The impact of the industrialized nation's CO2 emissions on climate change in Sub-Saharan Africa: Case studies from South Africa, Nigeria and the DR Congo

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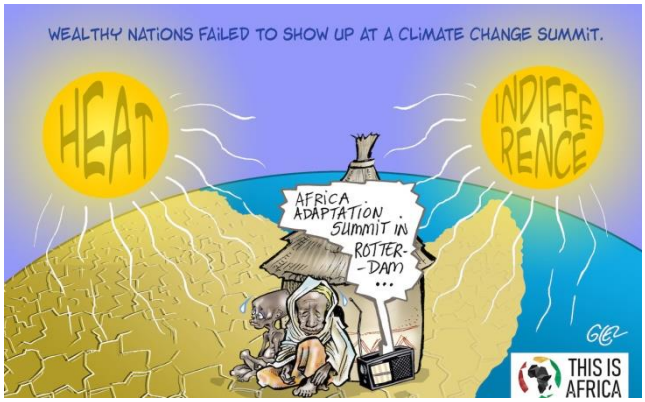
The impact of the industrialized nation's CO2 emissions on climate change in Sub-Saharan Africa: Case studies from South Africa, Nigeria and the DR Congo

Dirk Kohnert [1]

Wealthy nations snub African climate summit and remain indifferent to Africans' suffering [2]



Source: © Damien Glez; *This is Africa*, 9 September 2022

Abstract : Human activity has transformed the planet at a pace and scale unprecedented in recorded history, causing irreversible damage to communities and ecosystems. Countries have focused their capacities on economic growth, with too little attention to externalities in terms of environmental quality. The world will not avoid catastrophic warming unless wealthy nations accelerate their reduction of own emissions and help poorer countries to do the same. North America and Europe have contributed 62 % of carbon dioxide emissions since the industrial revolution, while Africa has contributed only 3%. However, it is in sub-Saharan Africa (SSA) that the impacts are most severe and the people most vulnerable. Developed countries, in their own interests, should focus on ways to help developing countries phase out fossil fuels and transition to renewable energy. However, there are tensions between richer and poorer nations over who should pay the costs of global warming. Rich countries have a responsibility to act more quickly than their low-income counterparts. Yet governments continue to subsidise the use of fossil fuels, and banks and companies still invest more in polluting industries than in climate solutions. The consumption habits of the richest 10 % of people generate three times more pollution than those of the poorest 50 %. Emerging economies such as China and India, which plan to achieve net-zero emissions by 2060 and 2070 respectively, should join the developed world in accelerating emissions reductions. It is not just the way we produce and use energy that needs to change quickly. It's the way we consume food, the way we protect nature. It's everything, everywhere, all at once. The agricultural sector is particularly vulnerable, especially in SSA countries where agriculture is central to the economy. Among the top eight countries with the highest cumulative net emissions from agriculture, forestry and other land use are two SSA countries, Nigeria and DR Congo. Most of these emissions are embodied in trade and are caused by consumption in regions such as Europe, the United States and China. The establishment of the Loss and Damage Fund agreed at COP27 will not be enough to turn the tide, nor will it necessarily translate into climate finance commitments, given the lack of progress in delivering the promised US$100 billion in annual climate finance from rich countries. African countries themselves need to reflect on their own strengths and step up their efforts in a timely and substantial way.

Keywords : Environmental sustainability, Carbon neutrality, climate change, Carbon dioxide, environmental pollution, greenhouse gas, fossil fuel, renewable energy, Governance, European Union, highly industrialized countries, emerging economies, BRICS, Sub-Saharan Africa, South Africa, Nigeria, DR Congo

JEL-Code: E26, F18, F54, F64, G38, H23, H84, H87, I15, I31, K32, N17, N37, N57, O13, O44, O55, Q54, Z13

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[1] Dirk Kohnert, associated expert, GIGA-Institute for African Affairs, Hamburg. *Draft*: 22 February 2024

[2] Referring to a meeting of African and other world leaders in Rotterdam on 7 September 2022, two months before the 27th United Nations Climate Change Conference (COP27) in Sharm El-Sheik, Egypt (AfDB 2022). The only Western leader to appear in person was the Dutch host, Prime Minister Mark Rutte (Glez, 2022).

1. Introduction

Cartoon 2: *The danger of carbon emissions to poor countries*

Source: © Rahma Cartoons, *cartoon-movement*, 28 August 2023

Two months before the 27th United Nations Climate Change Conference, commonly referred to as COP27, held from 6 November until 20 November 2022 in Sharm El Sheikh, Egypt, African and other global leaders rallied in Rotterdam, to highlight the urgency of climate adaptation funding for Africa. The former United Nations (UN) Secretary-General Ban Ki-moon, cautioned: "*The world has a fever. It burns hotter and higher with every day that passes … Statistics tell us that Africa is where the fever is at its most intense and people at the most vulnerable*." (AfDB, 2022).

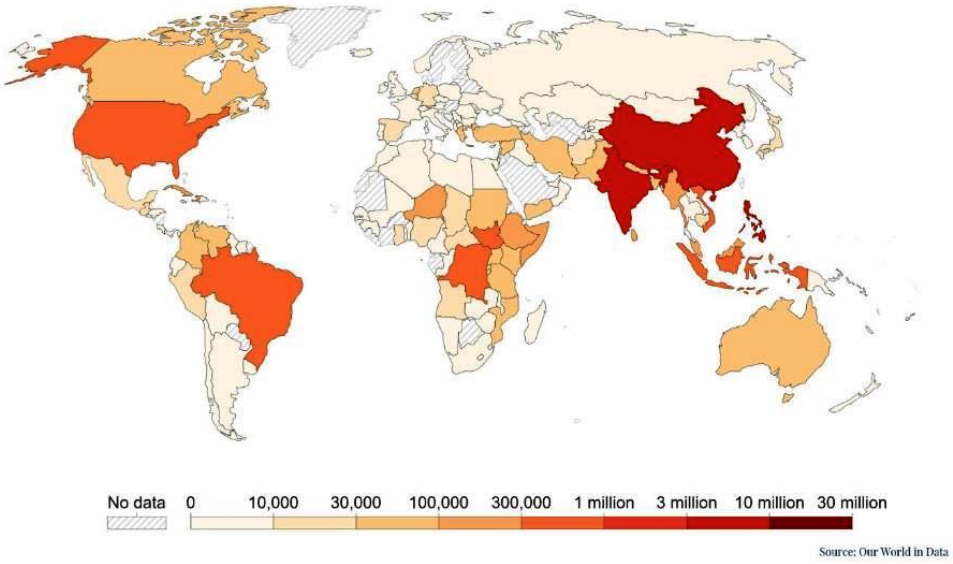
The world is on the brink of catastrophic warming, but few countries and institutions are acting fast enough, according to the UN's climate report. The report, published in March 2023 by the UN's Intergovernmental Panel on Climate Change (IPCC), found that the world is likely to miss its most ambitious climate target of limiting warming to 1.5 degrees Celsius above pre-industrial temperatures within a decade. Beyond that threshold, climate disasters will become so extreme that people will not be able to adapt (Kaplan, 2023). According to the Food and Agriculture Organization (FAO) of the United Nations (UN), malnutrition has increased by almost 50% since 2012, owing to the central role agriculture plays in African economies, allegedly causing 1.7 million deaths annually in Africa (Atwoli, et al., 2023).

The agricultural sector, such as farming, logging, fishing, and forestry, is particularly vulnerable to irreversible weather changes. This, in turn, is disrupting global consumption patterns, particularly in countries where agriculture is central to the economy and productivity. By shifting optimum temperature ranges, climate change is also increasing biodiversity loss by altering ecosystem architecture. Climate change increases the risk of food, water and vector-borne diseases (Raihan, 2023). Droughts in sub-Saharan Africa have tripled between 1970–1979 and 2010–2019. In 2018, devastating cyclones impacted 2.2 million people in Malawi, Mozambique, and Zimbabwe. More than two-thirds of Africa's population, for instance, depend on forest resources for their livelihoods, food, fuelwood, and grazing. In West and Central Africa, severe flooding resulted in mortality and forced migration from loss of shelter, cultivated land, and livestock (Atwoli, et al., 2023).

Africa has suffered disproportionately although it has done little to cause the crisis (Zielinski, 2023). North America and Europe have contributed 62 % of carbon dioxide emissions since the Industrial Revolution, whereas Africa has contributed only 3% (Atwoli, et al., 2023). Yet it is not just for moral reasons that the highly industrialized nations should be concerned for Africa. The acute and chronic impacts of the climate crisis create problems like poverty,

infectious disease, forced migration, and conflict in Africa that spread through globalised systems. This knock-on effect impacts all countries, including those of the European Union (EU) (Atwoli, et al., 2023).

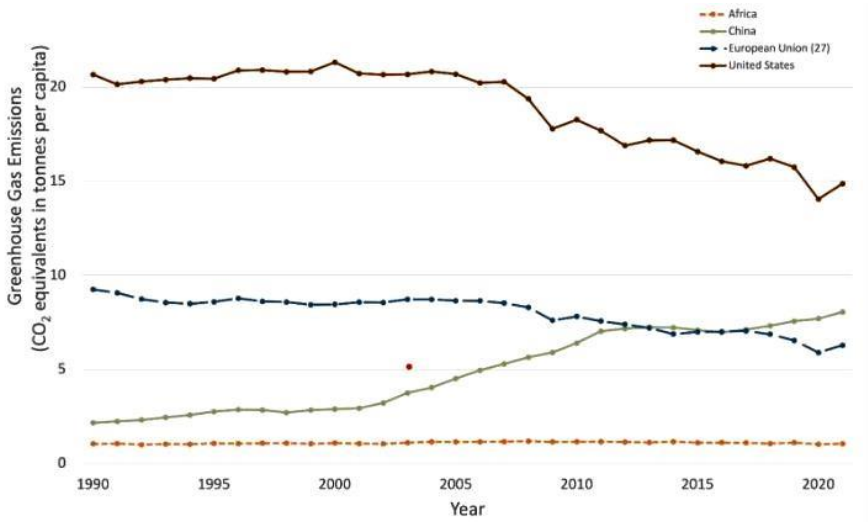
Graph 1: *number of in-country refugees caused by natural disasters*



Source: Raihan, 2023

Decades of delay have denied the world any hope of an easy and gradual transition to a more sustainable economy. More than 40 % of cumulative CO2 emissions have occurred since 1990, when the IPCC published its first study on the dangerous consequences of unchecked warming. Governments continue to subsidise the use of fossil fuels, and banks and corporations invest far more in polluting industries than in climate solutions. The consumption habits of the richest 10 % of people generate three times more pollution than those of the poorest 50 %, according to the report (Kaplan, 2023).

Graph 2: *Per capita greenhouse gas emissions (selected) in Africa, China, the EU and USA*



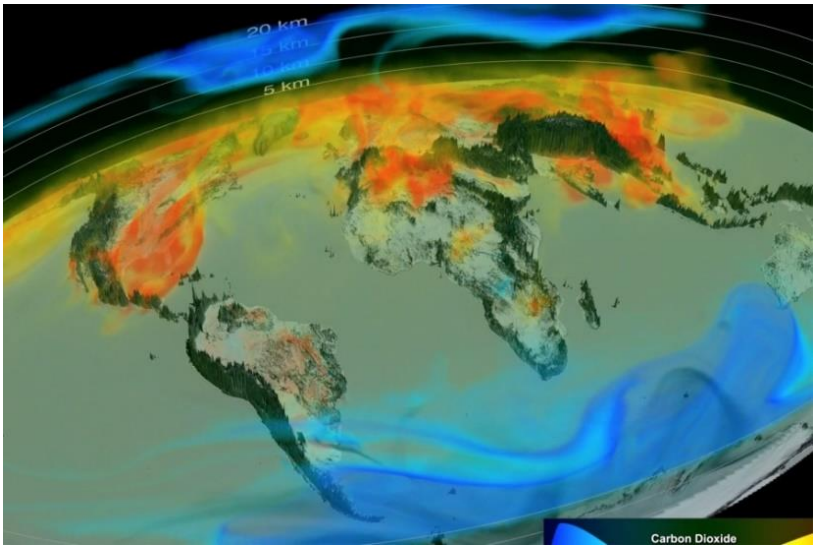
Source: Our World in Data based on the Global Carbon Project; Critchley, W, et al. 2023

Therefore, U.N. Secretary-General António Guterres demanded that rich countries have a responsibility to act faster than their low-income counterparts, with the developing world already suffering disproportionately from climate disasters. He urged the United States to eliminate carbon emissions by 2040, i.e. a decade earlier than the rest of the world. Also, emerging economies like China and India, which plan to reach net zero emissions in 2060 and 2070, respectively, should hasten their emissions-cutting efforts alongside developed nations (Kaplan, 2023). Christopher Trisos, director of the Climate Risk Lab in the African Climate and Development Initiative at the University of Cape Town, emphasised that it's not just the way we produce and use energy, but also the way we consume food, the way we protect nature, that we need to avert disaster. It's like everything, everywhere, all at once. Last, but not least, tackling climate change can help to address global inequalities, and vice versa (Kaplan, 2023).

Sustainable land management for small-scale farmers in Sub-Saharan Africa could mitigate climate change. Land is both a source and a sink of carbon dioxide (CO2), the chief greenhouse gas. About 50 % of human CO2 emissions are absorbed by plants on land and in the oceans. The highest CO2 mixing ratios are seen in the Northern Hemisphere during the winter months. As plants start to grow again in the spring, massive amounts of carbon are pulled out of the atmosphere, but not quite enough to offset the increase from human emissions. The CO2 released in the North mixes with air in the Southern Hemisphere, but this inter-hemispheric mixing can take about a year (Global Emissions, 2016).

Through sustainable land management, it can capture extra CO2 and store it as carbon in vegetation and soil. Adaptation practices include agroforestry, mulching and rainwater harvesting which confer ecological resilience, and simultaneously help secure production. This is especially valuable for land users in SSA who depend on rainfed agriculture (Critchley et al. 2023).

Graph 3: *A model of the behaviour of CO2 in the atmosphere, 2014/15*



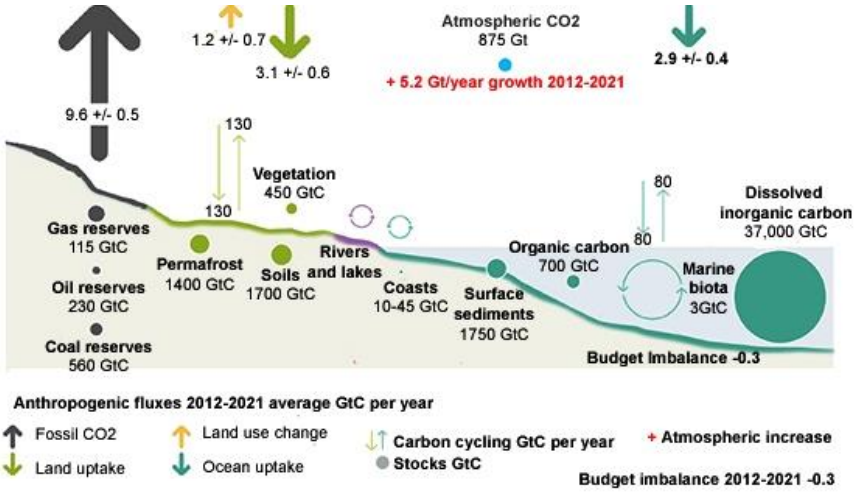
Source: © NASA. Credit: NASA; Global Emissions, 2016

Nonetheless, most countries are reluctant to phase out natural gas, mineral oil and coal. Countries, including those in sub-Saharan Africa, have focused their capacities on improving economic growth, with little attention to the associated externalities in terms of environmental quality (Gyamerah & Gil-Alana, 2022). In 2022 for example, China approved its largest expansion of coal-fired power plants since 2015. In March 2023, the U.S. government

endorsed a new Arctic drilling project, the Willow project, that is expected to produce oil for the next 30 years. With profits soaring, big oil companies are scaling back their clean energy initiatives and deepening their investments in fossil fuels also in Sub-Saharan Africa (ASS) (Kohnert, 2023; Kaplan, 2023). China's coal-based steel sector accounted for more emissions than the total emissions of the UK, Germany and Turkey combined. Meanwhile, China seeks to cut carbon emissions by switching from coal to gas. While LNG is cleaner than coal, it also produces greenhouse gases that contribute to global warming. Industry and many governments argue that LNG is a 'bridge fuel' between coal and renewables such as wind and solar. China is likely to dominate the growth in demand for LNG in the current decade, according to forecasts made by the multinational oil company Shell in February 2024. LNG continued also to play a vital role in European energy security in 2023, following a slump in Russian pipeline exports to Europe (AFP, 2024).

In 2022, the 27th UN Climate Change Conference (COP27) established a Loss and Damage Fund to respond to the human cost of climate change, whereby countries responsible for high carbon emissions will compensate vulnerable countries suffering from climate impacts. It is a response to climate injustice and climate debt, owed by the rich countries to the poor, excluded from health care, and living in fragile and conflict-affected states, notably in SSA (Wyns, 2022). The Fund was expected to become operational by the COP28 in December 2023. However, the global solidarity gap still hinders an adequate response to climate change. The establishment of the fund does not necessarily translate into climate finance commitments, with the poor progress in delivering the promised US$100 billion in annual climate funding from wealthy nations. Existing climate finance institutions, such as the Green Climate Fund, established in 2010, and the Adaptation Fund, launched in 2007, had elaborated application processes, and took years to distribute funds. They often struggle to reach local communities and the most vulnerable (Wyns, 2022). As for possible sources of funding, it has been proposed to remove fossil fuel subsidies and to tax fossil fuel and other carbon-intensive industries that are making exorbitant profits. This would generate tens of billions of dollars for the fund from the polluters responsible for the losses and damage (Wyns, 2022).

Graph 4: *The global carbon budget, 2012 - 2021*
How do human CO2 emissions compare to natural CO2 emissions?



Source: Mason, 2023

Significant changes in the post-Cold War era led BRICS member states like Brazil, India, China and South Africa to change their ideological framework, reposition themselves on the international stage, recognise new responsibilities and find common ground in the run-up to

the Copenhagen UN climate conference in 2009. The BRICS countries underwent a process of convergence that brought them closer to Russia, whose position called on major developing countries to take concrete action to reduce emissions. This process of convergence marked the beginning of the future BRICS partnership on climate change (Kıprızlı & Köstem, 2023).

The eight countries with the highest cumulative net emissions from land use, land use change and forestry (LULUCF), a key component of the global carbon cycle, are either located in carbon-rich, forested tropical regions (Brazil, DR Congo, Indonesia and Nigeria) and/or cover large areas (Brazil, Canada, China, India and Russia). Net LULUCF emissions are highest (in descending order) in Brazil, Canada, China, DR Congo, India, Indonesia, Nigeria and Russia, based on cumulative estimates between 1950 and 2021 (Obermeier et al, 2024). The differences are largest in Brazil, China, DR Congo and Nigeria. These top eight emitters accounted for more than about 53 % of total net LULUCF emissions in the period 1950-2021. They are therefore of paramount importance for mitigating climate change through LULUCF emission reductions. During the second half of the 20th century, high-net LULUCF hotspots became increasingly concentrated in countries of the Global South. More than 50 % of recent net emissions from LULUCF occurred in just three countries, Brazil, DR Congo and Indonesia, all in the tropics. Moreover, the availability of cheap fossil fuels can be the driving force behind a country's higher consumption, as in Nigeria. Apparently, there exists a one-way causality from energy consumption to carbon emissions, ruling out the validity of the conservation hypothesis in these economies. This could be a consequence of the region's heavy reliance on non-renewable energy consumption (Lawal, 2023). The problem may be more pronounced in developing countries, which are trying to accelerate their economic growth to overcome poverty while paying little attention to environmental concerns. The greater vulnerability of SSA countries to energy price shocks and interruptions in supply can increase their reliance on polluting energy sources such as oil, gas and coal and cause their pollution to grow (Kouyakhi, 2023).

Other things being equal, intensive farming might mediate the radiative balance between greenhouse gas emissions and soil carbon sequestration, e.g. in the controversial maize cropping systems of SSA (Zheng et al., 2023). Nevertheless, intensive farming remains the primary driver of the leaching of soil and the collapse in biodiversity. However, analyses found that nitrogen application reduced soil organic carbon (SOC) loss, likely through increased biomass yield and consequently belowground carbon allocation. Residue return switched the direction of SOC change from loss to gain. Such a benefit (SOC sequestration) was not compromised by negligible CH4 emissions nor outweighed by the amplified N2O emissions. Overall, it contributed to negative net global warming potential (GWP) (Zheng et al., 2023).

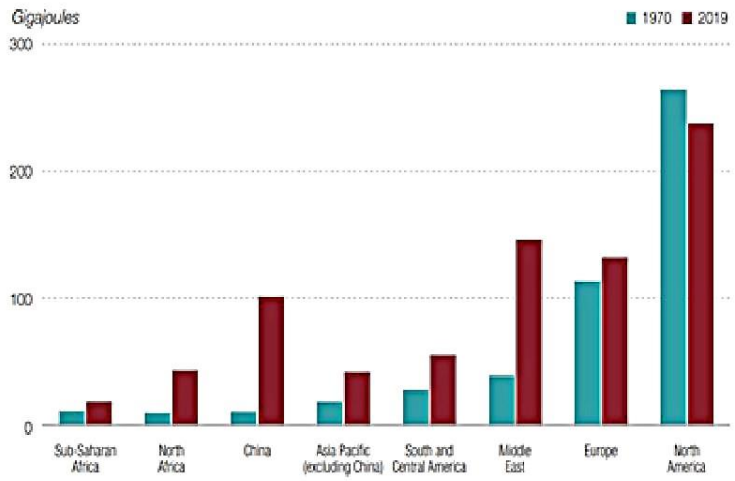
Similarly, greenhouse gas (GHG) emissions from livestock production, which are responsible for about 4% of global GHG emissions through methane production of animal agriculture (compared to an initial FAO estimate of 18%), could be reduced through breeding, and SSA is no exception. For example, total GHG emissions directly related to livestock production in southern Africa did not increase over 20 years, while the intensity of livestock-related GHG emissions (per kg of livestock product) decreased by 40 % (Scholtz et al., 2023).

On the other hand, an increase in climate change (CO2 emissions) will lead to a significant reduction in food production in SSA. This means that climate change appears to have contributed significantly to the food insecurity challenges in the region. Through changes in average temperature and rainfall patterns, climate change could exacerbate existing threats and problems related to food production in the SSA region (Fisayo & Oke & Fajingbesi, 2023).

In general, recent research on sectoral value chains and environmental pollution in Africa based on panel data for 40 African countries from 1990 to 2019, showed that deepening the agriculture, industry and services sectors' value chains participation increased the environmental pollution in Africa. The U-inverted hypothesis between value chain participation and environmental pollution was verified in all considered sectors (Essossinam & Gniniguè & Awade, 2023).

Yet, most of the emissions of developing countries are embodied in international trade and are caused by consumption in industrialised regions such as Europe, the United States and China. The large number of net emitting countries stands in stark contrast to the pledges made to meet the targets associated with the Paris Agreement (Obermeier et al, 2024).

Graph 5: *Per capita primary energy consumption of modern forms of energy by global region (1970 and 2019, including SSA (World Bank, 2020)*



Source: Nwankwo & Olaniyi & Morgan,2023

Strengthening institutions promises c.p. to reduce CO2 emissions. Institutional quality variables of control of corruption, rule of law, regulatory quality, political stability and absence of violence, voice and accountability, and government effectiveness reduce CO2 emissions (Kwakwa, 2023). Irresolute institutional governance through weaker rule of law induces pollution, while control of corruption theoretically works against pollution levels. However, corruption is endemic especially in SSA, according to the Corruption Perceptions Index. The voice of accountability, for example through civil society activists, could support the pollution-reducing effect of political governance. However, it has a significant desirable impact on pollution only in the G7 countries. Finally, renewable energy implementation and trade liberalisation have a negative and positive impact on environmental degradation, respectively (Ofori et al., 2023).

The analysis of Foreign direct investment (FDI) in developing countries, including SSA, confirms the pollution haven hypothesis, i.e. that multinational corporations (MNCs) look for the cheapest option in terms of resources and labour that a country offers. Thus, the impact of FDI tends to increase environmental degradation (Gao et al., 2023). Also, resource-backed lending of purchasing counties like China, which many African resource-rich countries are nowadays using as an effective means of providing public goods and services, can undermine environmental sustainability (e.g. forest cover loss, CO2 emissions, pollution, ecological collapse, material footprint, etc.).

Other studies in SSA supported the Pollution-Haven hypothesis and the environmental Kuznets 'inverted U-shaped' curve hypothesis in the region. They confirmed a long-run relationship between the financial sector, economic activity, and CO2 emissions, with fossil fuel consumption in industrial activities increasing CO2 emissions by about 2.5 times (Aminu & Clifton & Mahe, 2023). Therefore, a very strong compensation mechanism, such as introducing carbon-taxes or reforming the current tax system in resource-backed loan agreements, to protect biodiversity and mitigate the environmental impacts of these loans would be required (Coulibaly, 2023).

Finally, urbanisation is found to be responsible for exacerbating environmental problems by further increasing carbon emissions (Gao et al., 2023; Abdulqadir, 2023). Both openness to trade and urbanisation are found to have a significant negative impact on the level of renewable energy use in SSA, while the impact of resource rent on the level of renewable energy use is insignificant. Conversely, an increase in income levels associated with higher FDI was found to have a significant positive effect on renewable energy use. This implies that poverty reduction and foreign capital inflows can significantly boost the adoption and use of renewable energy in SSA (Dingru et al., 2023).

The following is an analysis of the impact of industrialised countries' CO2 emissions on climate change in sub-Saharan Africa, using the example of three countries that are among the ten largest economies in the region, and taking into account the impact on the social and economic fabric of the African societies concerned.

2. Case studies from Sub-Saharan Africa: South Africa, Nigeria and the DR Congo

Cartoon 3: *African Climate Summit, 2023: another big event, and then what?* [3]

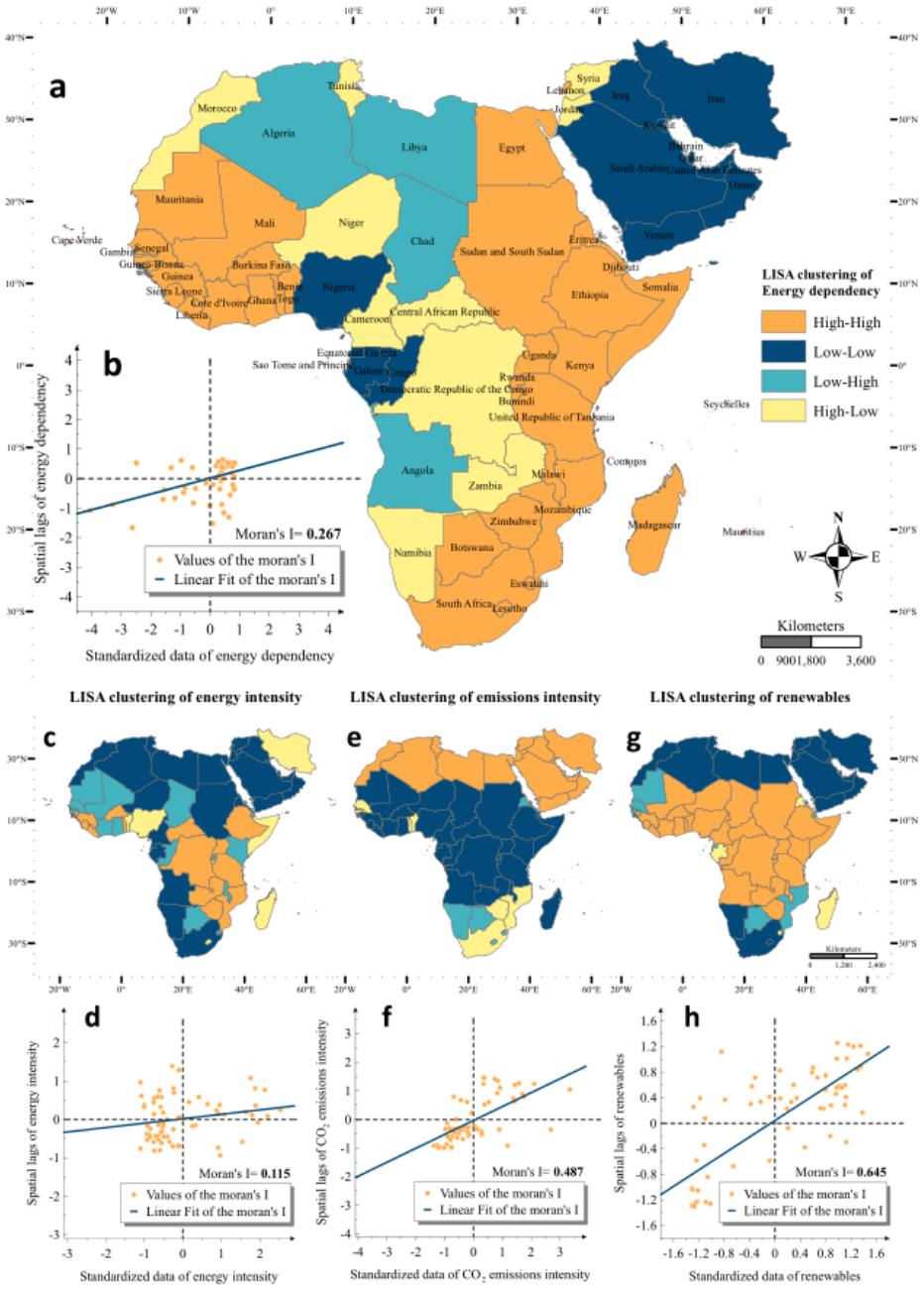
Source: © Damien Glez, *Jeune Afrique*, 4 September 2023

There is a global call for a transition from fossil fuels to renewable energy to mitigate climate change. According to the international scholarly discussion this call is mainly championed by the Global North, which has developed its economies using fossil fuels and still emits much more than the Global South (Nwankwo & Olaniyi & Morgan, 2023). For a just transition, where the transition process is fair and does not cause unnecessary hardship to a population, the complexities of the process in oil and gas-rich sub-Saharan African countries such as

[3] Referring to the first international 'African Climate Summit' in Nairobi, 4-6 September 2023 (just before COP28 in Dubai in December 2023), resulting in another 'Nairobi Declaration':– Translation of balloon: "Super, clouds (that will bring rain) … but no, just speeches".

Nigeria, Gabon, Angola and Mozambique need to be taken into account. They are heavily dependent on fossil fuels for economic growth, but they are poor in renewable energy, which hinders their ability to diversify their economies. Furthermore, many Global North countries still depend on gas from SSA for energy security due to the intermittency of renewable energy and its inability to power some energy-intensive sectors such as cement and steel, this the more so, because they have to maintain sanctions against Russia over its war in Ukraine. Oil and gas-rich sub-Saharan African countries have made up about 40 % of new global gas discoveries in the past decade (Nwankwo & Olaniyi & Morgan, 2023; Kohnert, 2023).

Graph 6: *energy dependency and emission intensity of African countries*
Moran's I scatter plot and LISA[4] map for each factor



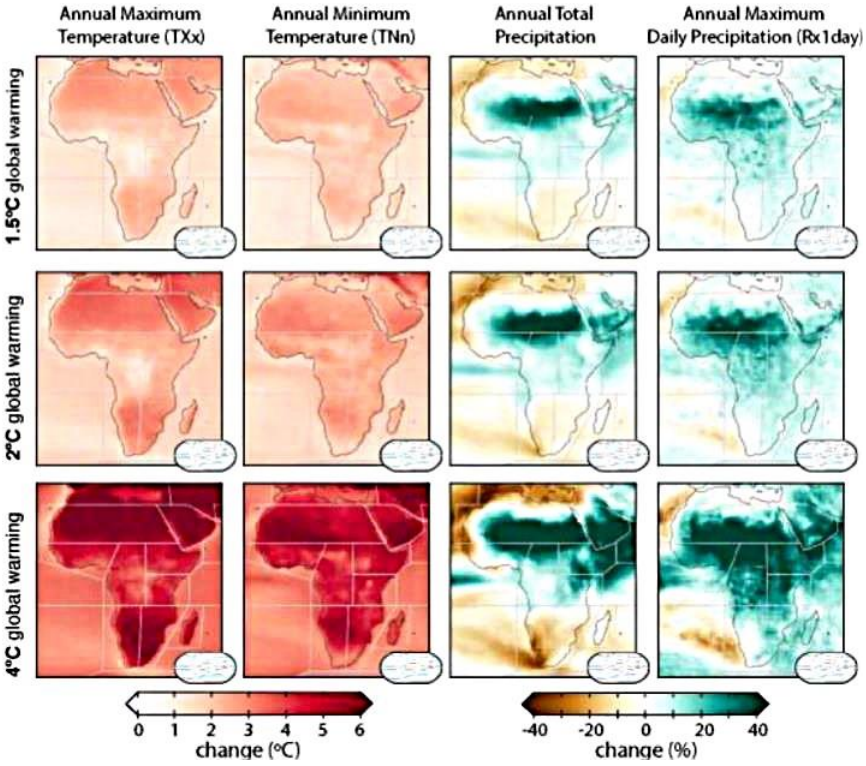
Source: Kouyakhi, 2023

[4] Local Index of Spatial Autocorrelation (LISA)

In early September 2023, the very first international conference devoted to climate issues in Africa, the 'Africa Climate Summit' opened in Nairobi, resulting in another 'Nairobi Declaration', stating that 'no country should ever have to choose between development aspirations and climate action', which aroused little more than scepticism and criticism (Glez, 2023a). Around twenty heads of state or government and the UN Secretary-General, António Guterres underlined the dangers inherent in climate change for Africa without delivering any notable progress.

Although Africa emits fewer greenhouse gases than other continents, it is the most vulnerable to the effects of climate change. In the near future, climate change will contribute to declining food production, flooding and inundation of its coastal zones and deltas, the spread of water-borne diseases and the risk of malaria, and changes in natural ecosystems and loss of biodiversity. It is evident that with additional increases in global warming, and changes in hot and cold temperature extremes, mean and maximum one-day precipitation get larger. This is a strong indication of flooding and other water-related extreme events in Africa (Ndubuisi & Ayotunde & Lukeman, 2023). Regions that are already water-stressed, such as most of the Sahel, are expected to face even greater water demands as the climate warms. Plagued by poverty, AIDS and other challenges, African countries are unlikely to have the resources to cope with these emerging and expected impacts of climate change (Ndubuisi & Ayotunde & Lukeman, 2023).

Graph 7: *Temperatures and precipitation in Africa: 2030 compared to 1851–1900* [5]



Source: Ndubuisi & Ayotunde & Lukeman, 2023

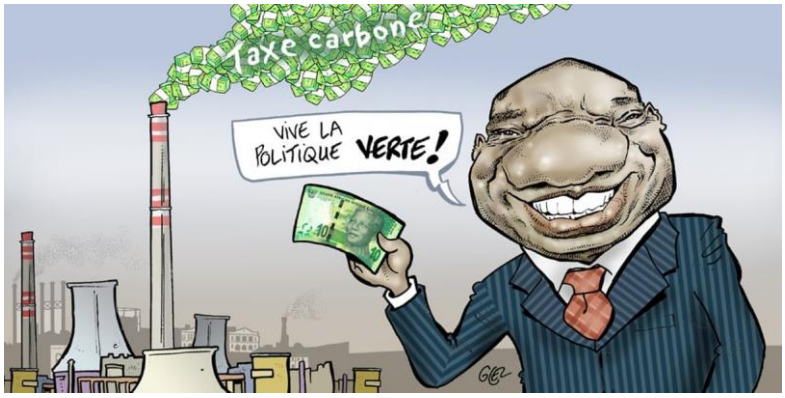
Africa's economy continues to be characterised by an increasing economic growth path and growing energy consumption. Countries have focused their capacities on improving growth

[5] Projected changes in annual maximum temperature (TXx), annual minimum temperature (TNn), annual mean precipitation and annual maximum daily precipitation (RX1day) at 1.5°C, 2°C, and 4°C of global warming (in rows) (Ndubuisi & Ayotunde & Lukeman, 2023).

with little attention to the associated externalities in terms of environmental quality. However, amid an economic boom, there is a likelihood of higher levels of greenhouse gas emissions, with economic, health and environmental consequences. However, at least in West and Central Africa, past levels of electricity consumption and economic growth do not appear to have had a significant impact on current CO2 emissions. At any rate, there is no short-term causality. This is in stark contrast to economic growth in China, for example, which has led to increasing CO2 emissions. This difference may be because industrialisation plays a major role in China's economy, compared to agriculture, which is the backbone of most SSA economies (Gyamerah & Gil-Alana, 2022).

2.1 Climate Change in South Africa

Cartoon 4: *Carbon tax in South Africa: Cyril Ramaphosa goes green* [6]



Source: © Damien Glez, *Jeune Afrique*, 3 June 2019

South Africa (SA) is committed to a proactive environmental policy, being arguably the largest African polluter and 14th globally. On 27 May 2019, President Cyril Ramaphosa signed into law a carbon tax. From 1 June 2019, companies were expected to pay 120 rand (€ 7.40) per tonne of CO2 emitted. Whereas the World Wide Fund for Nature welcomed the creation of this tax, Greenpeace considers its amount too low. Polluters threatened to increase the prices of their products or services (Glez, 2019).

South Africa's dependence on coal as the primary fuel source for electricity generation makes it one of the world's top 15 greenhouse gas emitters. Net emissions in 2020 were estimated at 442 metric tons of CO2 equivalent (USAID, 2023). This is a marginal decrease of 0.8 % from 2000 levels, largely a result of a temporary decline in emissions largely due to the COVID-19 pandemic. The energy sector represents roughly 85 % of gross emissions, with energy industries and transport being the main sources (USAID, 2023). Climate change is already altering South Africa's ecosystems, economy and livelihoods. Since 1990, the national average temperature has increased at twice the global rate. According to South Africa's National Adaptation Plan, there is evidence that extreme weather events are increasing, with heat waves becoming more likely, dry spells becoming slightly longer and rainfall intensity increasing. The impact of climate change on water security is particularly severe, with more frequent droughts and water shortages leading to water scarcity in parts of the country (USAID, 2023).

[6] Translation of balloon: 'long live green politics!'.

Research on South Africa's recent economic history (1960-2019), revealed a significant nexus between CO2 emissions, militarisation, and economic growth. The treadmill theory of destruction, which suggests that past and ongoing military spending and socio-environmental interactions are responsible for significant environmental degradation, and the Environmental Kuznets Curve (EKC) hypothesis also apply to SA (Saba, 2023). Although there is a long-run equilibrium relationship between the variables, there is no causality between militarisation and energy consumption. The unidirectional causality runs from militarisation to economic growth. The same applies to the relationship between militarisation, CO2 emissions, energy consumption and economic growth (Saba, 2023a).

Fiscal decentralization had a CO2 emission reduction impact in the short and long run, highlighting the presence of the 'race to the top' approach, whereas economic growth eroded ecological integrity (Udeagha & Breitenbach, 2023). CO2 emissions were driven by energy utilization, trade openness, industrial value-added, and foreign direct investment. The findings suggested that further fiscal decentralization should be undertaken through further devolution of power to local entities, particularly regarding environmental policy issues, to maintain South Africa's ecological sustainability. Apparently, regional rivalry reinforces a 'race to the top' effect, leading to stricter environmental rules at higher levels of fiscal decentralisation, making any fiscal decentralisation beneficial for the environment. However, this could also enable Pretoria to enhance ecological sustainability by implementing a 'beggar-thy-neighbour' approach to relocate environmentally damaging activities to neighbouring countries (Udeagha & Breitenbach, 2023).

As for public–private partnership investment in energy, it contributes to deteriorating environmental quality, while only the technique effect improves it. Energy consumption, foreign direct investment, trade openness, and industrial growth all escalate CO2 emissions. The scale effect largely contributes to escalating greenhouse gas emissions, thus confirming the EKC hypothesis (Udeagha & Ngepah, 2023).

Pretoria has approved key climate actions, including creating a Presidential Climate Commission, South Africa's Low Emissions Development Strategy, a National Climate Change Adaptation Strategy, a carbon tax, and a Just Transition Framework. At the 2021 UN Climate Change Conference (COP26), the U.S. government, together with the United Kingdom, France, Germany, and the EU, announced a Just Energy Transition Partnership (JETP) with South Africa. This partnership was a global first and served as a model for a subsequent similar agreement on coal power in Indonesia (USAID, 2023).

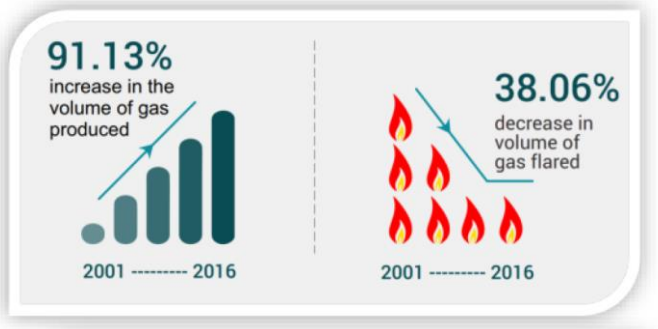
2.2 Climate Change in Nigeria

Cartoon 5: *Nigerian politicians debate climate change*

Source: © *Alesh* (Ebun Aleshinloye),
Premium Times, *Facebook*, 27 October 2022

Nigeria is Africa's largest economy, its most populous country, and home to a wealth of natural resources, particularly crude oil and natural gas. Nigeria is the world's eighth-largest supplier of oil and ninth-largest supplier of natural gas. The Nigerian economy would be massively affected by a sustained reduction in fossil fuel consumption. Nigeria is virtually a monoculture, i.e. around 80 % of government revenue, 90 % to 95 % of export earnings and more than 90 % of foreign exchange earnings come from the oil sector (Olaniyi & Ojekunle & Amujo, 2013). Following the Kyoto Protocol would be a double-edged sword for Nigeria: The probably positive long-term effects on climate change are opposed to the negative short-term effects on economic development. Observing the Kyoto Protocol would reduce the income of the OPEC member countries, including Nigeria, by about 25 % until 2010. This would be a catastrophe for the Nigerian development plan (Olaniyi & Ojekunle & Amujo, 2013).

Graph 8: *Trends in gas production and flaring in Nigeria*



Source: Ighalo. & Enang & Nwabueze, 2020

Recent years have been so dominated by Nigeria's internal power struggles that substantive policy issues, or even specific problems such as climate change, have not attracted much attention outside the circle of environmental experts or NGOs. In terms of short-term development policy, there are more pressing concerns, and strategic foresight is not an integral part of the country's policy. In addition, climate change and its problems and solutions do not generate much publicity because they are too complex for more superficial political discussions (Olaniyi & Ojekunle & Amujo, 2013). Moreover, the detrimental, but statistically significant, association between the growth of population and the attainment of

sustainable development in Nigeria is duly documented (Haliru, 2023). Nigeria's population has been increasing rapidly for at least the last five decades due to very high birth rates, quadrupling its population during this time, with 3.2 % growth p.a. (Statistics Times, 2021).

Environmental pollution by gas flaring has been a serious problem in Nigeria, with a global negative impact over decades. Gas flaring in the Niger Delta has been the world's biggest single environmental polluter. More gas is flared in Nigeria than anywhere else in the world. Estimates are notoriously unreliable, but roughly 2.5 billion cubic feet of gas associated with crude oil is wasted in this way every day. This is equal to 40% of all Africa's natural gas consumption in 2001. The flares have contributed more greenhouse gases than all other emissions of sub-Saharan Africa combined (Kohnert, 2023). The flares contain a cocktail of toxins that affect the health and livelihood of local communities, exposing Niger Delta residents to an increased risk of premature deaths, child respiratory illnesses, asthma and cancer (Zibima & Jack, 2020; Osuoka, 2002).

The life-threatening consequences of environmental pollution have been the basis for increasing militant protest by environmental activists such as Ken Saro Wiwa for decades, violently suppressed by the state. A more recent example is the Movement for the Emancipation of the Niger Delta (MEND), is a decentralised militant group in the Niger Delta region of Nigeria (Agbiboa, 2013).

Cartoon 6: *environmental pollution by decades of gas flaring in Nigeria*

Source: © Today's Woman (TW) Magazine Nigeria; Zibima & Jack, 2020

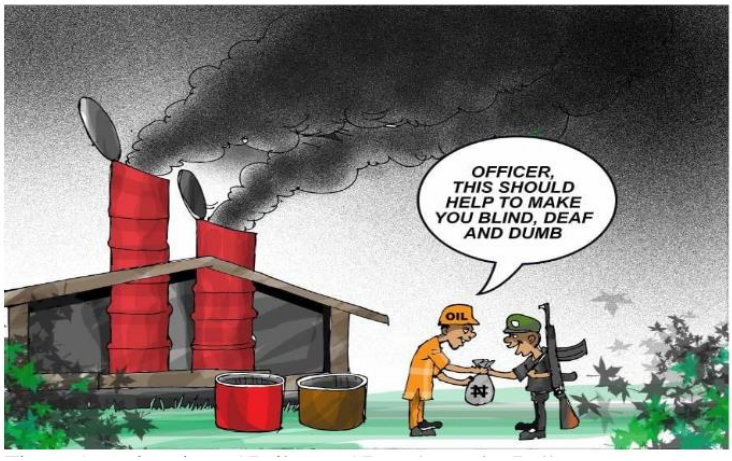
Unfortunately, the lack of policy coherence on gas flaring, including climate change alleviation efforts, has been slowed by partisan politics, poor governance, lack of regulatory compliance, and policy conflicts between environmental protection and economic development priorities. Nigeria urgently needs inclusive stakeholder engagement across sectors and levels of local and regional government, a strengthening of federal institutions, a revaluation of economic aspirations through revenue diversification, and leadership that can temper the power of international oil companies (IOCs) to exploit the complexity of the multi-level governance structure (Aigbe & Stringer & Cotton, 2023).

Cartoon 7: *Loading... the Niger Delta's global time bomb!* [7]

Source: © Francis Odupute, cartoonmovement.com (clipping, 2023)

Several pro-environmental groups have emerged throughout the Niger Delta, hitherto relying heavily on local, grassroots campaigns and traditional media to hold the Nigerian government, oil companies and other polluters accountable for environmental protection and environmental sustainability. Recently, new social media platforms have provided viable alternative structures for environmental activism and advocacy in the region, including the use of art in advocacy messaging and public awareness. The successful use of imagery and cartoons to translate the signifying ineptitude and corruption of government in environmental regulation underscores its usefulness and impact (Zibima & Jack, 2020). Among others, the *Stop the Soot* campaign has become a watershed in the emergence of a new form of advocacy that uses new media and the visual arts to demand environmental change and accountability. It has attracted the attention of not only the Nigerian government but also members of the international community such as the United Nations and the World Health Organization (Zibima & Jack, 2020).

Cartoon 8: *Animation of Bribery of Regulators by Polluters*



Source: © Zibima & Jack, 2020

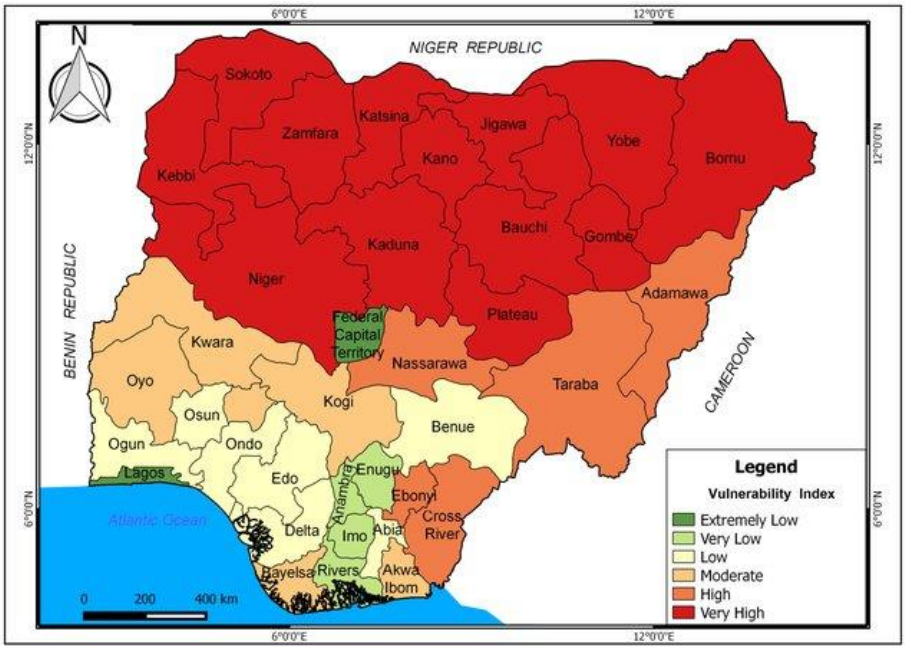
[7] Francis Odupute is a Nigerian visual artist and journalist. He has won international media awards through his editorial cartoon stories and reports. He is the founder and CEO of African Press Cartoon, a media and edutainment start-up in Benin City, Edo State, Nigeria. (Francis Odupute, Bio (excerpt), cartoonmovement.com, accessed: 5 December 2023).

In 2023, the Nigerian government, with significant technical assistance from USAID's program 'Power Africa', announced 42 winning bidders for its Gas Flare Commercialisation Programme, an innovative auction programme designed to reduce the environmentally damaging practice of gas flaring. According to USAID's conservative calculations, these 48 sites flare 2.6 to 3.1 billion cubic meters of gas per day, 48 % to 58 % of Nigeria's total flared gas emissions as reported by the World Bank. Capturing this gas and using it to replace other fuels, e.g. for power generation, transportation and other industrial purposes, could reduce Nigeria's carbon emissions by 5 to 6 million metric tons of CO2 per year (Reliefweb 2023).

Also, Nigeria has the highest rate of deforestation in the world, losing 3.7 % of its forest every year. It is also home to Africa's largest mangrove forest, but only 6 % is protected. Its multiple ecological zones have given rise to a wide range of livelihoods, agricultural practices, and commodities, all of which are affected by climate change and shocks. Rising sea levels threaten the big southern cities such as Lagos and coastal areas, increasing vulnerability to flooding and waterborne disease. Drought and reduced rainfall, combined with rising air temperatures, inhibit the country's hydropower systems and hinder agricultural production and fishing, reducing food security and negatively impacting health and nutrition (Reliefweb 2023).

Climate change affects certain groups of people more than others, depending on where they live and their ability to cope with different climate hazards. People living in rural areas are particularly vulnerable to climate change because of their remoteness, their high dependence on natural resources for income and livelihoods, and their limited capacity to adapt to climate change (Ignatius, 2016). There is significant spatial variation in vulnerability across geopolitical zones of Nigeria, with northern states being more vulnerable due to both higher levels of rurality and lower adaptive capacity. The North-West zone is the most vulnerable with an average index of 2.91, followed by the North-East (3.71) and North-Central (7.55). On the other hand, the South-West geopolitical zone is the least vulnerable with an index of 11.89, followed by the South-East (10.08) and South-South. (Ignatius, 2016).

Graph 9: *Patterns of climate change vulnerability in Nigeria*

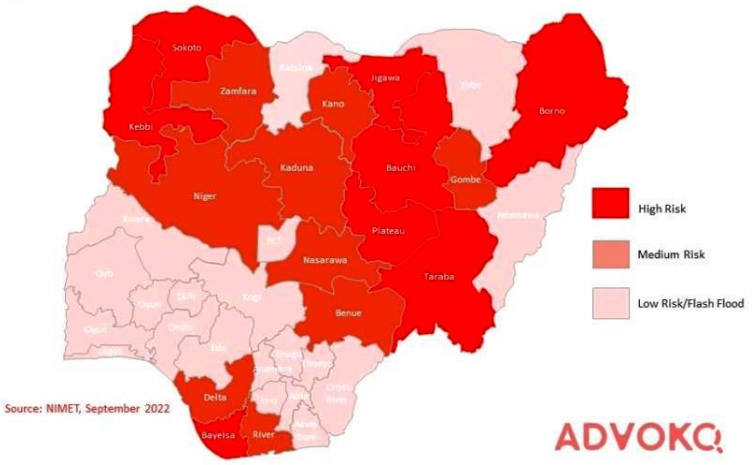


Source: Ignatius, 2016

Moreover, there exists an increasing risk of drought and flooding because of climate change in Nigeria (Durodola, 2022). In the Northern part, the wind erosion that has swept away houses and farms has intensified the effects of deforestation, drought, over-grazing, and desertification. In many of the towns along the Sahelian zones, the climate crisis is unleashing increasing desertification. In the Southern region, flash and seasonal flooding caused by climate change are ruining cities. In August 2011, Ibadan, one of Nigeria's populous cities, witnessed historic flooding caused by an all-time high of 187.5mm rainfall and indiscriminate dumping of solid wastes on water channels. In the end, more than a thousand people died and millions of naira worth of property was destroyed. In 2021, Jigawa, Bauchi and Adamawa states in the North-East region of Nigeria were also inundated by flood which evicted over 380 households and left more than 20 people dead (Durodola, 2022).

The floods in Nigeria in 2022 affected many parts of the country. According to the federal government, the floods had displaced more than 1.4 million people, killed more than 603 people and injured more than 2,400 people. About 82,035 houses were damaged and 332,327 hectares of land were affected (Oguntola, 2022). According to the National Emergency Agency (NEMA), flooding displaced more than half a million people in 2022 (Durodola, 2022). The Nigerian Metrological Agency (NiMet) noted in its September 2022 flooding outlook that places that are along the course of the Niger River and Benue River have higher chances of experiencing flooding due to their present status. Largely caused by the release of excess water from the Lagdo dam reservoir in Cameroon on September 2022, and torrential rainfall in the North-East, North-Central and Parts of South-Eastern part of Nigeria, this flooding has put states along the course of River Niger and Benue at an elevated risk of flooding. The situation further deteriorated with the wave of displacement and humanitarian crisis in the crisis-ridden northeast Nigeria, marked by the Islamist Boko Haram insurgency. According to the International Organization for Migration (IOM), there was an urgent need for humanitarian assistance as over 15,000 internally displaced persons scrambled for shelter after their camps were destroyed by flooding (Durodola, 2022). Economically, flooding resulted in acute food shortage. For example, Olam Farm, a $140 million investment and Nigeria's largest farmland of around 10,000 hectares in Nasarawa, was subverted by the flooding, the farm's 57 km dykes were broken thereby submerging the 4,400 hectare of rice on the farm (Durodola, 2022).

Graph 10: *States at risk of flooding in Nigeria*



Source: Durodola, 2022

Small and medium-scale farmers were especially affected by flooding. In Benue State, the food basket of the nation, farmers were deploring the loss of their produce and were calling

for government support. In Adamawa, another state along the course of the Benue River, 27,800 households and 89,342 hectares of farmlands were affected by the flood in 2022. Also, in Anambra, the number of flood victims was increasing daily as the flooding expanded to more communities in the south-eastern state (Durodola, 2022).

Although the country was still slowly recovering from the effects of the 2022 floods, the National Emergency Management Agency (NEMA) warned in October 2023 that the country was at risk of severe flooding in 2023 due to heavy rainfall. It stated that about 171,545 people had been displaced as a result of widespread flooding in parts of the country (Abdullahi, 2023). The NEMA said, over 33,000 people were affected by the flood disaster in different parts of the country, while the Nigerian Hydrological Services Agency (NIHSA), in its prediction of the annual flood outlook for 2023, said 178 Local Government Areas (LGAs) in 32 states, including the Federal Capital Territory (FCT), were within the highly probable flood risk areas, adding that over 30 million acres of land area would be washed away by the flood in 2023. The forecast showed that flooding in 2023 could be worse than in 2022 (Abdullahi, 2023).

Last but not least, climate change has exacerbated a generation-long and increasingly violent conflict between Fulani herdsmen and local farmers in Nigeria, like the 2023 Plateau State massacres. In February 2024, the Nigeria Inter-religious Council (NIREC), under the joint leadership of the Sultan of Sokoto, Alhaji Sa'ad Abubakar, and the President of the Christian Association of Nigeria (CAN), Rev. Samson Ayokunle, warned that although it was clear that other issues contributed to the clashes between herdsmen and farmers, a high percentage of the menace had to do with poor vegetation caused by global warming (Jannamike, 2024).

Cartoon 10: *Nigerian herders-farmers crises linked to climate change*

Source: © Jannamike, 2024

The National Council on Climate Change, established in 2021 by the Nigeria Climate Change Act, works to mainstream climate change actions and achieve low GHG objectives. Nigeria's National Adaptation Plan Framework (2020) articulates Nigeria's adaptation objectives and principles that guide these adaptation actions and facilitate the implementation of priority adaptation activities. The Nigeria Energy Transition Plan outlines Nigeria's commitment to carbon neutrality by 2060 across 5 key sectors: power, cooking, oil and gas, transport and industry (USAID, 2023).

In 2021, Abuja updated its Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement, which establishes an unconditional contribution target of reducing greenhouse gas emission (GHG) reduction by 20 % below the business-as-usual emissions scenario by 2030, and a conditional target of

47% GHG emission reduction below 2018 emissions levels contingent on international support (Reliefweb 2023). However, Nigeria's Nationally Determined Contributions (NDCs) to the UNFCCC have not resulted in a positive commitment to achieve net-zero emissions by 2060 (Salihu & Musa & Ubachukwu &Mshelia, 2023).

Cartoon 11: *Presidential candidate, Bola Tinubu, 2022 on climate change:*
'It's a question of how do you prevent a church rat from eating poisoned holy communion'.

Source: © Mike Asukwo; Fasan, 2022; *Business Day*, 31 October 2022

The Nigerian President Bola Tinubu put the dilemma in a nutshell in 2022, then still presidential candidate: "*It's a question of how do you prevent a church rat from eating poisoned holy communion*". Obviously, the 'church rat' in this analogy is Nigeria, which is 'as poor as a church rat', and the 'poisoned holy communion' is climate change, caused by burning fossil fuels, which may have immediate benefits but also come with devastating consequences. Therefore, according to Tinubu's logic, Western industrialised countries would have no choice but to succumb to Nigeria's threat and help it reduce its greenhouse gas emissions since they too are suffering from global climate change (Fasan, 2022). However, not every poor African country chooses to live with climate change. For instance, Kenya is poorer than Nigeria, with a GDP of US$ 98bn (2020), compared to Nigeria's US$ 432.3bn (2020) and a GDP per capita of US$ 1,550 (2020), compared to Nigeria's US$ 2,097 (2020). Nevertheless, Kenya has made real progress on climate change. It has set a target of 100% renewable energy generation and is close to achieving it because it has made tackling climate change a priority (Fasan, 2022).

2.3 Climate change in the DR Congo

Cartoon 12: *Rising waters of the Congo, which saint should we honour?* [8]
The government declared a state of hydrological ecological disaster

Source: © Kash/Actualite.cd; Kinshasa, 18 January 2024

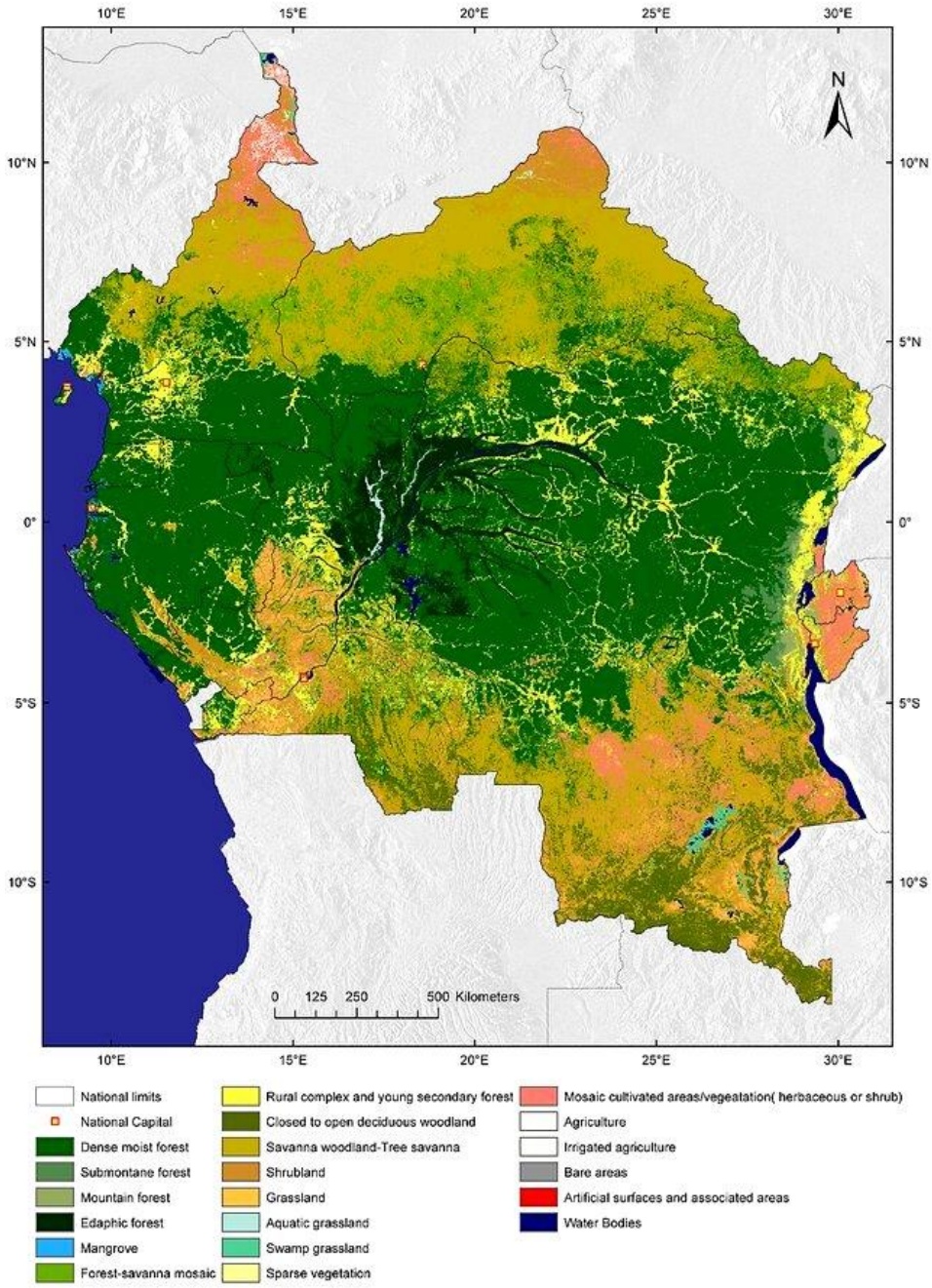
The Congo Basin is, next to the Amazonas, the second largest rainforest area worldwide. The DR Congo (DRC; 1971–1997 Zaire), is the second largest country on the African continent, with an area equal to the extent of Western Europe. It is home to two-thirds of the tropical forests of Central Africa, i.e. 150 million hectares of forest, ten per cent of the world's forest that covers more than 60 % of the country's land area. Therefore, Congo's nickname, 'lungs of Africa', reflects its crucial role in the global climate balance (Hund, 2015).

The majority of the population survives thanks to the forest. But this is also a major cause of deforestation. The DRC's economy is largely dependent on rain-fed agriculture and mining, both of which are vulnerable to climate variability and change. Agriculture accounts for 40 % of the national gross domestic product (GDP) and is the primary source of livelihood for most Congolese, employing 70 % of the country's population (USAID, 2023b). Climate change impacts imperil agricultural livelihoods for millions of Congolese and increase the risks to this important driver of economic growth in the DRC. Projected increases in temperature, more extreme weather events and changes in total precipitation and rainfall variability are likely to exacerbate social vulnerability, food insecurity, high poverty rates and political instability. Since 2010, deforestation in the DRC has increased significantly and was second highest in deforestation only to Brazil in 2020 (USAID, 2023b).

It is not primarily commercial or industrial deforestation, but uncontrolled deforestation by the population. The reasons for this, and the challenges it poses, reach deep into the social and economic fabric of local societies. As far as the rainforest is concerned, the government's devastating development policies over the decades have been both a blessing and a curse. Industrially, mainly for international trade, 'just' 300,000 to 450,000 hectares are cut down annually. This is due in part to the high investment risk for private companies, but above all to the dilapidated infrastructure, which makes the forest virtually inaccessible (Hund, 2015).

[8] Translation of Ballon: " *Already ten days we are flooded! Do something!! ...henceforth the President of the River Brigade is responsible! ...Do you want their phone number?*"- The cartoon refers to a devastating flood of the Congo River in early January 2024, hitting the capital Kinshasa, and provinces such as Tshopo, Mongala, Kongo central, Equateur, Mai-Ndombe, Sud and Nord Ubangi, Kasai, Kasai Central, Sud-Kivu, Lomami, Tshuapa, and Kwilu. On 12 January 2024, the government declared a state of hydrological ecological disaster (Actualite.cd, 2024).

Graph 11: *Congo Basin forest, use & vegetation types*



Source: Verheggen & Mayaux & C. Wasseige & Defourny, 2012

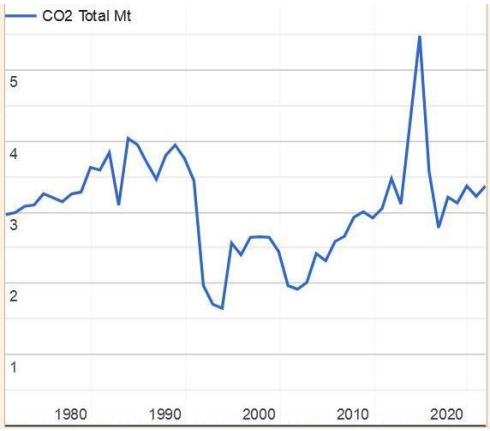
The loss may seem low compared to the Amazon basin, where in Brazil, for example, an average of more than one million hectares were cut down per year between 2000 and 2010. Nevertheless, the shrinking of the Congolese rainforest is serious and should be stopped as soon as possible.

The biggest threat is the population of the Congolese themselves. Deforestation increases in direct proportion to population growth. Most of the cutting is illegal because the population is desperate for food and energy. They have no choice if they want to survive. As a result, environmental awareness is almost non-existent. The need for agricultural land is the main cause of cutting (60%), but also the local production of charcoal as an energy source (20%). The millions of poor people living in the cities (Kinshasa, Mbuji-Mayi, Lubumbashi,

Kisangani), which are experiencing rapid urbanisation, are particularly affected. They have to feed themselves, which requires more and more charcoal for cooking, as the electricity supply for them is insufficient or non-existent (Hund, 2015).

Nevertheless, for decades the DRC was the country that emitted the least CO2 into the atmosphere per capita. In terms of CO2 emissions per $1,000 of GDP, which measures 'environmental efficiency', the country emitted 0.03 kilograms per $1,000 of GDP. In short, the DRC is one of the least polluting countries per $1,000 of GDP. However, CO2 emissions, which have been falling since 2011, as well as emissions per capita and CO2 emissions per $1,000 of GDP, have increased over the last five years, which is not good news (ce, 2020).

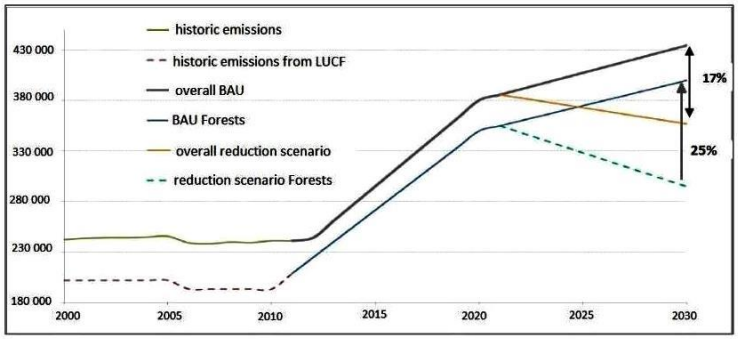
Graph 12: *DR Congo – CO2 emissions, 1980 – 2020*



Source: ce, 2020

According to recent analyses of the industrialisation of the DRC in the period 1980 to 2020, there are asymmetric effects of manufacturing-based industrialisation on climate change in the short term (Onounga & Etsiba & Sah, 2023). On the other hand, in the long term, the impact of industrialisation on climate change in the Republic of Congo is symmetric. That is, industrialization and deindustrialization would positively influence CO2 emissions from the manufacturing sector in the long term which would contradict the Environmental Kuznets Curve (EKC) hypothesis.

Graph 13: *Emissions in kt CO2 from 2000 to 2030 for DR Congo: total national emissions, respectively emissions from land use (LU) and their reduction shares* [9]



Source: Hargita & Rüter, 2015

[9] Source: Taken and adapted (25%) from DR Congo (2015b); Hargita & Rüter, 2015 - Referring to land use, land use change, and forestry (LULUCF), business as usual (BAU).

With the growing recognition of the importance of tropical forests in the climate change debate, notably through the adoption of the international REDD+ (Reducing Emissions from Deforestation and Forest Degradation) initiative, the fight against deforestation has become a *leitmotif* for forest policy actors in the DRC, at least verbally and pro forma (Mudibu, 2023).

The DRC ratified the United Nations Framework Convention on Climate Change in 1997, the Kyoto Protocol in 2005 and the Paris Agreement in 2015. The DRC's National Adaption Plan to Climate Change (NDC), updated in October 2021, commits to a 21 % reduction in emissions from 2021 to 2030, of which 19 % will be achieved with external support and 2 % will be based on domestic efforts. This equates to an estimated reduction of up to 650 tonnes of CO2 by 2030. The NDC identified energy, agriculture, forestry and other land use and waste as priority sectors for GHG mitigation and 52 priority adaptation actions. The country's National Action Programme for Adaptation to Climate Change (NAPA, 2006) and NDC identified urgent and priority adaptation actions in the water resources, forestry and agriculture sectors, as well as in the country's coastal zones. The DRC's NDC budget is estimated at 48.68 billion US dollars (USD), of which 25.60 billion USD is for the implementation of committed mitigation initiatives and 23.08 billion USD is for priority adaptation actions (USAID, 2023b).

International organisations and transnational conservation NGOs tried to employ power strategies, including financial incentives, dominant information and forest policy expertise, to impose 'good governance' in the Congolese forestry sectors. However, their attempts have been countered by the skilful strategies of domestic decision-makers and political elites who wanted the 'undesired' forest policy reforms to lose so that their private interests and their 'quest for sovereignty' could prevail, both formally and informally. The resulting political rivalries worsened the governance crisis and the related policy failures (Mudibu, 2023).

The intervention of international organisations, especially the World Bank, sometimes led to symbolic policy changes, although often reversible, in the forestry sector. The governance crisis that has plagued the DRC forest sector since the 1980s, has not been overcome by the intrusive 'good governance' interventions. The lingering ongoing crisis in the forestry sector is the result of several forms of opposition by state bureaucracies and political elites (Mudibu, 2023).

Cartoon 13: *DRC: in Washington, Félix Tshisekedi becomes a climate champion* [10]

Source: © Damien Glez; Glez, 2022a, *Jeune Afrique*, 15 December 2022

[10] Translation of balloon:" *Finally, in Africa, do you have too much or too little water? … Both … depending on the country? … in the same country …*".

In 2021, Congo's President Félix Tshisekedi and British Prime Minister Boris Johnson on behalf of the Central African Forest Initiative (CAFI) endorsed an ambitious 10-year agreement (2021-31) to protect the Congo Basin rainforest. The agreement was meant to unlock on-the-ground multi-donor investments of US$500 million for the first five years (CAFI, 2021).

In an attempt to curb rising deforestation in the DRC, which has exceeded one million hectares per year since 2016, and to achieve carbon neutrality by 2050, the country's government introduced a carbon tax, a first in the Congo Basin (PFBC, 2024). While timely, the imminent tax has been controversial, as it would come on top of the pollution tax already in place. Civil society says it has not been consulted, and the private sector fears double taxation. It also remains unclear how informal activities in sectors such as subsistence agriculture, which accounts for 92.2 % of deforestation recorded between 2000 and 2014, or artisanal mining, which is mostly illegal, will be taxed. Last, but not least, the action could prove counterproductive in the long term, because a carbon tax on fossil fuels would inevitably lead to an increase in the price of petroleum products, resulting in increased dependence of local communities on other sources of energy like wood (PFBC, 2024; Kohnert, 2024).

Hypothetically speaking, the DRC has a renewable energy potential that could allow it to diversify its energy mix. However, the country's progress towards energy transition has been slow due to several challenges, including poor governance, lack of a sectoral and coherent energy policy, low government efficiency, poor regulatory quality and lack of control over corruption (Burhama Eka, 2023). In addition, there is a poor business climate, which means that the country is not attractive to investors and donors; a low average proportion of the budget allocated to energy expenditure; high investment and production costs compared with disposable income; high population growth, which means an increase in energy demand; a low level of production, despite a moderately high growth rate, which means that the Congolese population remains poor (more than 60%); an almost non-existent technology transfer rate, with a low competitiveness index; and, finally, a lack of specialised training, which means that DR Congo has a low capacity to train its workforce, particularly in the field of renewable energy (Burhama Eka, 2023).

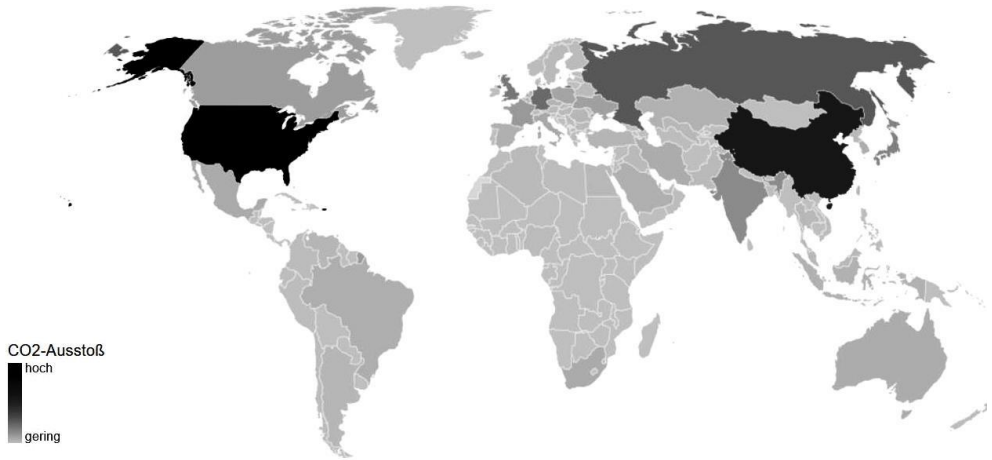
3. Conclusion

Cartoon 14: *Reparations must flow to Africa* [11]

Source: © picture alliance / Zoonar / Konstantin Kalishko

In 2021, the EU-27 emitted a total of around 3,472 million tonnes (million t) of greenhouse gases in carbon dioxide (CO_2) equivalents. Germany, France, Italy and Poland together accounted for around 57% of this. Germany alone already contributed over 22%. Per capita emissions were lowest in Malta with just 4.1 tonnes (t) of CO2 equivalents per capita and Luxembourg with 14.7 t of carbon dioxide equivalents per capita. France and Italy were also at the lower end with around 6.1 and 7.1 t, respectively, while Poland with 10.6 t and Germany with 9.1 t of carbon dioxide equivalents per capita were in the upper middle range (UBA, 2023).

Graph 14: Climate: major polluter countries
Which countries contribute the most to CO2 emissions? [12]



Source: owid ; Morcinek & Schneider, 2023

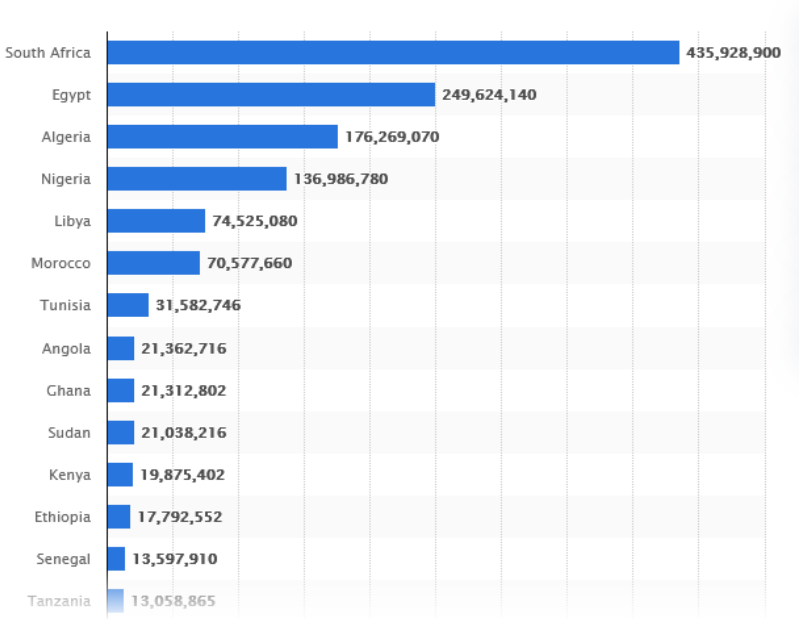
A completely different picture emerged concerning emissions concerning gross domestic product (GDP). Bulgaria and Poland ranked at the upper end with 1,008 t and 742 t CO2 equivalents per million €, respectively Germany (around 237 t CO2 equivalents per million EUR), Italy (249 t CO2 equivalents per million EUR) and France (179 t CO2 equivalents per million €) remained in the good midfield. The EU-27 was slightly higher at 262 t CO2

[11] Africa produces just below 4 % of global CO2 emissions but suffers the most from the effects of natural disasters such as droughts (Loick, 2023).
[12] Share of global carbon dioxide emissions (CO2) in per cent, as of the end of 2020. : owid ; Morcinek & Schneider, 2023.

equivalents per million €, the leader was Sweden with 94 t CO2 equivalents per million € (UBA, 2023). The 'Energy' category accounted for 82% of the 2021 emissions in 2020. Since 1990, emissions in this category have fallen by 29%. Agriculture accounted for almost 12% of greenhouse gas emissions. Their emissions fell by around 22% between 1990 and 2021. Emissions from industrial processes accounted for almost 10% of greenhouse gas emissions in 2021. CO_2 emissions dominated the EU-27's greenhouse gas emissions with a share of 80.2%. Emissions of methane (CH4) and nitrous oxide (N_2O) were significantly lower at 12.1% and 5.4%, respectively (UBA, 2023).

By comparison, South Africa, the by far most polluting country in Sub-Saharan Africa, emitted nearly 436 million metric tons of CO2, followed by Nigeria with 137 million metric tons of CO2 and Angola and Ghana both with 21 million metric tons of CO2 in 2021.

Graph 15: Production-based CO2 emissions in Africa in 2021 by country (in metric tons)



Source: © Statista, 2024

When the First Senate of the German Federal Constitutional Court announced its so-called climate judgement on March 24, 2021, this caused a stir not only in the German society (Bajohr, 2023). It was the first time that the highest court of an industrialised country had confirmed that a government violates its duty of care to its citizens by doing too little to combat emissions. The ruling was heralded as ground-breaking because it, and many similar rulings that followed, made it possible to test future legislative proposals for their compatibility with emissions reduction targets. It opened the door to legal action to protect the climate. In fact, nearly two thousand such lawsuits have already been filed worldwide. Climate change litigation is the name given to the strategy of legally enforcing climate justice. (Bajohr, 2023). The ruling made it clear beyond doubt that climate change is not just a misfortune, but an injustice. The German Constitutional Court ruled that the freedom rights of members of the younger generations in particular were threatened. They would be burdened with the economic, social and political burdens of the emission reductions still outstanding after 2030, which would then most likely have to be achieved so radically and at short notice that they would be severely restricted in the exercise of their constitutionally protected freedoms. The political theorist Judith Shklar used a similar methodological approach to describe the concerns of climate change litigation protagonists in her study 'On Injustice' and

the term ‘passive injustice’, which she coined (Bajohr, 2023). In a broader sense, beyond the borders of German jurisdiction, this would mean that not only the young generation would be disadvantaged compared to the old, but also, for example, Africans would be disadvantaged compared to Europeans. Two years after the ruling, however, it became clear that the immediate impact of the decision was extremely limited. Above all, the ruling has not been implemented by politicians, administrative courts or even the Federal Constitutional Court itself. The problem of how to effectively implement climate protection has still not been solved (Gross, 2023).

Meanwhile, climate litigation is being pursued in many states and against many multinational coal, oil and gas companies, the most famous being the Royal Dutch Shell case in the Netherlands in 2021, when the court ordered Shell to reduce its global carbon emissions by 45% from 2019 levels by 2030, covering not only emissions from its operations but also those from the products it sells (Boffey, 2020).

The first African climate summit in Nairobi in September 2023 was remarkable for several reasons. For the first time, the meeting focused on Africa, more precisely, on the devastation that climate destruction has been wreaking on the African continent for a long time (Loick, 2023). African heads of state were not so much interested in asking for more development aid, but rather in promoting investments. To remove barriers to investment, they demanded that unfair lending rules should be changed and a new global carbon tax be introduced, according to the final declaration of the summit. Also, climate reparations were called for, concerning the historical responsibility of the former colonial industrial nations as compensation (Loick, 2023).

Africa produces just below 4 % of global CO2 emissions, but arguably suffers the most from the effects of so-called natural disasters such as droughts and floods. Civil rights groups demand that those who cause the damage should pay for it. Thus, for example, just 100 corporations are responsible for 71 % of global emissions. They have made huge profits from oil and other fossil fuels. They owe it to Africans and other people whose livelihoods are being destroyed or threatened. Reparations therefore mean a fundamental intervention in the global power structures that enable individual nations and corporations to destroy the planetary basis of life for everyone. According to the American philosopher and political theorist Olúfémi O. Táíwò, reparations also include, in addition to cash transfers, the establishment of social infrastructure, the promotion of ecological projects, debt relief and, above all, the radical democratization of the global economy and the establishment of effective control and steering mechanisms (Loick, 2023).

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Résumé : *[L'impact des émissions de CO2 des pays industrialisés sur le changement climatique en Afrique subsaharienne : études de cas d'Afrique du Sud, du Nigeria et de la RD du Congo]* – L'activité humaine a transformé la planète à un rythme et à une échelle sans précédent dans l'histoire, causant des dommages irréversibles aux communautés et aux écosystèmes. Les pays ont concentré leurs capacités sur la croissance économique, avec peu d'attention aux externalités associées en termes de qualité environnementale. Le monde n'évitera pas un réchauffement catastrophique à moins que les pays riches n'accélèrent leurs propres réductions d'émissions et n'aident les pays les plus pauvres à faire de même. L'Amérique du Nord et l'Europe ont contribué à 62 % des émissions de dioxyde de carbone depuis la révolution industrielle, tandis que l'Afrique n'en a contribué qu'à 3 %. Cependant, c'est en Afrique subsaharienne (ASS) que les impacts sont les plus graves et que les populations sont les plus vulnérables. Les pays développés devraient, dans leur propre intérêt, se concentrer sur les moyens d'aider les pays en développement à éliminer progressivement les combustibles fossiles et à passer aux énergies renouvelables. Cependant, des tensions existent entre les pays les plus riches et les pays les plus pauvres quant à savoir qui doit payer les coûts du réchauffement climatique. Les pays riches ont la responsabilité d'agir plus rapidement que leurs homologues à faible revenu. Pourtant, les gouvernements continuent de subventionner l'utilisation des combustibles fossiles, et les banques et les entreprises investissent encore bien plus dans les industries polluantes que dans les solutions climatiques. Les habitudes de consommation des 10 % les plus riches génèrent trois fois plus de pollution que celles des 50 % les plus pauvres. Les économies émergentes telles que la Chine et l'Inde, qui prévoient d'atteindre zéro émission nette d'ici 2060 et 2070 respectivement, devraient rejoindre le monde développé pour accélérer la réduction de leurs émissions. Ce n'est pas seulement la façon dont nous produisons et utilisons l'énergie qui doit changer rapidement. C'est la façon dont nous consommons la nourriture, la façon dont nous protégeons la nature. C'est tout, partout, à la fois. Le secteur agricole est particulièrement vulnérable, en particulier dans les pays d'ASS où l'agriculture joue un rôle central dans l'économie et la productivité. Parmi les huit pays ayant les émissions nettes cumulées les plus élevées provenant de l'agriculture, de la foresterie et d'autres utilisations des terres figurent deux pays d'ASS, le Nigeria et la République démocratique du Congo. La plupart de ces émissions sont incorporées dans le commerce et sont causées par la consommation dans les régions industrialisées comme l'Europe, les États-Unis et la Chine. Cependant, la création du Fonds pour les pertes et dommages convenu lors de la COP27 ne suffira pas à inverser la tendance, et ne se traduira pas nécessairement par des engagements en matière de financement climatique, compte tenu de l'absence de progrès dans la fourniture des 100 milliards de dollars de financement climatique annuel promis par les pays riches. Les pays africains eux-mêmes doivent réfléchir à leurs propres atouts et intensifier leurs efforts de manière opportune et substantielle.

Zusammenfassung : *[Die Auswirkungen der CO2-Emissionen der Industrienationen auf den Klimawandel in Subsahara-Afrika: Fallstudien aus Südafrika, Nigeria und der DR Kongo]* – Menschliche Aktivitäten haben den Planeten in einem in der Geschichte beispiellosen Tempo und Ausmaß verändert und irreversible Schäden an Gemeinschaften und Ökosystemen verursacht. Die Länder haben ihre Kapazitäten auf das Wirtschaftswachstum konzentriert und dabei den damit verbundenen externen Effekten im Hinblick auf die Umweltqualität wenig Aufmerksamkeit geschenkt. Die Welt wird eine katastrophale Erwärmung nicht vermeiden können, wenn wohlhabende Nationen ihre eigenen Emissionsreduzierungen nicht beschleunigen und ärmeren Ländern dabei helfen, dasselbe zu tun. Nordamerika und Europa haben seit der industriellen Revolution 62 % der Kohlendioxidemissionen verursacht, während Afrika nur 3 % beitrug. Allerdings sind die Auswirkungen in Subsahara-Afrika (SSA) am schwerwiegendsten und die Menschen am stärksten gefährdet. Industrieländer sollten sich in ihrem eigenen Interesse darauf konzentrieren, Entwicklungsländern beim Ausstieg aus fossilen Brennstoffen und beim Übergang zu erneuerbaren Energien zu helfen. Es gibt jedoch Spannungen zwischen reicheren und ärmeren Ländern darüber, wer die Kosten der globalen Erwärmung tragen soll. Reiche Länder haben die Verantwortung, schneller zu handeln als ihre einkommensschwachen Länder. Dennoch subventionieren Regierungen weiterhin die Nutzung fossiler Brennstoffe, und Banken und Unternehmen investieren immer noch weitaus mehr in umweltverschmutzende Industrien als in Klimalösungen. Die Konsumgewohnheiten der reichsten 10 % der Menschen verursachen dreimal mehr Umweltverschmutzung als die der ärmsten 50 %. Schwellenländer wie China und Indien, die bis 2060 bzw. 2070 Netto-Null-Emissionen erreichen wollen, sollten sich den Industrieländern anschließen und die Emissionsreduzierung beschleunigen. Nicht nur die Art und Weise, wie wir Energie produzieren und nutzen, muss sich schnell ändern. Es ist die Art und Weise, wie wir Lebensmittel konsumieren, die Art und Weise, wie wir die Natur schützen. Es gilt alles, überall, und alles auf einmal zu ändern. Der Agrarsektor ist besonders gefährdet, insbesondere in SSA-Ländern, in denen die Landwirtschaft für Wirtschaft und Produktivität von zentraler Bedeutung ist. Zu den acht Ländern mit den höchsten kumulierten Nettoemissionen aus Land- und Forstwirtschaft sowie anderer Landnutzung gehören zwei SSA-Länder, Nigeria und die DR Kongo. Die meisten dieser Emissionen sind durch internationalen Handel induziert und werden durch den Konsum in industrialisierten Regionen wie Europa, den Vereinigten Staaten und China verursacht. Allerdings wird die Einrichtung des auf der COP27 vereinbarten Verlust- und Schadensfonds nicht ausreichen, um das Blatt zu wenden. Er wird sich auch nicht zwangsläufig in Verpflichtungen zur Klimafinanzierung niederschlagen, da bei der Bereitstellung der versprochenen jährlichen Klimafinanzierung in Höhe von 100 Milliarden US-Dollar durch die Reichen bisher keine Fortschritte erzielt wurden. Die afrikanischen Länder selbst müssen sich auf ihre eigenen Stärken besinnen und ihre Anstrengungen rechtzeitig und substanziell verstärken.