa where the "climate is likely to be affected more severely than that of other regions" (Collier, Conway, & Venables, 2008, p. 2). Already, climate crises are being recorded across the continent, therefore, it is wise to nip the situation in the bud.

Climate Change in Africa

Africa as a continent in the Global South bears the burden of climate change, despite having little contribution to the emission of greenhouse gases. In the Emissions Gap Report 2020, "the G20 nations collectively account for 78 percent of all emissions…The top four emitters (China, the United States of America, the European Union and India) contribute to over 55 percent of the total emissions over the last decade, excluding emissions from land-use change such as deforestation…" (Godfrey & Tunhuma, 2020, p. 4). In spite of Africa's "minuscule contribution to the greenhouse gas emissions that cause climate change" (Selormey, Dome, Osse, & Logan, 2019,

p. 1), "Africa has been identified as one of the parts of the world most vulnerable to the impacts of climate change" (IPCC 2014; Niang et al. 2014, as cited in Serdeczny, Adams, Baarsch & Coumou, 2017, p. 1587), and the continent feels this impacts global increase in temperature "in many different ways, with changes in hydroclimate, biodiversity and wildfire dynamics already visible today" (Al-Zu'bi et al. 2022, p. 1078). "The majority of both bottom up and top down ('integrated assessment') studies suggest that damages from climate change, relative to population and GDP, will be higher in Africa than in any other region in the world" (Godfrey & Tunhuma, 2020, p. 26). "The UN estimates nine out of every 10 disasters are climate-related" (Holmes, 2008, as cited in Brown & Crawford, 2009, p. 9). Therefore, Africa cannot afford to stand aloof, hence; climate action is on Africa's priority list, with mitigation or adaptation measures being imperative.

There are several reasons why Africa must prioritise climate action, the first of which is that "the rest of the world will impact on Africa…The second reason is that there is one area where Africa is fast becoming a major greenhouse gas emitter. This is from land use change, in particular deforestation…for which Africa now accounts for 20% of world emissions (with world emissions from land-use change amounting to around 20% of total anthropogenic emissions) (Collier, Conway, & Venables, 2008, p. 353). Another reason is that Africa's vulnerability and the already emerging realities of climate change impacts the continent. This is due to facts from records that, "the continent of Africa is warmer than it was 100 yr [*sic*] ago. Warming through the 20th century has been at the rate of about 0.5°C century…with slightly larger warming in the June–August (JJA) and September–November (SON) seasons than in December–February (DJF) and March–May (MAM)" (Hulme, Doherty, Ngara, New & Lister, 2001, p. 149). What this translates to is that, now, there are significant effects of climate change on the continent. In different regions of Africa, reports of climate and extreme weather and environmental crises are rife. For instance:

> Flooding that occurred over Africa in 2020 was extensive across many parts of East Africa, with Sudan and Kenya the worst affected: 285 deaths were reported in Kenya, and 155 deaths and over 800,000 people were affected in Sudan. Moreover, there were further indirect impacts from diseases. Countries reporting the loss of life or significant displacement of populations included Sudan, South Sudan, Ethiopia, Somalia, Kenya, Uganda, Chad, Nigeria (which also experienced drought in the southern part), the Niger, Benin, Togo, Senegal, Côte d'Ivoire, Cameroon, and Burkina Faso. Many lakes and rivers reached record-high levels, including Lake Victoria (in May) and the Niger River at Niamey, and the Blue Nile at Khartoum (in September). ("State of the Climate," 2020, p. 18).

This is the same situation across other regions of Africa where extreme events are being recorded. In central Africa, "heavy rainfall in the region caused the bursting of the Congo River and the Mayo Palar. Adverse impacts included the collapse of the Corniche Monument in the Congo (Brazzaville) and of Palar Bridge in Cameroon (Maroua) in January and August 2020, respectively, as well as the economic losses in transboundary exchanges between Cameroon and Chad (the Palar case)" ("State of the Climate," 2020, p. 18). The events that usually follow are flooding. The flood is then accompanied by various disease outbreaks and it also displaces both human and animal species. "Currently, more than 11 million people are experiencing crisis or emergency levels of food insecurity in nine southern African countries (Angola, Eswatini, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Zambia and Zimbabwe) due to deepening drought and climate crisis…In

West Africa, climate risks, food insecurity and metastasizing violence are all set to intensify in the Sahel region" (Godfrey & Tunhuma, 2020, p. 2). "In the western Sahel…a 20 % decline in tree density and a significant decline in species richness across the Sahel have been observed for the second half of the twentieth century and attributed to changes in temperature and rainfall variability" (Gonzalez et al. 2012, as cited in Serdeczny, Adams, Baarsch & Coumou, 2017, p. 1594). In the same vein, econometric evidences are pointing to the fact that climate change and particularly, global warming, has a harsh effect on the African majorities and those from developing countries whose major livelihoods are hinged upon the Agricultural sector.

While climate change poses many threats to humans, there are also far-reaching environmental impacts, which bother much about extreme geophysical events, biodiversity, animals and plant species (Afolabi, Okpadah and Ogunmekan 2023, Okpadah and Osakue 2021, Okpadah 2020). "Soil erosion and reduced biodiversity have increased food shortages, led to the spread of disease, and exacerbated mass migration, which further compound the destructive effects of climate change in a negative feedback loop" (Gleick 2014; Crane, Roncoli, and Hoogenboom 2011; Yamba, Walimwipi, Jain, and Zhou 2011, as cited in Isaacman & Musemwa, 2021, p. 10). "Biodiversity is an important resource for African people. Uses are consumptive (food, fibre, fuel, shelter, medicine, wildlife trade) and nonconsumptive (ecosystem services and the economically important tourism industry). Given the heavy dependence on natural resources in Africa, many communities are vulnerable to the biodiversity loss that could result from climate change" ("Impact of Climate Change," n.d. p. 3). It is safe to bear in mind that, "there is evidence that Africa is warming faster than the global average and this is likely to continue" (Collier, Conway, & Venables, 2008, p. 338). Regrettably, "climate change has already affected the marine animals of Africa. Coral reefs in the Indian Ocean experienced massive bleaching in 1998, with over 50 percent mortality in some regions" (Spalding 2001, as cited in "Impact of Climate Change," n.d. p. 4). As the situation worsens, "irreversible changes are expected at further warming of 1ºC above present…there is also an associated risk that some species and even whole ecosystems will be placed at risk of extinction (Po¨rtner et al. 2014; Drinkwater et al. 2010, as cited in Serdeczny, Adams, Baarsch & Coumou, 2017, pp. 1594-1595). Important to note is that, "Africa occupies about one-fifth of the global land surface and contains about one-fifth of all known species of plants, mammals, and birds in the world, as well as one-sixth of amphibians and reptiles" (Siegfried 1989, as cited in "Impact of Climate Change," n.d. p. 4), also "Africa is immensely rich in biodiversity and contains an estimated one-fifth of all known species of mammals, birds and plants, as well as one-sixth of reptile and amphibian species" (Al-Zu'bi et al. 2022, p. 1081). "Africa's biodiversity is concentrated in several unique native environments. The Cape Floral Kingdom (fynbos), which occupies only 37,000 square kilometres at the southern tip of Africa, has 7,300 plant species—of which 68 percent occur nowhere else in the world" (Gibbs, 1987, as cited in "Impact of Climate Change," n.d. p. 5), thus, this underscores the imperative of protecting African biodiversity. Biodiversity loss in Africa would leave a large tear in the global biodiversity fabric. For example, the "2007 National Adaptation Programme of Action (NAPA) for Burkina Faso identified four sectors as particularly vulnerable to climate change: water, agriculture, stockbreeding and forestry/fisheries" (Brown and Crawford, 2008, p. 48). It is predicted that there would be a decrease in forestry biomass "from 200 million cubic metres in 1999 to little more than 110 million cubic meters by 2050" (MECV & SP/ CONEDD 2007, as cited in Brown & Crawford, 2008, p. 48). This prediction might not be peculiar to Burkina

Faso alone. For example, it has been noticed that in Africa "climate change affects the distribution of the endemic Ethiopian wolf (*Canis simensis*) and the African elephant (*Loxodonta africana*) by reducing the amount and availability of suitable habitats. Similarly, climate change induces habitat expansion of invasive species such as the shrub *Prosopis juliflora*, which suppresses the growth, availability and quality of palatable plant species" (Al-Zu'bi et al. 2022, p. 1081).

At the 2009 Copenhagen Conference of Parties (COP), the African Union (AU) established a common position on climate change and this has since set the injunction for African negotiators, and with the position set up on the concept of environmental justice, holding that, Africa contributes insignificantly to greenhouse gas emissions and therefore, must prioritise adaptation. This has birthed the use of strategies and actors such as multiculturalism, bilateralism and regionalism (AU/AMCEN, 2009; Ramsamy, Knoll, Knaepen, & Wyk, 2014, as cited in Tsega, 2016, p. 8). Now, "many African governments have laid out their countries' vulnerabilities in agriculture, water resources, food security, livelihoods, and other sectors and have incorporated climate change mitigation in national plans" (Selormey, Dome, Osse, & Logan, 2019, p. 1). However, our best is still not enough. In the spirit of climate action and adaptation, we need to look more keenly into areas such as biomass and biodiversity protection, conservation and regeneration, and through fostered nominal ecologies. This must be by individual and collective concerted, pragmatic and intentional efforts of African states. A good initiative to take a cue from is the Great Green Wall.

> The Great Green Wall Initiative is regreening the Sahel, restoring degraded lands and providing decent livelihoods for its people, snaking the Sahel from Senegal in the West to Djibouti in the East, restoring degraded lands and providing jobs and opportunities for millions of people in Africa. The Great Green Wall is an African-led movement launched in 2007 by leaders from the Sahelian countries, with an epic ambition to grow an 8,000 km natural wonder of the world across the entire width of Africa ("The Great Green Wall," 2008, p. 2).

Over the years, the Great Green Wall has been known "as a major vehicle for combating desertification in the Sahel. It has evolved a long way from its original, narrow, and potentially harmful interpretation as a line of trees from the Atlantic to the Red Sea. The GGW is now viewed by many as an ambitious plan to restore degraded landscapes and to sustainably manage land through a mosaic of land uses" (Davies, 2017, p. 1). Also, mention needs be made about projects such as, "greenbelt in Niamey (1965), the green dam in Algeria (1971) and the greenbelt in Nouakchott (1975)" ("The Great Green Wall Initiative," 2008, p. 9). In the same vein, "In 1977, Wangari Mathai, the first African woman to receive the Nobel Peace Prize in 2004, founded the Green Belt Movement in Kenya. The movement planted and grew 51 million trees in Kenya's three major mountain ecosystems: the Aberdares, Mt. Kenya and the Mau Complex" (Gravesen & Funder, 2022, p. 10). She "considered tree planting a way of breaking the cycle of poverty, saying 'poverty is both a cause and a symptom of environmental degradation'" (Maathai in Nixon 2011, as cited in Woynarski, 2020, p. 41). These laudable efforts and achievements are not only to mitigate desertification, they serve various other environmental and climate action purposes such as decarbonisation, flood control, biodiversity regeneration, etc. In Nigeria, for example, an important biodiversity is the Osun Osogbo grove. Some others Idanre Hills in Ondo state, Igbo-Olodumare sacred grove also in Ondo state and Ogun-Onire sacred grove, located in Ekiti state.

Also, other sites in Nigeria, rich in biodiversity "7 National Parks of Old Oyo, Cross River, Gashaka-Gumti, Okomu, Chad Basin, Kainji Lake, and Kamuku; 27 Important Bird Areas including all National Parks and 60% the Ramsar sites; 11 Ramsar Sites…994 Forest Reserves; 32 Game Reserves; 1 Biosphere Reserve; and many Sacred groves at varied level of protection" ("National Biodiversity Strategy," 2015, p. iv). It is advisable that such models as this should be considered across other spaces in the country and the African continent.

Biodiversity, Conservationism, Preservationism and Ecomusicology in the Osun-Osogbo Sacred Grove

The Osun-Osogbo grove in Osun state Nigeria, is a world-known green space harbouring plants, animals, insects, a major water body and other biotic and abiotic ecosystem components. The grove is a "unique landscape that combines important environmental, biological and cultural features" (Ogunfolakan, Nwokeocha, Olayemi & Olayiwola, 2016, p. 243). "Osun-Osogbo Sacred Grove is located along the bank of the Osun River in Osogbo Local Government Area of Osun State, South-Western Nigeria" (Oseghale, et al, 2014, as cited in Okosodo & Sarada, 2021, p. 60). "It covers an area of 75 hectares and is encircled by a buffer zone of 47 ha" (IUCN, 2005, as cited in Oyeleke, Ogunjemite, & Ndasule, 2017, p. 441). "It is filled with 40 sanctuaries and shrines, two palaces and several sculptures and works of art in memory of the goddess Osun and other gods" (Onyekwelu & Olusola, 2014, as cited in Agbelade & Ojo, 2020, p. 134). The grove is "mainly dominated by vegetation with the remaining parts as bare lands (due to inflows of visitors) and water body. Most of the cultural values identified in the sacred grove are located under vegetation. They include sculpture of Yemoo, Iyana Arugba, the flying tortoise Egungun, *Lajomi, Kanmololu, Oguntimeyin, Pajepolobi, Arenugbongi, Eyefodo* (*Ile eleye*)*, Egun meta*…" (Adesoji & Tolulope, 2020, p. 4). "Osun-Osogbo Sacred Grove in Nigeria is one of the major biodiversity hotspots in sub-Saharan Africa with high plant diversity…" (Fisayo & Obafemi, 2017, p. 21). "The cultural/natural site is particularly important to the local Osogbo people, serving as their traditional sacrifice grounds, especially during their annual "Osun Osogbo" Festival" (Wahab, Alarape & Ayodele, 2015, p. 2). By local belief and laws, the grove is protected against anthropogenic activities such as poaching, fishing, tree felling, farming, etc. it is believed that, "regardless of gender or color, anyone who breaks the ancient rules faces death, the goddess' wrath or inundation, imbecility or insanity, and unproductiveness; however, consequences based on conventional laws are less severe and do not prevent future offenders from committing the crime" (Adeyemi & Ayinloye, 2020, as cited in Manyam & Japhet, 2022, p. 75).

As a result of decade-long conservation, which has been sustained by local and spiritual beliefs, and government laws, several plant and animal species are still existing in the grove. For example, some rare bird species reported to be found in the Osun-Osogbo grove include "Malinbus ibadanesis, Coracias cyanogaster, Spizaetus africanus, Ceratogymna Cuculus clamosus and Yellow Mantled Weaver" (Okosodo & Sarada, 2021, pp. 66-67). According to research conducted by Ugbe and Kuje (2022), in the Osun-Osogbo grove, "a total of 32 tree species, belonging to 19 families were encountered at the core zone of the sacred grove…At the buffer zone of the sacred grove 27 tree species belonging to 17 families were encountered…At the outer zone of the grove, 11 tree species were identified from 10 families…" (p. 45). Some of the names of the flora species in

the Osun-Osogbo grove are: Mountain thistle (Acanthus montanus) which is known as *Ahon ekun* locally, Adenia (Adenia cissampeloides), which local name is *Arokeke,* African Mahogany (Afzelia Africana), known as *Apa* locally, White siris or karoi tree (Albizia procera, known as *Ayunre* locally, Murarahomba (Alchornea laxiflora) known as *Ijan* locally, Cheese wood (Alstonia boonei), called *Ahun* locally, African custard-apple (Annona senegalensis), called *Arere* locally, Cabbage tree (Anthocleista djalonensis), known as *Sapo* locally, Sacking tree (Antiaris toxicaria), called *Ooro* locally, Common bamboo (Bambusa vulgaris), called *Oparun* locally (Ugbe & Kuje, 2022, p. 45), among many others.

Among the many fauna species found in the grove are: African civet (Civettictis civetta), African Cuckoo (Cuculus gularis), African giant rat (Cricetomys gambianu), African giant snail (Gastropoda spp), African Grey Hornbill (Tockus nasutus), African Palm Swift (Cypsiurus parvus), African tortoise (Centrochelys sulcate), Vinaceous Dove (Streptopelia vinacea), etc., being "total of 43 fauna species was sighted at the sacred grove" (Ugbe & Kuje, 2022, p. 45).

A prime factor in the conservation of the Osun-Osogbo grove is the cultural/spiritual hinge connecting most people around the grove to biodiversity. Thus, anthropogenic activities that would have been carried out by the same people in other non-restricted zones, would not be carried out in sacred groves such as the Osun-Osogbo sacred grove. This "interaction between culture and biodiversity has also assisted in the protection of certain endangered species of wildlife such as the Sclaters Guenon (Cercopithecus sclateri), which is not only available in the wild in Taylor Creek and Stubbs Creek Forest Reserves, but also in abundance in sacred forests in Akpogueze community in Anambra State and Langwa community in Imo State" ("National Biodiversity Strategy," 2015, p. 12). According to Oladeji, Osanyinleye and Lawal (2021), the Osun-Osogbo forest "is secured using taboos, rituals, dedicating the forest to deities, government and grove guards. The local communities, priests and traditionalists play a significant role in the conservation of the grove, the use of ritual is one of the fundamental ways Osun priests preserve the biological and cultural features of the grove" (p. 105).

Also, music has been used to amplify the call for the preservation of the environment of the Osun-Osogbo grove, particularly the Osun river. The reason for this is found in the African concept of ecology. Africans are eco-cognizant and this is reflected in their music. According to Aniekan, 2016, "the African concept of ecology includes individuals (men, women and children), variously related with one another as members of families, societies, groups etc. This concept also has artificial (man-made) objects such as furniture, tools, machine, decorated materials etc, plants and animals. Natural or Cosmic objects such as sun, moon, mountain, air etc" (p. 165). Often, people sing special songs dedicated to the Osun goddess as the custodian of the river in order to eulogise her and inform others about the importance of the Osun river. For example, one of the songs dedicated to the Osun goddess and to the celebration of the Osun-Osogbo festival is:

Omi labuwe omi labumu

A kii b'omi s'ota omo araye

Araye o, e ma f'owo pa'da yeye omi loju

Iyemoja o, Oluweri

Ma f'omi b awa ja o, ebora inu omi

Yeye ma nbo o, ago l'ona o…

This song can be translated thus:

Water, it is what we drink and bathe with.

No one succeeds as an enemy against water

Let the world take note, never to incur the wrath of the water goddess

Iyemoja, Oluweri

Do not turn punish us with water

You water spirit

Here comes Yeye, pave the way…

This song constantly reminds us of how important water is. In this context, what is being referred to is any body of water such as rivers, oceans, seas, streams and lakes. The song encourages a good relationship with water bodies, ensuring to protect them so that they can also protect humanity. "The mythology of super-humans that allegedly dwell in rivers makes it clear that super-human creatures could be angry when their abodes in rivers are spoiled by human beings" (Olusegun, 2019, p. 72). Thus, an ecological relationship is being confirmed here. Further, the song eulogises *Iyemoja/Oluweri* the water/river goddess who is believed to hold many benefits for humanity. Essentially, songs such as this remind us that a good relationship with the environment promises good results. Importantly too, these songs have improved the reverence for the Osun river and the Osun-Osogbo grove.

However, a sad reality is that in spite of the indigenous methods such as using music to promote conservation, taboos, local and government laws of conservation and green spaces protection, anthropogenic activities are still reported in these conserved areas and it has posed a huge threat to sustainable biodiversity. For instance, though the Osun-Osogbo sacred grove is a model in this study, however, "current evidence indicates that the degradation of the ecological site could be largely attributable to neglect and unsustainable human activities (e.g. bushfire setting, grazing, hunting, farming, fuel wood harvesting, estate development, etc); a reasonable number of protected areas indicated encroachment and illegal occupation over the years" (Kotharri, 1989, as cited in Wahab, Alarape & Ayodele, 2015, p. 2). Also, due to rapid urbanisation and some other human activities, "biodiversity in Nigeria is under enormous pressure. For instance, the deforestation rate in Nigeria is about 3.5% per year, translating to a loss of 350,000-400,000 ha of forest land per year" (Ladipo, 2010, as cited in "National Biodiversity Strategy," 2015, p. 12). As biodiversity is depleted, there is a long-term effect on the environment, and the climate is, in the long run, affected. Thus, ever since it was discovered that biodiversity is threatened in Nigeria, "ecologists, conservationists and governments have recommended and adopted various conventional conservation methods. One of the methods that have gained attention in the recent past is the use of traditional practices in protecting and managing biodiversity, among which the sacred grove system is prominent" (Daye & Healey, 2015, as cited in Onyekwelu, Lawal, Mosandi, Stimm & Agbelade, 2021, p. 1). As well accepted and proposed in this paper, indigenous and/or

traditional conservation practices are viable options in biodiversity conservation, since Nigeria is a very religious and cultural society. In corroboration, since "sacred groves comprise stands of trees that are of special religious importance to a particular culture and based on its relevance, the conservation of species in the grove is guaranteed. Scared groves are well distributed among various cultures in Nigeria because a preponderance of the Nigerian population still practices traditional religion" (Imarhiagbe & Egboduku, 2019, p. 96). Also, though urbanization is a major challenge in climate change and conservation, urban development and green spaces can be possible, if we can take cues from "planning concepts such as garden city, green belt, green fingers and greenways highlight the need to preserve the natural environment of urban areas by incorporating many green spaces into the design of cities" (Mensah, 2014, p. 1). Essentially, with adequate and intentional agency, a green and pristine environment is not rocket science. Hence, the protection of nature is the protection of us all.

Conclusion

It has become a global concern to pay much cognizance to the environment. This is due to recurrent crises consequent of human negligence to natural *others.* Although several people do not believe that humans are responsible for climate change, for biodiversity loss and climate change, a vast majority of environmental scientists and activists believe that, the burden rests on our shoulders to take urgent and bold steps to salvage the planet. Africa is in no way exempted from the call to action as the continent stands at a great disadvantaged point in the climate turn. Foot-dragging will only lead to more climate crises such as flooding, insecurity (social, food, health, etc), more disease outbreaks, desertification, etc.

As a major stride in response to the climate emergency, the protection of biodiversity is non-negotiable. Nations of the Global South should give fostered nominal ecologies serious consideration. The Great Green Wall is a good model to foster a nominal ecology where flora and fauna species can be introduced for preservation and protection. Similar projects should be replicated across different spaces in the continent, and not restricted to the Sahel region of Africa alone. Why? We need carbon sinks. Nominal ecologies regarding the artificial cultivation of green spaces or the conservation of existing ones are important carbon sinks that could aid the decarbonisation process. Also, concerned agencies must ensure that stricter protective measures are taken in the protection of green spaces and reserved or conserved areas. Importantly, the government must employ indigenous and inclusive methods of biodiversity protection as it is with the Osun-Osogbo grove, emphasising the sacredness of the sites. In the same light, governments of African nations must be sure to arm their citizens with enough information, education, sensitisation, and provide them with alternative sources of food, energy, and livelihoods.

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