ISS | AFRICAN FUTURES

Climate

African responses to Climate change

Alize le Roux and Jakkie Cilliers

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Policy response 1: Carbon sequestration and storage through forest regeneration in Africa

Forest regeneration and the retention of savanna and grassland areas can play a critical role in reducing carbon emissions in Africa and globally through sequestration and storage, given that deforestation and land-use changes contribute a sizeable chunk of between 11% and 20% of global greenhouse gas emissions. They can also provide a potential trade-off in respect of a global carbon tax, discussed further below.

Nature stores significant amounts of carbon in the Earth's soils. Soil health is closely linked to carbon preservation, and efforts to reduce soil erosion are crucial in maintaining the effectiveness of carbon sequestration processes. Soil erosion and poor farming practices threaten this natural carbon sink, as they can lead to the degradation of soil quality and the release of stored carbon into the atmosphere.

Photosynthesis, the process by which plants absorb carbon dioxide and convert it into biomass, is a natural mechanism for capturing and storing carbon. Deforestation and poor land management practices disrupt this process by reducing the number of trees, grass and other plants available to absorb carbon dioxide. It diminishes the Earth's natural capacity for carbon sequestration and releases stored carbon when, for example, trees are cut down or burned. Protecting, conserving, restoring, replanting and managing these carbon sinks are thus vital in mitigation and sustainability efforts. Forests, in particular, act as a significant carbon sink, removing an estimated 2.6 billion metric tons of carbon dioxide from the atmosphere annually. However, Africa is under constant threat due to its growing population that needs cheap, low-technology fuels and land for agriculture. Land expansion in agriculture accounts for up to 90% of deforestation globally, including in Africa. Next to South America (68 million hectares) Africa experienced the highest deforestation in 2000-2018 (49 million hectares). The leading cause of forest loss in Africa is cropland expansion, particularly in the Congo Basin, home to the world's second-largest tropical rainforest and its most significant carbon sink.

The Congo Basin spans six Central African countries and should be at the heart of global climate action. It absorbs 4% of the world's CO_2 emissions, with its peatlands alone storing an estimated 30 billion metric tonnes of carbon – the equivalent of three years' worth of global fossil fuel emissions. The region, however has lost 30% of its forest cover since 2001, mainly in DR Congo which is home to more than half of the Congo Basin's rainforest area. While illegal logging was outlawed in 2002, enforcement remains weak due to resource constraints and, in some cases, the complicity of officials in the hardwood trade.

Urgent action is required to halt deforestation in the Congo Basis since forests are shrinking at an alarming rate of 1 to 5% per year. Due to unregulated logging and mining, up to 30% of forest cover has been lost since 2000. Mining, logging and agricultural expansion are accelerating forest loss, with Chinese and European companies implicated in illegal deforestation—often with the collusion of local officials. Elsewhere, countries like Mozambique, one of the world's poorest nations, are also severely impacted, losing an estimated 267 000 hectares of forest annually.

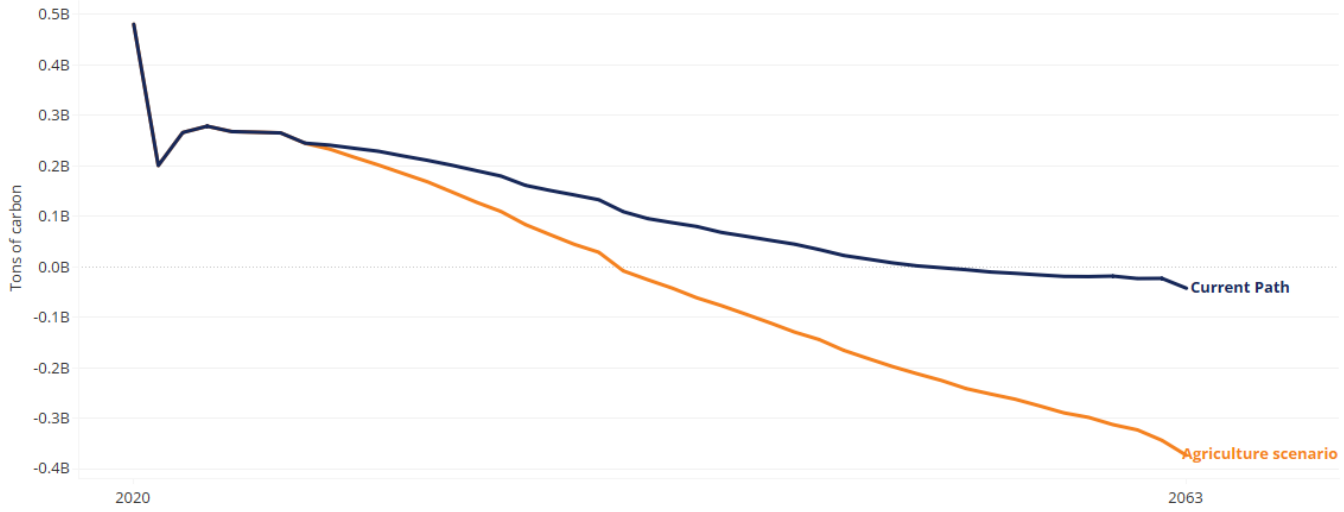
Recognising these threats, international policies like the 2024 EU Deforestation Regulation (EUDR), aim to buttress reforestation. Under EUDR, importers of commodities like coffee, cocoa, soy, palm, cattle, timber and rubber - and products that use them - must be able to prove their goods did not originate from deforested land or else face hefty fines.

However, the efficacy of these measures is not fully established.

In addition to soil erosion and deforestation, desertification represents another significant challenge to carbon sequestration efforts. The process depletes the ability of arable land to retain carbon, contributing to the degradation of natural ecosystems. An estimated 45% of Africa's land area is affected by desertification, particularly in the Sahel region. In response, the African Union launched the Great Green Wall (GGW) initiative in 2007 to combat desertification, land degradation and climate change. The project aims to restore 100 million hectares of degraded land, capture 250 million tons of CO, and create 10 million jobs by 2030. At COP26 in 2021, the European Union reaffirmed its commitment to the GGW with an annual pledge of €700 million, bringing total global commitments to €19 billion.

Already the Agriculture scenario includes a reasonable forest protection multiplier to constrain the expansion of cropland. The multiplier is introduced over a 40-year period in 17 African countries.[1] Chart 10 compares the carbon emission from deforestation in the Agriculture scenario with the Current Path which, by 2063, equates to 1.2 billion tons of CO_2 equivalent less carbon in the atmosphere. That reduction represents 4.7% of global carbon emissions from fossil fuels in 2063 and translates into 2.6 ppm less CO_2. The latter is more than half the additional concentration associated with the Combined scenario (3.5 parts per million) compared to the Current Path in 2063.

Chart 10: Carbon emissions from deforestation: Current Path vs Agriculture scenario, 2020-2063



Source: IFs 8.34 initialising from Appalachian State University data

Africa needs to monetise its role as a global carbon sink, especially as deforestation and land degradation threaten its ability to absorb emissions. One way to do this would be to explore the potential of a global carbon tax that could not only fund the continent's more rapid transition to renewables but also support large-scale reforestation and conservation efforts critical for maintaining its carbon sequestration capacity. However, such a proposal faces opposition from high-emitting economies reluctant to commit to mandatory carbon pricing, fearing economic slowdowns and competitiveness concerns. On the other hand, there is growing international support from climate advocacy groups, multilateral institutions like the World Bank and IMF, and emerging economies that see a global carbon tax as a fair mechanism to hold historic polluters accountable while financing sustainable development in the Global South.

Policy Response 2: Carbon pricing through a Global Carbon Tax

The matter of a carbon price is raised regularly. It would likely be implemented through carbon taxes or emissions trading systems, also known as cap and trade systems.

Carbon taxes assign a fixed cost to carbon emissions to incentivise businesses and individuals to adopt cleaner technologies and sustainable practices. The revenue generated is then channelled into initiatives such as renewable energy projects (to speed up the energy transition) or climate change adaptation (to safeguard communities and infrastructure). Emissions trading systems or cap and trade systems set an emissions allowance (or permit) for an industry or sector, allowing companies to trade permits. While emission trading systems have proven effective, they can cause "carbon leakages" where industries move to regions with less stringent environmental regulations, resulting in a shift in emissions rather than a genuine reduction. The associated responses can compromise the effectiveness of carbon reduction efforts and have unintended ecological consequences. Despite widespread support and publicity, only 39 carbon tax initiatives have been implemented globally, covering a meagre 6% of global greenhouse gas emissions. Of the world's top 10 emitters, only Japan has adopted a carbon tax. Emission Trading Systems cover 19% global emission. Collectively these two instruments cover 24% of global emissions. The most recent report from the World Bank, State and Trends of Carbon Pricing 2024, indicates that while a carbon price covers 24% of global emissions, only 1% is at the recommended price range which is sufficient to curb emissions in line with the Paris goals.

According to the World Bank's Carbon pricing dashboard, carbon prices in Europe range from US$0.77 per metric ton in Ukraine to as much as US$132 in Switzerland. Globally, carbon prices ranges between US$0.46 per metric ton to US$167. Some countries in the Global South like South Africa, Uruguay, Argentina and Chile have also set a carbon price, with Uruguay having the highest price worldwide at US$167 per metric ton of CO_2. Subnational emissions trading systems are also present in some US states (e.g. California, Oregon, Washington and Massachusetts).

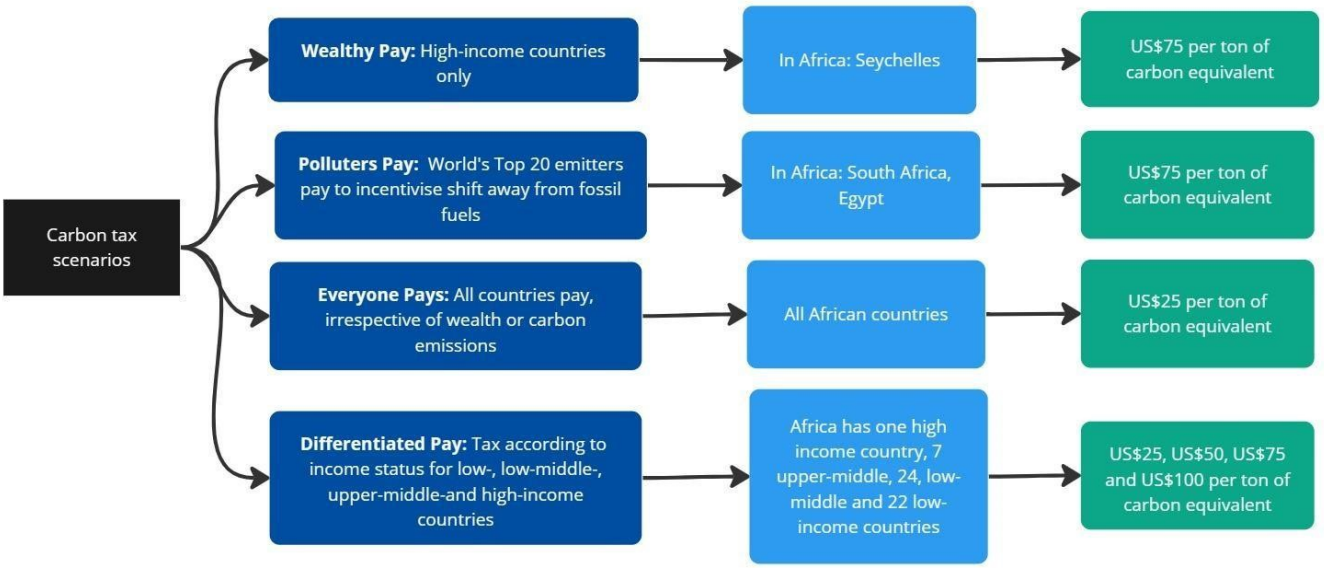
A 2023 study on the emission trading pilot areas in China showed outsourcing of carbon emissions or carbon leakage in pilot areas to non-pilot areas where less stringent environmental laws persist. This phenomenon was also observed in the EU emission trading system (EU ETS), prompting the proposal of a Carbon Border Adjustment Mechanism (CBAM) to ensure that imported goods face a comparable carbon cost to domestically produced goods, preventing a competitive disadvantage for EU businesses and incentivising global partners to adopt emission reduction measures. The EU CBAM (legislated as part of the EU's Green Deal) aims to align the amount of carbon involved in industries within and outside the EU and will impact specific carbon-intensive goods (steel, aluminium, fertilisers, electricity, hydrogen and cement) from 2026 onward. The initial price is at 2.5% of the carbon price per ton which will increase to 100% of that generated in the production of the goods by the end of 2034.

Concerns have been expressed about the potential harm that CBAM may inflict on several African economies, specifically the risk to industries in low- and middle-income countries, as they may lack the resources to decarbonise production. Some, such as South Africa, are considering taking the EU to the World Trade Organisation.

What is clear from the above is that the complex, different and fragmented approaches to carbon pricing internationally. Many countries responsible for contributing to high greenhouse gas emissions are not taxing carbon emissions or pricing them at very low rates. There is, therefore, growing support (backed by institutions such as the World Bank and the IMF) for a uniform (global) carbon tax framework to drive emission reductions worldwide. An international framework would be more transparent and improve emission reduction efficiency and effectiveness. A single carbon tax framework will also be less complex. Still, it must be flexible enough to consider countries' economic structures, incorporate precise compensation mechanisms to address potential disparities and diverse national circumstances and include technical and financial assistance provisions for developing countries. A global carbon tax at scale could also assist Africa's energy transition.

To implement these ambitions, we explore four illustrative carbon tax scenarios, summarised in Chart 11. As reference we use the International Carbon Price Floor (an IMF proposal) of a minimum carbon price ranging from US$25 to US$75 per metric ton of CO_2, but apply the price to a ton of carbon (equivalent to 3.67 tons of CO_2), meaning that the rates used in the scenarios are significantly lower than those proposed by the IMF.

Chart 11: Global carbon tax scenarios



In the **Wealthy Pay scenario**, we argue that present-day developed countries obtained their wealth through an enormous environmental impact and should be taxed accordingly. The carbon tax for high-income countries is introduced at US$75 per metric ton of carbon (or US$20.43 per ton of CO_2) and phased in over ten years from 2027. Since China (the world's largest carbon emitter) is on the cusp of graduating to high-income status ranks, it is included among the high-income countries and the tax phased in over 15 years from 2030. The only African country affected is Seychelles, but the impact is minimal due to its low carbon emissions (2nd-smallest carbon emitter in Africa).

In the **Polluters Pay scenario**, the 30 largest polluters in 2023 pay a carbon tax of US$50 per metric ton of carbon equivalent (or US$13.62 per ton of CO_2), phased in over ten years from 2027. The scenario places a carbon tax on countries responsible for 88% of the world's emissions in 2023.

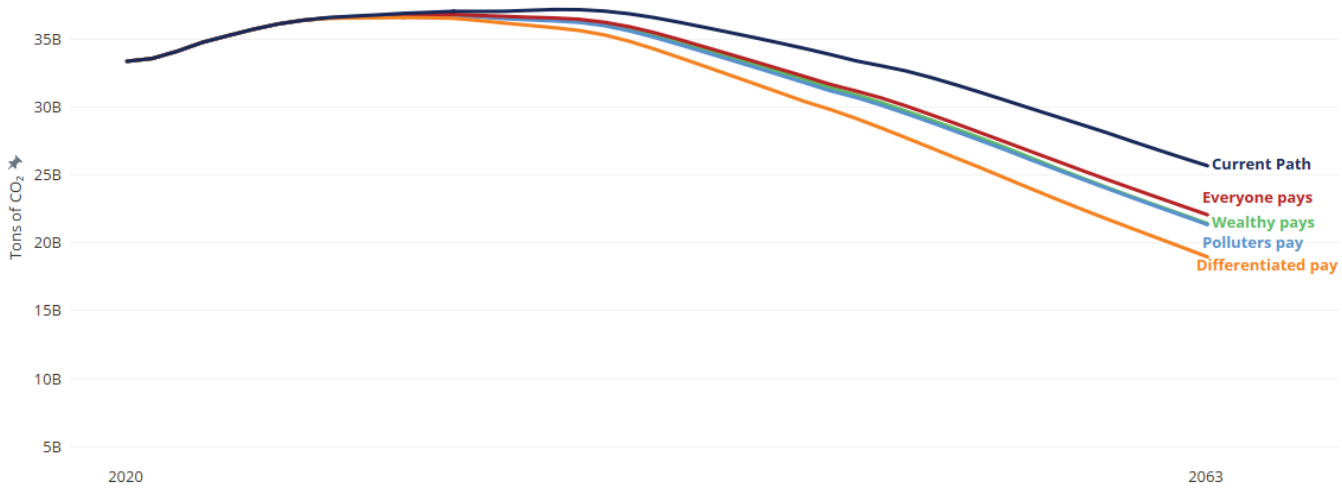
In the **Everyone Pays scenario**, the responsibility for reducing carbon emissions is shared across all nations, reflecting the collective responsibility of combating climate change at US$25 per ton of carbon equivalent emissions (or US$6.81 per ton of CO_2). The tax is phased in over ten years, starting in 2027. However, a recent study by the WTO stresses that low-income countries would adversely be affected by such a Carbon Price Floor and that even a low-carbon price would impact production decisions and reduce real income in these countries.

In the **Differentiated Pay scenario**, income classification determines the carbon tax. In this scenario, high-income countries pay US$100 per ton of carbon equivalent (or US$27.25 per ton of CO_2) while upper-middle-income countries pay US$75/ton. The taxes are phased in over ten years, starting in 2027. Lower-middle-countries pay US$50/ton, and low-income countries pay US$25/ton. In both these cases, the taxes are phased in over a more extended period of 15 years. In 2024, Africa had one high-income country, eight upper-middle-income countries, 23 lower-middle-income countries and 22 low-income countries.

Compared to the Current Path scenario, all carbon price interventions substantially reduce fossil fuel-related carbon emissions (Chart 11), reducing the accumulated CO_2 in the atmosphere (Chart 12), albeit to levels still on par with an RCP4.5 world.

Chart 12: CO_2 emissions in different Carbon tax scenarios, 2020-2063

Measured in tons of CO_2 equivalent emissions from fossil fuel use



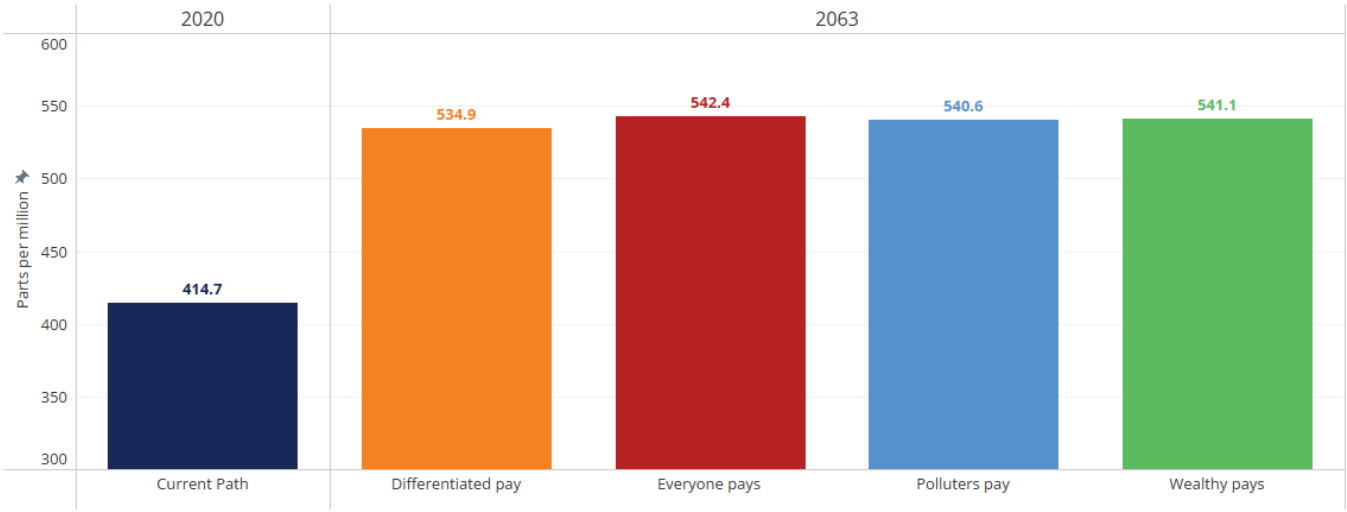
Source: IFs 8.34 initialising from Appalachian State University data

The Differentiated Pay scenario significantly affects carbon emission reductions (14% below the 2050 Current Path and 26% lower in 2063). This is followed by the Polluters Pay and Wealthy Pay scenarios, which have similar results. The Everyone Pays scenario has the lowest impact. It is important to remember that the prices used in these illustrative scenarios are significantly below those recommended by the IMF in its International Carbon Price Floor.

The Differentiated Pay scenario leads to a swift decline in emissions, evident from 2034. By 2050, CO_2 equivalent emissions decline from 36 billion tons to 31.2 billion tons. However, implementing such a differentiated carbon tax will require careful management. The impact on each country under a carbon tax regime hinges on its ability to navigate the transition effectively, invest in clean energy alternatives (modelled in the next section) and implement policies that foster economic resilience and sustainability.

Chart 13 shows the impact of the four carbon tax scenarios on CO_2 concentration in the Earth's atmosphere.

Chart 13: CO_2 concentration in atmosphere in different Carbon Tax scenarios, 2020 vs 2063



Source: IFs 8.34 initialising from Appalachian State University data

The Differentiated Pay scenario aligns with the Paris Agreement, which established the principle of common but differentiated responsibilities. It also aligns with the Just Energy Transition initiative and advocates for a collective global responsibility in addressing climate change. It recognises that all governments are responsible for tackling environmental destruction worldwide, but not equally. This acknowledgement stems from the understanding that earlier industrialised economies have historically contributed more to the climate crisis. In this context, requiring richer countries to pay a more significant tax reflects a commitment to addressing historical disparities and ensuring a fair distribution of the financial responsibility for mitigating climate change.

The result of the Differentiated Pay scenario is that atmospheric carbon dioxide levels could be 3.4% lower in 2063 than the Current Path, with up to 0.2^{O}C lower average global temperature. Higher prices, as recommended by the IMF, would have a much more significant effect.

A carbon tax is only one of several policies, tools and measures to tackle the global climate crisis. It would need to be complemented by measures such as carbon sequestration and a swift energy transition, particularly in the more significant global emitters. Implementing a global carbon tax framework has challenges, but it addresses the potential social and economic effects of carbon emissions on vulnerable communities. However, by embedding fairness and efficiency, a global carbon tax can become a cornerstone of effective climate governance — as long as Africa is active and the world's top polluters pay their bills.

Endnotes

1. Congo, Zambia, Angola, CAR, Nigeria, São Tomé, Senegal, Sierra Leone, Ghana, Benin, Eswatini, Gambia, Guinea, Malawi, Burkina Faso, Togo, Madagascar.

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About the authors

Ms Alize le Roux joined the AFI in May 2021 as a senior researcher. Before joining the ISS, she worked as a principal geo-informatics researcher at the CSIR, supporting various local and national policy- and decision-makers with long-term planning support. Alize has 14 years of experience in spatial data analysis, disaster risk reduction and urban and regional modelling. She has a master's degree in geographical sciences from the University of Utrecht, specialising in multi-hazard risk assessments and spatial decision support systems.

Dr Jakkie Cilliers is the ISS's founder and former executive director. He currently serves as chair of the ISS Board of Trustees and head of the African Futures and Innovation (AFI) programme at the Pretoria oce of the Institute. His 2017 best-seller Fate of the Nation addresses South Africa's futures from political, economic and social perspectives. His three most recent books, Africa First! Igniting a Growth Revolution (March 2020), The Future of Africa: Challenges and Opportunities (April 2021), and Africa Tomorrow: Pathways to Prosperity (June 2022) take a rigorous look at the continent as a whole.

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