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Fragility and Resilience in Green Development in Africa: Intersections and Trade-offs

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Abstract

1. *The outbreak of the COVID-19 pandemic has been a significant disruptor and risk multiplier that has exacerbated fragility in Africa by further weakening states and their capacity to meet the population's basic needs, as well as to withstand shocks that impact multiple sectors of development.*

2. *The most critical "drivers of fragility" include the rising impacts of climate change, increased land degradation, growing losses of biodiversity, and widespread energy poverty. These drivers disrupt socioeconomic systems, making livelihoods and society much more fragile, as reflected in growing social inequalities and hard to close critical social gaps. Both the deficiencies in response systems and the weak capacity to act hinder decisions in favor of moving towards low-carbon development.*
3. *The fragility of the continent's ecology and economy has been further compounded by the outbreak of COVID-19, persistent inequalities, trade deficits, and resource depletion. Economic fragility exacerbates underlying instabilities, which conspire to produce new forms of conflict and insurgency, as well wiping out progress towards the SDGs.*
4. *The multidimensional risks faced by African economies and societies threaten a cascade effect, which in turn has negative impacts on environmental systems. Addressing these intricately linked challenges requires going well beyond the "green transition" towards the restoration of functioning eco-systems, in which the bonds between humans and the environment are firmly re-established.*
5. *Investing in resilience-building and addressing the underlying causes of fragility will greatly support the recovery process, help build back better, and secure the stability of development efforts.*
6. *"Greening" is a highly promoted paradigm to fundamentally redefine and redesign the relationships between economic, environmental, and social systems. It could bring about a much-needed*

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transformation by reducing fragility and building system stability, provided this transformation is built into the strategic direction adopted for "greening".

7. *The potential benefits of greening include diversification of economies, job growth, and greater resilience in all essential systems, so that more substantial buffers are created to withstand shocks and reduce vulnerabilities.*
8. *However, it is important to recognize that the "green transition" is not a universal panacea. It is affected by major inhibiting factors, such as how to finance the transition, how to put social justice at the heart of adaptation measures, identifying choices to manage the energy transition, and implications for loss of fiscal space and risk of stranded assets.*
9. *Africa has contributed the least to greenhouse gas emissions but is suffering the most from the adverse impacts of climate change, now exacerbated by the COVID-19 outbreak. The continent has the highest potential to leapfrog its energy systems by using low-carbon options to drive economic development, and thereby contribute to global mitigation goals under the Paris Agreement. It is therefore vital that Africa can access global mechanisms to leverage investment in transformative low-carbon energy systems.*
10. *As underscored in the NDCs of most African countries, successfully realizing their ambitions depends on the means of implementation. As the global region with the greatest proportion of its population living on incomes below US $2 a day, it has also seen even more people pushed into extreme poverty due to COVID-19. Africa can contribute significantly to reducing global GHG levels mainly by aligning its future development along low-carbon development pathways, provided it is given adequate support for implementation.*
11. *In parallel, African governments must increase the domestic share of climate funding, ensure that climate responses are built into national budgetary processes and establish government leadership of measures to address climate change impacts on national development agendas. This includes creating the governance framework and enabling environment for private-sector participation and increasing the roles of nature and nature-based solutions in national development.*
12. *While the recent COP26 re-affirmed the centrality of multilateral processes, the mitigation gap remains large. Greater ambition is needed from all the world's nations to engage in the massive time-critical actions embodied in the Paris Agreement and to push for decarbonization of the global economy. At COP27, to be held in Egypt, African countries must push for particular attention to be paid to meeting their priorities.*

1. Background

It will be a long time before the world can take full stock of the deep impact of the coronavirus (COVID-19) crisis, which is devastating the economies of countries around the world. The crisis comes on the heels of a series of interconnected emergencies, such as climate change, extreme inequalities, and ecological deterioration, that have marked recent decades. These crises are deeply rooted in a carbon-intensive economy that has driven much economic growth and human progress in past centuries, but now threatens to tip us over the planet's boundaries. Many aspects of the carbon economy have also

engendered great human injustice[3] and caused the inherent structural fragilities faced by some societies across the world.[4]

The outbreak of the COVID-19 pandemic, together with climate impacts, have further exposed the different axes of fragility, for instance, between high- and low-income countries. The varying impacts on economic, social, human, political, security, and environmental systems have demonstrated the broad dimensions of fragility, helped inform post-COVID recovery efforts, and supported "build forward better" initiatives.[5] Countries and societies manifest a wide spectrum and types of fragility, of varying intensities, at any point in time. Fragility in this context of multi-dimensional crises combines exposure to risk with insufficient coping capacity. It is not just about armed conflict or geopolitical insecurity, but more about the ability of development systems to withstand both internal and external shocks, and safeguard people's livelihood systems.

Nigeria's Dependence on oil was laid bare by COVID-19 (Adeyemi Dipeolu)

COVID-19 posed a major risk to the oil and gas sector and fast-tracked us into the stranded assets situation (Senyo Hosi)

The consequences of environmental impacts, such as pollution, climate change, and land degradation, have been shown to have very different burdens across populations, with more severe impacts borne by the most vulnerable, especially the marginalized.[6] For instance, the impacts of climate change on the population of the United States of America are reported to be disproportionately more severe among communities of color, indigenous communities, the poor, and minority groups.[7] Similarly, higher mortality from the coronavirus is found to be correlated with exposure levels to air pollution.[8] In a study of 355 municipalities in the Netherlands, a strong relationship was found between the incidence of COVID-19 and pollution levels, with a doubling in the number of COVID-19

[3] Letter from economists: to rebuild our world we must end the carbon economy. 4 August 2020. https://www.theguardian.com/commentisfree/2020/aug/04/economists-letter-carbon-economy-climate-change-rebuild

[4] SSH20 Academies Joint Statement July 2021. Crises: economy, society, law, and culture towards a less vulnerable humankind.

[5] UNDP 2021: Understanding the Impact and Implications of COVID-19 in Fragile and Conflict-Affected Contexts.

[6] Pollution is a racial justice issue: Let's fight it that way. Moses, E. and Excell, C. 2020. World Resource Institute.

[7] EPA 2021. Climate change and social vulnerability in the United States: A focus on six impacts. US Environment Protection Agency, EPA 430-R-21-003.

[8] Why deforestation and extinctions make pandemic more likely. Nature vol. 584, 13 August 2020. https://media.nature.com/original/magazine-assets/d41586-020-02341-1/d41586-020-02341-1.pdf

cases for every corresponding 20% increase in concentrations of air pollution.[9] Furthermore, there are socio-economic disparities in air pollution. Studies have shown that globally, there is higher concentration of air pollution in areas inhabited by people of low socio-economic status.[10] Even where there are policies to curb the situation, their implementation is shrouded in injustices, as highlighted in the report *Watered Down Justice* by the Natural Resource Defense Council.[11]

The intricate interconnectedness between all human systems has left no location, economy, or section of the population unaffected globally. The vulnerability and fragility of all social and economic systems, irrespective of developmental status, have been laid bare. However, the effects have been asymmetric due to the underlying fragility that prevails in some regions, such as Africa. Unfortunately, the ripple effects across all systems have direct implications for every social unit of humanity, the risk being that they could be long-lasting and further increase the vulnerability of these regions.

Regrettably, in some cases, the drivers of fragility conspire to create new stressors on development systems. This can exacerbate limited capacities, as systems of resilience are depleted over time.[12] Under such conditions, any form of shock is likely to overwhelm governance systems and institutions, which must function with inadequate resources, themselves grossly disproportionate to the magnitude of the crisis. If not properly managed, fragility will escalate and intensify humanitarian needs, fuel tensions, put at risk peaceful coexistence between communities, and reverse development gains over time. Although COVID-19 is non-selective in the extent to which it affects rich or poor countries, measures for containment of the virus are based on nationalism and self-interest, as is clearly observed with the inequalities of the global distribution of vaccines. As a result, the world's poorest regions, such as Africa, with their highly vulnerable populations, are the hardest hit by the lack of vaccines and are likely to remain with the burden of the pandemic for much longer than more prosperous regions of the world.

The nature of this new crisis has triggered nationalistic, individualistic, and protectionist tendencies that are misaligned with the global approach prescribed by the World Health Organisation, a collective approach which we urgently need in order to find shared solutions that build on differentiated capabilities. Africa needs its future development to be anchored in self-determinism, in systems of self-production powered by renewable resources, and resource efficiency, rooted in equitable access to opportunities that can

[9] Incidence of COVID-19 and connections with air pollution exposure: evidence from the Netherlands 2020. Policy Research Working Paper 9221. World Bank Group 2020.

[10] Anjum et al. 2015. Socioeconomic Disparities and Air Pollution Exposure: A Global Review. *Curr Environ Health Rep*. 2015 December; 2(4): 440–450. doi:10.1007/s40572-015-0069-5.

[11] Watered Down Justice 2019. Natural Resources Defense Council. https://www.nrdc.org/sites/default/files/watered-down-justice-report.pdf

[12] UNDP 2021. Putting Fragility at the Center of Iraq's Recovery from the COVID-19 Pandemic and the Oil Crisis

empower society, especially women and young people. To achieve this vision, however, Africa will need to figure out what works. The African Union's Agenda 2063, for instance, highlights several avenues to designing a growth and transformation plan for the region. It offers a common strategic framework for inclusive growth and sustainable development that draws on Africa's own rich resources.

We need to strengthen our regional energy markets to be able to attract worthwhile investments (Yao Graham)

The vision for a green transition has emerged as a way to redefine and realign relations between economic, environmental, and social systems, which could safeguard Africa's development by making systems more responsive and creating safety nets for society. However, seeking to pursue a green transition during a pandemic is a major challenge, even if the solutions can deliver stable economies and sustainable development in the longer term.

The post-COVID-19 recovery process needs to be designed with fragility in mind, as part of the transitional framework for greening. This is crucial, particularly in Africa where economic and conflict-related fragility predominates, as is visible in the widespread displacement and movement of people. Even prior to the pandemic, it was estimated that by 2030, over two-thirds of the world's extreme poor would be living in fragile, conflict-affected locations.[13] Furthermore, one in four Africans is not living in his or her place of birth, which underscores the high rate of intra-regional migration across the continent, including rural-urban migration. Whether this is due to forced or chosen migration, some form of fragility often triggers relocation. Mindful of the multiple strands of fragility and their sources, the key question is whether greening will take Africa out of its current state of fragility, and what are the most critical measures?

The impacts of climate change and the outbreak of COVID-19 can be better understood through the lens of current patterns of fragility in Africa. Besides the common recommendations to implement greening and "build forward better", post-COVID-19 recovery initiatives require a well-tailored enabling environment that is comprehensive and that can focus on multiple sources of fragility.[14]

[13] World Bank Group Strategy for Fragility, Conflict, and Violence 2020–2025 (English). Washington, DC: World Bank Group. documents.worldbank.org/curated/ en/844591582815510521/World-Bank-Group-Strategy-for-FragilityConflict-and-Violence-2020-2025

[14] UNDP 2021. Putting Fragility at the Center of Iraq's Recovery from the COVID-19 Pandemic and the Oil Crisis.

The resounding call for greening, whether linked to the Green New Deal, the Green Economy, or to the Green Transition, has never been so loud. It has echoed particularly forcefully across the globe because the dual impacts of climate change and the outbreak of COVID-19 have so clearly exposed the fragility of current economic growth models. Africa is a candidate for a green recovery. And, unlike other regions of the world, the continent can benefit from first-comer advantages if it rises to the "green challenge" as a means to deliver its development goals. This raises the question of whether greening is simply an awareness-driven reaction throwing the spotlight on the importance of nature, or a genuinely solution-oriented framework prompted by place-based diagnosis. Until there are concrete policies and actions for the implementation of greening, it will be perceived as the former. Deploying green initiatives across regions must recognize their great diversity, each characterized by different patterns of production and consumption, and each experiencing a mixed range of stresses.

The confluence of these multidimensional crises has created behavioral volatility and uncertainty in what to expect and how to respond, which puts the future of the continent at risk and in a state of fragility even when exposed to minor shocks. Complexity in tackling the situation and ambiguity in the scope of the challenge require innovative approaches to designing and tailoring interventions that enhance institutional and public readiness, country by country. For instance, the capacity of government institutions for the facilitation, coordination, and timely deployment of services will be crucial. In such situations where predictability is difficult, building resilience is the most appropriate option.

2 Climate, energy, and environment

Africa's development has, in part, been shaped by climate, energy, and the environment. Rainfed agriculture, for example, which sustains household food and nutrition, is the predominant form of farming, with only 6% of Africa's cultivated land being irrigated. The natural environment also provides a wide range of ecosystem goods and services, such as water, medicines, and natural infrastructure, including mangroves, which offer coastal protection from different forms of disaster. Unfortunately, many of these natural systems no longer function well because of erosion, poor management, and heavy pressures on such systems.

2.1 Climate change impacts and risk

Most global assessment reports highlight the impacts of climate change and the risks they pose to development efforts and communities in Africa. For example, the IPCC special report on keeping global temperatures below 1.5C states that most land regions are

experiencing greater warming than the global average, and 20-40% of the global human population live in regions that have already experienced warming of more than 1.5C above the pre-industrial period in at least one season.[15] Regional differentiation is very important in assessing both future climatic risks and different vulnerabilities to rising temperatures. For instance, some tropical regions like West Africa, Southeast Asia, and Central America are projected to face substantial local yield reductions, particularly for wheat (9% at 1.5C, and 15% at 2C) and maize (3% at 1.5C, and 6% at 2C). These same regions are also projected to experience the greatest increases in land areas covered by heat extremes. It is now generally agreed that both the level of warming and population responses – consumption, production, technological development, and land management – will determine how the risk of climate change is felt on the ground.[16]

2.2 The green transition and building resilience

The transition to a green economy will provide opportunities to restore the integrity of ecosystems that normally serve as natural infrastructure and provide nature-based solutions. For instance, restoring healthy ecosystems, such as coastal mangroves, wetlands, swamps, and peatlands, will help to protect people and assets from the damaging force of waves, floods, and storms.[17] At the same time, they serve as large reservoirs of carbon, currently in stable form, which are critical for achieving the global temperature goal. The building of resilience is now largely anchored in the green recovery, which also serves as a stimulus for economic recovery. Countries are expected to harness low-carbon investment opportunities as a way of rebooting their economies, alongside curbing greenhouse gas emissions and air pollution, both of which have direct implications for human health.[18] Greening also potentially provides an opportunity to pull people out of poverty, create more jobs and foster resilience to future shocks like disease outbreaks and the impacts of climate change.[19][20] However, such development outcomes will depend on countries' strategic orientation and on how greening is conducted. Thus, greening has direct consequences in addressing fragility and vulnerability, especially

[15] IPCC Special Report on 1.5C.

[16] IPCC, 2019: Summary for Policymakers. In: *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems.*

[17] The Nature Conservancy. 2021. The Blue Guide to coastal resilience: Protecting coastal communities through nature-based solutions. A handbook for practitioners of disaster risk reduction. The Nature Conservancy. Arlington, VA.

[18] WRI 2021. How emerging economies can pursue green recoveries. https://www.wri.org/insights/how-emerging-economies-can-pursue-green-recoveries?utm_campaign=wridigest&utm_source=wridigest-2021-6-1&utm_medium=email&utm_content=readmore

[19] ILO 2016. Greening Economies Enterprises and Jobs: The role of employers' organizations in the promotion of environmentally sustainable economies and enterprises ISBN 978-92-9049-776-9

[20] ILO & UNEP 2012. Poverty eradication through green jobs in a green economy. Information Note.

when internalized in national policies and programmes. The integration of greening into national policies has direct implications for addressing social fragility by improving social cohesion in communities and enhancing peaceful coexistence.[21]

2.3 The climate—energy—environment nexus

The nexus approach is defined as *"the interrelatedness and interdependencies of environmental resources and their transitions and fluxes across spatial scales and between compartments. Instead of just looking at individual components, the functioning, productivity, and management of a complex system is taken into consideration."*[22]

The Sustainable Development Goals (SDGs) adopted in 2015 set out a common vision and milestones for global development and constitute a unique entry point for taking a nexus-based approach. The security nexus for development, embodied in the SDGs, includes climate change, food, energy, and water as key pillars of development that demand a joint approach to their implementation. Harnessing the nexus of different systems requires framing the benefits, co-benefits, and trade-offs in order to demonstrate the investment opportunities that could be derived from the interactions between these systems.

In pursuit of food and energy security, therefore, a nexus approach has the potential to improve cooperation and collaboration among different stakeholders, sectors, and actors. By not addressing Africa's energy deficit, for example, deforestation for fuelwood will be further aggravated, which in turn amplifies flash floods and reduces agricultural production through soil erosion and the loss of soil fertility. Similarly, in addressing food security, there are nexus-related opportunities for energy production, such as biogas and cellulitic biofuel as renewable sources of energy that are beneficial to the climate system. If the cereal straw left behind after harvest is made the base source for this biofuel, rather than the cereal grain, this will have less impact on food security.[23]

In support of coherence across sectors and countries, a nexus approach is crucial in finding synergies and shared benefits. The nexus approach helps to improve the efficiency of natural resource use, enhancing water, energy, and food security, ensuring the sustainable use of ecosystem services, reducing trade-offs, and improving

[21] National Academies of Sciences, Engineering, and Medicine 2021. Enhancing Community Resilience through Social Capital and Social Connectedness: Stronger Together! Washington, DC: The National Academies Press. https://doi.org/10.17226/26123.

[22] Huelsmann, Stephan, and Reza Ardakanian, ed. 2015. White Book on *Advancing a Nexus Approach to the Sustainable Management of Water, Soil and Waste*. Dresden: UNU-FLORES.

[23] US Department of Energy, Energy Efficiency & Renewable Energy 2016. Biomass Conversion: From Feedstocks to Final Products.

governance across sectors. This will help manage trade-offs and facilitate coherent policies and decisions, identify synergistic actions to moderate negative impacts or trade-offs, and enhance the positive links between sectors. The IPCC special report on "Climate and Land" used this approach in evaluating synergies and trade-offs and in defining integrated responses to address interlinkages between desertification, land degradation, food security, and GHG fluxes for different regions and contexts.[24] The Water-Energy-Food nexus approach is crucial for making progress across the multiple SDGs.[25]

There are both internal and external forces driving the relationships between energy and food security. While food and energy systems can be mutually supporting, there are also externalities that can generate shocks in each system that need to be managed. This is especially pertinent in transboundary river basins or aquifers, such as those we are witnessing in the Nile River Basin. Egypt's disagreement with Ethiopia over construction of the Grand Renaissance Dam is a clear example of this. In this case, Ethiopia's plans to massively increase energy generation run counter to Egypt's food security concerns. The nexus approach provides a framework for cooperation in transboundary systems, which are often fragile, with the risk of conflicts.[26] Thus, it is crucial to ensure the following:

- Governance mechanisms, policies and incentive structures surrounding the interdependence between food and energy security, climate change and trade, to address the main shortcomings that arise in intersectoral interests that are common at national and transboundary levels.[27]

- Boosting smart regional specializations to foster strategic cooperation over trade, food, and energy security. In South Asia, for example, this has facilitated trade and the flow of commodities across borders within the region.[28]

- Facilitating coordination and synergies in policies and programs among regions to respond to climate change, and capitalize on the trade opportunities for food and energy security (Figure 1). The nexus approach is considered an important way to enhance the Comprehensive Africa Agriculture Development Programme (CAADP), which was established by the assembly of the African Union (AU) in 2003. The aim

[24] IPCC, 2019: Summary for Policymakers. In: *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems.*

[25] Water-Energy-Food Nexus for the Review of SDG7. Policy Briefs in support of the first SDG7 Review at the UN High Level Political Forum 2018.

[26] UNECE 2018. A nexus approach to transboundary cooperation: The experience of the Water Convention. United Nations Economic Commission for Europe.

[27] The application of a nexus approach in transboundary basins. Prepared by the secretariat and the Royal Institute of Technology (KTH, Stockholm) 22 April 2015.

[28] Kerswell, Clay; Kunaka, Charles. 2015. The Security and Trade Facilitation Nexus: International Trends and Practices. SARConnect, issue no. 3. World Bank, Washington, DCB. © World Bank. https://openknowledge.worldbank.org/handle/10986/22031 License: CC BY 3.0 IGO.

has been to raise agricultural productivity by at least 6% per year and increase public investment in agriculture to 10% of national budgets per year by linking national and regional initiatives towards achieving this goal.[29]

- Innovative ways of exploring and exploiting the opportunities in the nexus approach for achieving transformational change in Africa, for example, by managing intra-African migration in ways that increase the economic and trade benefits to the home and host countries.[30]
- Develop alternative planning and management solutions based on joint work by public and private stakeholders. Constructing effective public-private partnerships is important in expanding investments and implementing the diverse actions needed for sustainable development.[31]

A sustainable solution should therefore reflect the interconnectedness between systems and how each of them is powered. Building on the synergies between these systems requires an understanding of the interface in order to quantify the linkages and influence of other systems, such as trade, investment, and climate policies. Recognizing the multiple dimensions and complexity of the interlinkages between resources will help minimize the fragility of the system.

[29] Afun-Ogidan, D., van Seters, J. & Rampa F. 2012. Regional approaches to food security in Africa: The CAADP and other relevant policies and programme in EAC. Discussion Paper No. 128c. www.ecdpm.org/dp128c

[30] Economic Development in Africa Report 2018: Migration for Structural Transformation. UNCTAD 2018.

[31] Wojewnik-Filipkowska, A. & Wegrzyn, J. 2019. Understanding of Public-Private-Partnership stakeholders as a condition of sustainable development. Sustainability 11, pp. 2-16.

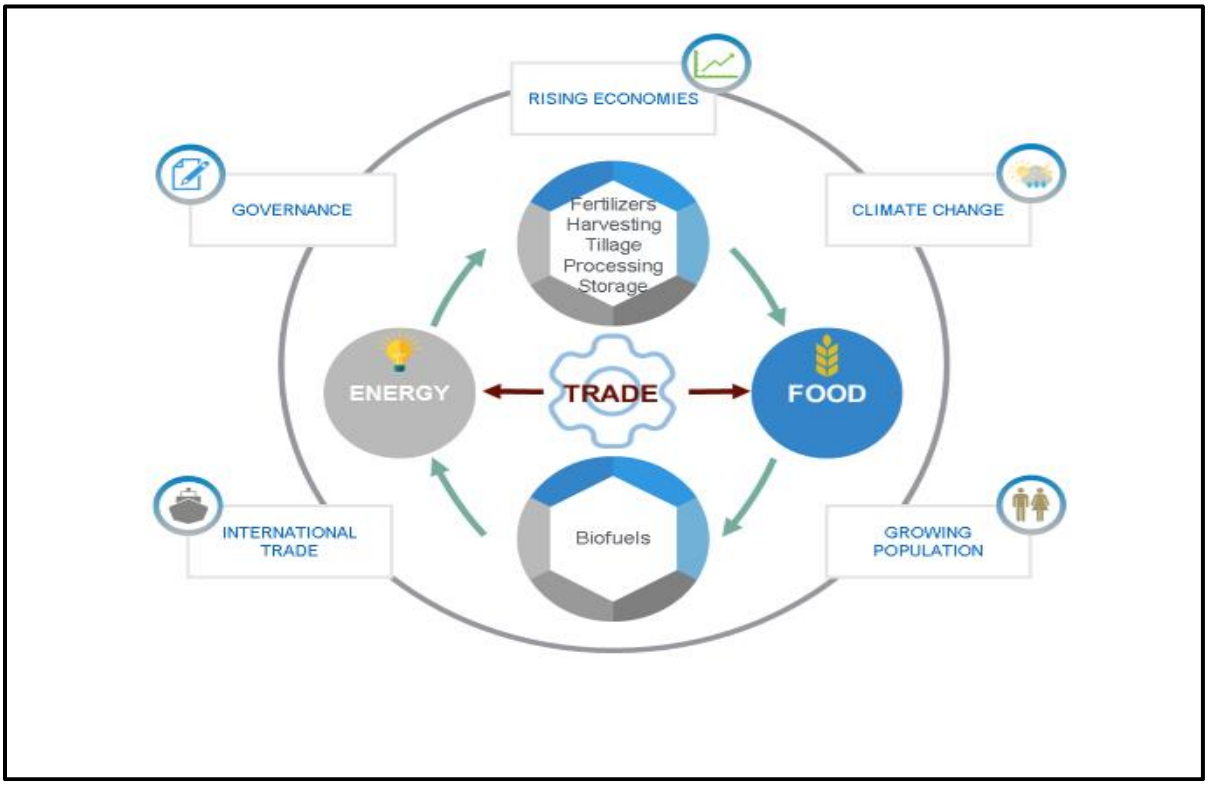

Figure 1. Diagram showing the climate-energy-trade-food nexus and associated parameters as drivers and enablers (adapted and modified from Mohtar and Daher 2012).[32]

Markets for energy and food, for example, are governed by multi-scale supply chains, shaped by prices, market structures, and public regulations that have both economic and political ramifications. Under climate change, trade has the potential to stabilize agri-food systems, not just by the provision of commodities through imports, but also by saving on the production resources impacted by climate change by externalizing production. Nations can significantly gain from trade if they specialize in the production of goods and services in which they have a comparative advantage, while importing those goods and services where they currently have limited capacity.

3. Fragility

3.1 Drivers of fragility

[32] Mohtar R.H. and Daher, B. 2012. Water, energy and food: The ultimate nexus. Encyclopedia of Agricultural, Food, and Biological Engineering, Second Edition DOI: 10.1081/E-EAFE2-120048376

Fragile and conflict-affected states are more vulnerable to shocks and less able to mitigate them or recover from them. As noted earlier, fragility is not a simple concept, there being no single definition, but rather a wide range of characteristics. The OECD refers to fragility as:

> *"the combination of exposure to risk and insufficient coping capacity of the state, system and/or communities to manage, absorb or mitigate those risks. Fragility can lead to negative outcomes including violence, the breakdown of institutions, displacement, humanitarian crises or other emergencies".*[33]

In general, the causes, and consequences of fragility can be understood in relation to their economic, environmental, socio-political, and security dimensions, as shown in Table 1 below.

Table 1. Principal dimensions of fragility.

Economic	Environmental	Socio-political	Security
- Poverty - Inequality - Joblessness - Debt and fiscal imbalance	- Climate change - Land degradation, desertification, and displacement - Natural resource dependence	- Institutions - Governance - Corruption - Conflict	- Food security - Energy security - Human security

3.2 Covid-19 and fragility

Though the direct health impact of COVID-19 in Africa is low, the socio-economic impact has been devastating, resulting in the worst recession in many decades[34]. The pandemic dealt shocks to Africa's trade, contraction of oil and non-oil commodity prices, the decline in manufacturing, shifts in food production and distribution, increased food prices, job losses, and bringing untold hardships to Africa's poor and vulnerable, inflicting complex economic shocks disrupting Africa's fragile economy.

[33] OECD 2020. State of Fragility Report 2020.

[34] Centre for Economic Policy Research (CEPR). (2021). *Shaping Africa's Post-Covid Recovery* (R. Arezki, S. Djankov, & U. Panizza (eds.)). https://voxeu.org/content/shaping-africa-s-post-covid-recovery

The COVID-19 pandemic and its impacts have revealed the varying abilities of countries to respond to shocks, with more vulnerable countries experiencing deep-rooted consequences that exacerbate their fragility. The pandemic has set back much of the progress towards achieving the Sustainable Development Goals (SDGs), while progress towards implementing the Paris Agreement and Nationally Determined Contributions (NDCs) has been pushed much further away.

The last decade witnessed rapid economic growth in Africa, enabled by favourable commodity markets for key African exports, which led to increased investment in infrastructure and growth-enabling assets. Africa's economy grew by 3.4% in 2017 and 3.2% in 2018, with growth in Eastern Africa taking a faster pace at 6.2% in 2018[35]. However, the pandemic is reversing the gains made in promoting the growth and prosperity of the continent and exposed the region's vulnerabilities. The foreign exchange rate quickly devalued for many commodity-dependent African countries (Figure 2), and stock markets in Africa lingered in negative territory. By contrast, stock markets in developed markets quickly rebounded in 2020 [36].

[35] RES4AFRICA & UNECA. (2020). *THE IMPACT of Covid-19 on Africa's energy sector AND THE ROLE OF RE to empower a long term and sustainable recovery In partnership with : With the support of*. https://www.tralac.org/documents/resources/covid-19/regional/3943-the-impact-of-covid-19-on-africas-energy-sector-res4africa-june-2020/file.html

[36] Agbloyor, E. K., & Abor, J. Y. (2020). *Centre for Global Finance Working Paper Series By Elikplimi Komla Agbloyor and Joshua Yindenaba Abor*. *October*. https://doi.org/10.13140/RG.2.2.17767.06561

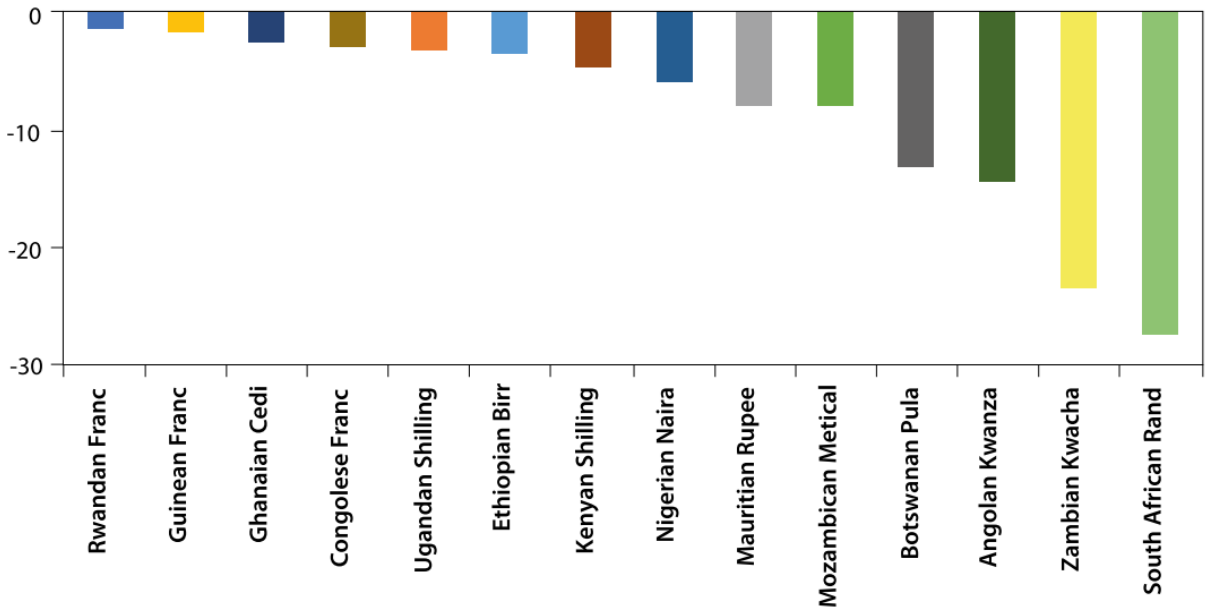

Figure 2: COVID-19 and depreciation of currencies in Africa. (Source – fitchsolutions.com; Bloomberg)

Furthermore, Africa's debt burden has been exacerbated by the pandemic. The huge spending made on health and stimulus packages to address the pandemic and cushion the impacts of the pandemic have further reduced the fiscal space of many African countries with limited opportunities left to invest in sustainable recovery, climate goals and sustainable development objectives. According to a study by UNDP, Angola's government had to spend 61% of its budget for 2020 on the public debt[37], resulting in an increased borrowing burden.

3.3 Development perspectives

Access to food and energy are essential elements of development, and should be seen as fundamental rights. Expressions of freedom and the ability to innovate must not be constrained by the fear of hunger or a sense of insecurity as regards future supplies of food and energy. In fact, the right to food is considered a human right by the Committee on Economic, Social and Cultural Rights (Committee on ESCR),[38] which, in its General Comment 12 of 1999, defines the right to food as follows: *'The right to adequate food is realized when every man, woman and child, alone and in community with others, has physical and economic access at all times to adequate food or means for its procurement (para. 6)'.*

[37] UNDP. (2020). *POTENTIAL SOCIO-ECONOMIC IMPACT OF COVID-19 PANDEMC IN ANGOLA: A BRIEF ANALYSIS*. 1–11. https://www.undp.org/coronavirus/socio-economic-impact-covid-19

[38] The right to food http://www.righttofood.org/work-of-jean-ziegler-at-the-un/what-is-the-right-to-food/

No industrialized country has achieved sustained economic growth without a firm ability to feed its population. Building on the Millennium Development Goals, the Sustainable Development Goals are a collective global effort tailored to improve human well-being and overcome the poverty, food scarcity, and chronic energy deficits that prevail in some parts of the world.

Agriculture has been at the forefront of development in Africa and still contributes over 30% of the GDP of most countries on the continent, providing employment to about 70% of the population. Unfortunately, the fragility of Africa's food systems has come to exert a stranglehold on its development. The majority of people still live on the land and draw an income and sustenance from it for their livelihoods. Africa is still a land-based economy, and people remain intricately connected to their land culturally, spiritually, socially, and economically. In those areas where the quality of land has deteriorated, this disrupts social and economic systems, as well as cultural co-existence, driving conflict and migration. In those areas where competition for land is acute and land values are rising, poor people are becoming increasingly vulnerable to losing access to this vital resource.

Land-use and land-use change (LULUC) have great implications for global GHG emissions. LULUC also has a vitally important role to play in Africa's development, in safeguarding biodiversity, and in developing nature-based solutions as lifelines for survival. While Africa's economic transformation has the potential to lift millions of people out of poverty, it could also dramatically alter its ecological characteristics in terms of changes in the quality and extent of its natural capital.[39]

Infrastructure provides the backbone of the economy, connecting people, enhancing the quality of life, and promoting health and safety. However, climate change and the COVID-19 pandemic have revealed the large-scale inadequacies and vulnerabilities faced by infrastructure in Africa, including health-care services. The degradation of ecosystems further weakens'nature's infrastructure and the essential services it provides.

Dependence on carbon-based economic growth raises major concerns for sustainability, especially given the rapid depletion of Africa's natural capital, continued population growth, and the pressure placed on vital life-support systems.[40] Africa has a diverse endowment of carbon-based assets (woodland and pastures above ground, fossil-fuel reserves below ground), which have great potential for improving economic growth and

[39] WWF & AFDB 2015. African Ecological Futures 2015.

[40] Okoh et al. (2018) Green transformation through sustainability of natural capital: the path for Africa. ICCSDA Special Issue: JENRM vol. 1, 68-77.

the well-being of its people. Diversifying sources of economic growth away from such carbon-rich assets is central to achieving the transition to a low-carbon economy. While there are linkages in the composite challenges posed by the COVID-19 outbreak, locust infestation in East Africa, widespread land degradation, and climate change impacts, there is also systemic connectivity in dealing with the risks to be considered in designing solutions and acting in a timely, targeted manner. Biological, hydrological, and geological processes are connected in ecosystems and function within bounded thresholds, such that minimal changes in one respect can result in unprecedented changes in another.[41] The stability of such non-linear dynamics can only be secured by enhancing the integrity of the larger ecosystem and reinforcing its interconnectedness.

Greening has emerged as a potential lifeline to hedge future development bets, to undertake recovery and resilience post-COVID-19, to deliver prosperity for people, and ensure planetary health. Green and blue transitions can usher in new spaces for development that include marine ecosystems, and renewable resources, such as solar, geothermal, and wind energy, whose potential has barely been tapped across the continent.

The COVID-19 pandemic disrupted systems and created opportunities for a green transition that we must build on (Dr Ade Freeman)

If Africa delays transition, it may again become a dumping ground for obsolete carbon polluting technologies (Youba Sokona)

Current development pressures have brought old dilemmas to the fore. For instance, whether to adopt GMOs in farming remains a polarizing question, amidst the pressures to feed hungry populations while upholding the sociocultural values of food and the ecological integrity of local cropping systems. Can a green transition truly represent a paradigm shift that ushers in "the future we want", as underscored in Africa's Agenda 2063? Greening is not an entirely new concept for the continent but has been occurring haphazardly in selective sectors and locations, primarily tailored to spur industrial transformation and generate economic growth. Greening has not necessarily been formulated as the means to achieve a transition in economic development that could transform human and planetary health. A more ambitious approach to the green transition would build on the synergies between systems, curb the fragility of sectors and locations, and strive to balance responses to both the climate and COVID-19 emergencies. Before the outbreak of the COVID-19 pandemic, many African countries had started putting in

[41] Burkett et al. (2005) Nonlinear dynamics in ecosystem response to climatic change: Case studies and policy implications., Ecological Complexity 2, 357-394.

place policies for Mass Transport Systems (MTS), for example, as an important strategy in managing the future growth in greenhouse gas emissions and promoting public transport. However, these policies may need to be re-configured to respond to COVID-19 because of social distancing, which will require additional costs that were not envisaged at the outset. In searching for equilibrium between people, prosperity, and planetary health, different entry points will need to be evaluated in terms of how they either increase development fragility or enhance stability. These include, as discussed below, resource endowment and dependence, system fragility, environmental change impacts, and the nexus approach in securing development.

3.4 Key areas of fragility in Africa

Resource endowment and dependence. The current model of natural resource dependence is both a source of wealth and a risk amplifier. It also constitutes a source of fragility and conflict. Issues of land tenure, forest degradation, water stress, and climate change are affecting the development paradigm of the African continent and the choices available. The productive capacity of the continent risks further degradation due to its limited options to diversify incomes away from reliance on these endowments. With a growing population, there are direct implications from degradation for the socioeconomic fragility of the continent, as outlined below.

Land endowment for Africa's agricultural potential. Land is an important endowment in Africa, with great potential for future growth in agricultural productivity. It is reckoned that less than a quarter of the land in sub-Saharan Africa that is suitable for rain-fed agriculture is currently being used[42] (FAO 2016). This translates into 700 million hectares of cultivable land being available,[43] more than twice the area currently dedicated to global wheat production. Among the prime zones for increased agricultural production are 400 million hectares of cultivable land in the Guinea savanna, with agro-ecological conditions similar to those of the Brazilian breadbasket region of Cerrado. Yet only 17% of the Guinea savanna is currently being cultivated, despite its potential.[44] Thus, the fragility of Africa's agricultural production systems is not just because they are mostly rain-fed. It is also the consequence of insufficient cultivation, which requires a different set of drivers, such as more active markets and value-chain development, to enable farmers to transform their activities into viable businesses.[45] Given the global pressures on food systems, land-grabbing has become widespread and is creating new forms of conflict and dispossession

[42] FAO 2016. The State of Food Security and Agriculture; Climate Change, Agriculture and Food Security

[43] Critics argue that such large areas of land are not necessarily "available", since they are currently used by herders and farmers for grazing their livestock, and are central to land-fallowing systems.

[44] African Ecological Futures 2015, AfDB & WWF.

[45] Scheren P. et al. 2021. Defining Pathways towards African Ecological Futures. Sustainability 2021, 13, 8894. https://doi.org/10.3390/su13168894

of local communities. While Africa may have a large reserve of cultivable land, the big question is "who will farm it?"

3.5 System fragility and environmental change impacts

The African landscape, including the political landscape, is highly diverse, uncertain and often fragile, due to drivers that amplify vulnerability and disrupt the response measures that have been put in place. Therefore, the design and governance of adaptive measures need a different architecture from other parts of the world in order to streamline adaptation response measures.

There are several causes and types of fragility in Africa. Ecologically, some regions are very marginal, and on the edge. People's livelihoods hang in the balance, whose tipping point can be reached by a single season of poor rainfall, or misaligned practices, as in the Sahel, Horn of Africa, and southern African regions. Other ecological fragilities occur as a result of natural resource exploitation. Under shared resource systems, these can degenerate into conflict, insurrection, and other forms of social and political instability. This demonstrates the cascading effects of environmental fragility on governance and institutional systems, putting further pressure on current economic models that rely heavily on natural resources, which have become increasingly difficult to manage with a rapidly growing population.
The fragility of economic systems for many African countries is also evident given their high levels of dependence on both climate-sensitive sectors such as agriculture, and extractives such as fossil fuels, whose high carbon intensities make them less and less attractive as the world moves to decarbonize the global economic system. Other business models are urgently required for Africa's economic growth. Political systems are under pressure to deliver the immediate needs of the population, especially given Africa's youthful population, the majority of whom are poor, hungry, and jobless. There is some irony in describing this youthful segment of the population as representing a demographic dividend, given the absence of dedicated investments to enhance and harness their potential, and the consequent risk of significant disruption.

African food systems are vulnerable to high variability, with 95% of cropping and livestock systems reliant on uncertain rainfall, and 50-85% dependent on manual labor[46] from an aging population. It is a paradox that, although agriculture contributes a large share of GDP and employs many people, hunger and malnutrition are still pervasive on the

[46] MGI (2020) How will African farmers adjust to changing patterns of precipitation?

continent, with over 20% of the population undernourished,[47] most of whom are women and children. The farming sector is on the frontline of climate change impacts, with crop yields in the most affected areas projected to fall by 20-30% by 2050.[48] As Africa's population grows, agriculture and food production are struggling to keep pace, generating perennial food shortages, hunger, and malnutrition. Even though Africa possesses over 60% of the remaining global arable land that is suitable for production, yields per hectare remain low, and harvest growth is largely due to the expansion of cropland areas. The farming sector is also potentially at the heart of solutions to climate change, assuming that "climate smart agriculture" is able to deliver on its promise. For instance, growing more food on the same piece of land could cut 2.1 gigatons of carbon dioxide by 2050.[4950]

It is not just about producing more food, but about producing healthier food through diversified and resilient production systems. These need to have equity, food sovereignty, and growing prosperity for smallholders at their heart, particularly for women and young people in rural areas. Transforming the rural economy in Africa will directly impact the lives of millions of smallholders.[51] Technology has a role to play here. For example, it is estimated that use of a mobile phone has increased agricultural incomes for African smallholders by 11%, and by an estimated US$138 billion globally by 2020[52] by connecting them to markets and suppliers of inputs, as well as providing them with climate information.

Land should not be seen exclusively for its farm production value, as it also hosts many natural habitats that serve as society's “green infrastructure”, providing ecosystem goods and services. Land offers nature-based solutions to some of the challenges that humanity is facing today, including climate change, biodiversity loss, and the outbreak of viral pandemics. The rehabilitation, restoration, and afforestation of landscapes are urgently required if we are to live within the limits of the biosphere and avoid catastrophic and irreversible changes (see Box 1). For Africa, natural capital is essential for achieving stability in ecological, social, and economic systems, hence the huge importance of avoiding agro-ecological deterioration.[53]

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[47] FAO (2020) The state of food security and nutrition in the world 2019. Rome, FAO.

[48] IPCC (2019) Special Reports on Climate Change and Land. Bonn, IPCC.

[49] WRI World Resource Report 2018. Creating a sustainable food future: A menu of solutions to feed nearly 10 billion people by 2050. Synthesis report.

[50] Ranganathan J. et al. 2018. How to sustainably feed 10 billion people by 2050, in 21 charts. WRI. https://www.wri.org/insights/how-sustainably-feed-10-billion-people-2050-21-charts

[51] IFAD (2016) Rural Development Report 2016: Fostering inclusive rural transformation.

[52] Accenture Connected Agriculture: The role of mobile telephones in driving efficiency and sustainability in the food and agriculture value chain.

[53] Okoh, A.I.S. et. Al. (2018) Green transformation through sustainability of natural capital: the path for Africa. ICCCSDA 2017 Special Issue: Environment, Technology and Sustainable Development Vol. 1, 68-77.

Decisions made about Africa's resource endowment underscore some of the fragility that the continent faces. For instance, even though Africa is the region with the greatest proportion of food insecurity among its citizens, more than thirty-five million hectares of arable land are reported as having been sold to foreign investors for agriculture.[54] Globally, Africa is the prime target for large-scale land acquisitions (LSLAs), as reported by the Land Matrix database. Foreign investors from other parts of the world have been able to secure large land-holdings through concession agreements, despite adverse climate change impacts, and in total disregard of Africa's own food challenges. While this could be seen as making a positive contribution to the region, it is actually obliterating regional self-development efforts. This is fueling food insecurity and eroding trust in governments and international investments, especially among Africa's youthful population, which views international instruments as being dominated by self-interest.

The dilemma for government decision-makers is that they see these land deals as significant sources of revenue injection into the economy through tax payments and job creation. In practice, however, there is considerable doubt about whether these investments really create jobs. There is much evidence to show that instead they impoverish local communities who are forced off their land and converted into waged laborers on these plantations.[55] In many cases, large-scale investments in land result in conflicts with local communities. There are also concerns about the terms of the concession agreements, which in some cases extend for more than thirty years and are limited to cultivation of non-edible crops, such as flowers, tea, and agrofuels. These investments in land are major sources of deforestation, with 800 contracts having been signed in Africa so far since 2000, often in regions of high importance for global climate-change responses, like the Congo Basin Forests.

[54] The Africa Report 2021. Inside the great African land rush. https://www.theafricareport.com/77291/inside-the-great-african-land-rush/

[55] Toulmin, C. (2020) Land, Investment, and Migration: Thirty-five years of village life in Mali. Oxford University Press.

Box 1. The case of fragility in the Sahel and Horn of Africa

The Sahel and the Horn of Africa are regions with complex humanitarian and development challenges. They are highly vulnerable and exposed to environmental, socio-economic, and security stressors, exacerbated by climate change, terrorism, and extremism. There have been serious cases of violations of women's and girls' rights and forced migration by millions of people. Livelihood systems are closely linked to land and natural systems, which themselves are vulnerable to high levels of risk and uncertainty, and exacerbate the fragility of livelihoods to climate change, drought, desertification, land degradation, and loss of biodiversity. These regions urgently require stabilization of the natural resource base and the communities that are dependent on this. Building resilience into the vagaries of the natural resource system is critical to underpinning a more secure framework to prevent violent extremism and migration. Thus, climate actions for mitigation and adaptation must be coupled with stronger institutions and governance systems that are able to manage, invest in, and restore environmental and social stability within the locality. It is also important to recognize the vulnerability of women and young people to a range of systemic injustices in order to build multifaceted resilience. The urgent inter-linked crises in the Sahel and Horn of Africa need a response which uses a humanitarian, peace and development nexus approach to promote ecological restoration, enhance recovery, strengthen resilience, and stabilize ecosystems and communities, including displaced populations. Support to these regions needs to showcase quick peace dividends through an economic transformation that builds opportunities to create wealth, jobs, and livelihoods.

4. Green growth in the context of fragility

4.1 Just transition

The term "just transition" reminds us of the intrinsic inequalities that exist between communities, economies, and natural and human systems in terms of coping with the transition process and its outcomes. The fragility embedded within each of these systems will shape the outcomes, hence the imperative to avoid a one-size-fits-all approach. The genesis of the concept of a just transition is linked to the US labor movement of the 1970s and the alliances they made with environmental groups in the 1990s. Today, the just transition has become synonymous with social inclusion, social justice, and issues related to well-being, access to energy, and a sense of identity.[56] The notion of the just transition considers both distributive justice (where and how costs and benefits are distributed) and procedural justice (whose agency is considered, and who has the power to define what is just).

Human-induced greenhouse gas emissions are largely responsible for the growing impacts of climate change, but the attribution of responsibility for these changes is highly uneven across all metrics: regions, development status, economy, income class,

[56] McCauley, D. & Heffron R. 2018. Just transition: Integrating climate, energy and environmental justice. Energy Policy, vol. 119, issue C, pp. 1-7.

population, sectors, and geography. These impacts are mirrored by an equivalent maldistribution from the economic impact triggered by COVID across regions and within sectors. The concept of the just transition is underscored in the preamble to the Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC), which both reiterate the point that low-carbon development is not simply an economic question, but one that also concerns the fragility and vulnerability of different communities and systems. The discussion of the just transition has been evolving and gaining momentum. However, if poorly managed and ill-conceived, it will simply heighten current structural fragilities and disable the preparations for low carbon development. The pathway that is followed must take due account of how the benefits and costs of the green transition are distributed, to ensure green ambitions are not achieved at the expense of fairness.

Africa should be involved in transition debates and determine the pace of its transition; otherwise, if it comes as a shock then it could be problematic. (Dr Akpalu)

While the just transition currently focuses on the pathway towards low-carbon development, local agendas and domestic imperatives cannot be overlooked. Low-carbon choices must be aligned with contextual realities, adaptation priorities, and social inclusion to avoid the risks of a steep divide between winners and losers along the transition pathway.

If Africa is going to have a greener development pathway, it cannot come at the cost of reducing poverty and meeting the basic needs of people in Africa - that is not negotiable (Dr Harald Winkler)

4.2 Stranded assets

Continued dependence of most African economies on carbon-intensive natural resources, especially hydrocarbons (oil, coal, natural gas), for their growth further amplifies their fragility from the lack of diversification and their vulnerability to swings in global market prices. These assets are at risk of stranding as the world moves towards low-carbon development and the increased use of renewable energy. The outbreak of the COVID-19 pandemic signaled the impending risk of stranding given the sharp decline in energy demand and the fall in the global price of oil and gas. Nigeria's fragile economic recovery from the 2014-2016 oil-price collapse was abruptly halted. In 2020, when COVID-19 brought the world economy to a halt, global oil revenues fell by 50-85%,[57]

[57] IEA (2020), *Energy market turmoil deepens challenges for many major oil and gas producing nations.*

offering a preview of what might happen with climate-induced stranding. While oil prices had recovered by the end of 2021, and have subsequently surged, due to Russia's invasion of Ukraine, divestment from fossil-fuel resources is taking hold, and African countries must now rethink ways to diversify into other productive sectors, such as agriculture, manufacturing, and services.

4.3 Debt and fiscal dependence

While carbon assets risk becoming stranded, the burden of debt is becoming more prominent and squeezing Africa's fiscal space more tightly. It has reduced the state's ability to draw on innovative approaches, to generate income in support of the green transition and help families cope with the short-term costs of such a transition. It is argued that imposing taxes on energy, for instance, provides a flexible and cost-effective way to reinforce the "polluter-pays principle."[58] However, this raises the cost of energy for citizens which, in the case of Africa, will only amplify the energy-access gap across the continent. The redistribution of environmental tax revenues to help households cope with the increasing costs of energy and transport works well for Europe, which is pursuing its own New Green Deal. But it is much harder for Africa, where revenues from other sources will be required to subsidize citizens to deal with the additional costs of a green transition. For instance, in 2018 the EU generated 324.6 billion Euros as revenue from environmental taxes, 77% coming from taxes on energy, where such levies constitute 40% of the average electricity price. The same flexibility to generate an income to fund the green transition and incentivize greening does not exist in Africa.

Inevitably, some of the debt burden faced by African countries stems from the cost of climate change responses. Commonly-used blended finance instruments, whereby grants and loans are intricately coupled and non-discretionary in terms of the options proposed, force countries into debt because of their desperation to address climate change impacts. Yet, these loans are still counted as climate finance. Similarly, public resources in these poor countries are drawn on to de-risk private-sector investments in response to climate change. This often involves diverting resources from public services, such as health-care or education, into de-risking private-sector investments. This should not occur under the "polluter pays principle" of the Climate Change Convention, nor under a fair and just system.

There is an urgent call to roll out financial packages to boost liquidity in Africa, such as the IMF's Special Drawing Rights and extension of the Debt Service Suspension Initiative,

[58] Murauskaite-Bull, I. and Caramizaru, E., (2021) Energy taxation and its societal effects, EUR 30552 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-28371-3 (online), doi:10.2760/223415 (online), JRC123486.

as the region faces its first recession in 25 years following the outbreak of the COVID-19 pandemic. The situation is currently so precarious that governments are considering using debt-for-climate or debt-for-nature swaps as relief measures.[59] The most climate-vulnerable countries in Africa should take advantage of the pro-climate change in leadership with the new Biden administration in the US and of the EU's Green New Deal. Both policies signal an openness towards, for example, issuing a new round of 'Special Drawing Rights' for Africa to drive resilience, renewable energy, and nature-positive investments.[60] For instance, it is estimated that extensive peatlands in the Congo Basin offer a natural carbon sink currently holding over 30 billion tons of carbon. This represents sequestered carbon equivalent to three years' worth of total global emissions. Means are needed to harness the value of such assets using their sequestration equivalence. There is a growing momentum in designing solutions at the conjunction of debt, climate, and nature, such as the Congo Basin peatlands. However, doing so in a timely manner alongside managing the COVID recovery will require new reflexes, skill-sets, and capacities.

5. From fragility to resilience

It is crucial to find innovative approaches that reduce fragility and promote stability in delivering Africa's development solutions, given the complex challenges the continent faces. Different approaches yield different outcomes, and the adaptability of an approach to the context will shape how well it addresses fragility.

5.1 Intersectionality, synergies, and the nexus approach

There are opportunities when addressing the multi-dimensional challenges of fragility in most countries by using approaches that target the common aspects and shared elements found within related systems. This can be achieved by focusing on the interdependencies that exist between systems to ensure account is taken of the inter-relations and resource flows across spatial scales and between components of the larger complex system.

5.2 Regional instruments and the role of markets

[59] ECA 2021. Building Forward Better for an African Green Recovery.

[60] Rumbi Chakamba (2021) With debt-for-climate swaps in Africa, timing is crucial. Devex Inside Development – Focus on People and the Planet, 8 March 2021.

The adoption of a regional approach to development is crucial for Africa to address the uneven availability of human capacity and skill-sets and to leverage collective action. Harnessing the role of markets, as may be unleashed by the AfCFTA, and the development of regional value chains could help break the vicious cycle of fragility. This may provide stability in the flow of critical commodities, such as food, medical supplies and pharmaceutical products, which are imported into the continent. The African Continental Free Trade Area (AfCFTA) is designed to increase intra-African trade, which is the lowest (16%) across any global region. The urgency to enhance regional trade has been evident during the COVID-19 crisis, during which African countries suffered from their high levels of dependence on global trade, as most supply chains were abruptly broken. Rice consumption, for instance, largely depends on imports, especially from Asia,[61] but its disruption brought shortages to West Africa. With very little buffer, African countries need to strengthen trade and collaboration among themselves at both sub-regional and continental scales.

5.3 Landscape-based solutions

Better mapping and the use of spatial information would be very helpful in planning and managing exposure to different forms of risk and vulnerability. This would facilitate the recognition of risk locations and identify the vulnerability of societies, even to low-intensity climate events, like floods, gully erosion, bush fires, and landslides. Spatial analysis and planning will be crucial in addressing ecological fragility, enhancing urban planning, and mapping land suitability. However, access to such spatial information is very limited in Africa, which has significantly constrained the use of landscape approaches to designing development strategies. A landscape approach could also shape spatial planning to capitalize on the opportunities presented by the AfCFTA, which could be further accelerated by wider adoption of digitalisation and information technology.

5.4 Empowering human capital and institutions

Building the capacity of African people, especially the young people and women who are in the majority, is crucial to taking greater ownership of the continent's future. This will serve by mobilizing Africans to engage and shape governance, set up their own businesses, and demand accountability from the state. Curbing fragility requires investment in risk management, not just disaster-risk management, but risk-proofing economic and social systems more broadly. Human and institutional capacity needs investment alongside creating an enabling environment within which the private sector,

[61] Kathiresan, A. et. Al. 2020. Policy options for galvanizing Africa's rice sector against impacts of COVID-19. World Development 136 (2020) https://doi.org/10.1016/j.worlddev.2020.105126

small and large, can thrive. The innovation and vitality of the private sector have not yet been sufficiently harnessed to contribute to the socio-economic empowerment of Africa's women and young people.

Africa has a generation more attuned to technology. All that is required is to build and encourage that capacity to provide the right incentives that can give them the capabilities and skills that they need for innovations (Dr Ade Freeman)

If Africa is going to see diversification of assets which is essential for the Green Transition and just transition, if Africa is going to have a positive redistributive and welfare outcome aligned to the environmental outcome, then African governments will have to invest in capacity development, since new skills and expertise will be necessary (Dr Anderson)

Dealing with the recurrent cycle of fragility on the continent is of great concern. While Africa's mineral endowment might be expected to bring prosperity to the region and its people, this has not been the case so far. As rich countries move rapidly with their green new-deal agenda to transform their transport systems from fossil fuels to fleets of vehicles powered by electricity, cobalt for batteries is in ever-increasing demand. However, 75% of this mineral is mined in the Congo, where child labor is used for its extraction in artisanal mining, causing untold misery for children and their families.[62] This scramble for cobalt has intensified, just as happened for coltan used in the manufacture of cellphones. Strengthening national and regional institutions is needed, together with global actions and governance, to avoid this demand for cobalt triggering a form of "green slavery" for those living in the areas where these minerals are found. The pressures are growing more intense, as prices soared from $30,000 per ton to more than $70,000 by the end of 2021, in response to governments setting more ambitious targets for car manufacturers. Globally, greening norms and standards will be crucial for a just transition that addresses the knock-on impacts and fragility of other regions.

Africa has huge energy potential. There should be skills transfer so Africa can export to Europe and make returns to enhance Africa's economy (Dr Akpalu)

There is the need to build the capacity of African governments and civil servants to be able to think outside the box (Dr Mukungu)

6. Partnership and Multilateralism

[62] The Economist – Finance & Economics, 3 April 2021. The electric-car boom sets a scramble for cobalt in Congo.

Africa has always embraced multilateralism, despite the outcomes not always serving its interests. The slow and inadequate distribution of the COVID-19 vaccine has revealed the dark side of multilateralism and the unreliable quality of the "global partnership" for Africa. Taking lessons from this most recent exhibition of nationalism, how should Africa pursue a global green pathway, given its current limitations on infrastructure, knowledge, and resources? What direction of travel will best support African progress to achieve green development, and what hard choices must it make? Africa needs partnerships with others to coordinate the transition better and enable the deployment of resources into green technologies, infrastructure, social programs, and good jobs, thus spurring economic transitions that benefit both people and the planet. Since the crises that have engulfed Africa are rooted in injustice and inequality, a new system that democratizes opportunities domestically and globally is urgently required.

6.1 Global Climate Change Response under the Paris Agreement

Translating Africa's ambitions for GHG mitigation, as expressed in the NDCs, into concrete actions will require a set of partnerships that enhance greening as a long-term strategy. Africa's responsibility to "do no harm" requires that it receives support for its transition to non-carbon forms of energy and ceasing to explore for fossil fuels. The green transition must involve creating a system that is compatible with a stable future for all.

6.2 Managing the costs of climate change

The burden of climate change impacts on Africa requires adaptation measures and strategies. Adaptation constitutes Africa's priority for climate change responses, yet the USD 100 billion a year, promised by Annex 1 countries to support both mitigation and adaptation in developing countries under the UNFCCC global process, has not yet been achieved. At COP26, it was agreed that funding for developing countries to cover the costs of adaptation would be doubled by 2025 to reach USD40bn, and talks are progressing on establishing a financial mechanism to address loss and damage experienced as a consequence of climate change impacts. While greening should have long-term benefits for adaptation, the immediate needs of vulnerable communities continue to put huge and urgent pressures on African governments. How should Africa manage them both, given the unpredictable flow of funds for climate change adaptation?

6.3 Financing the green transition

There is a cost to greening, yet it is not clear where the resources to pay for it will come from. Some people argue that, following the global need for carbon neutrality to keep global temperatures below 2C, Africa's green transition should be financed by global mechanisms due to its mitigation benefits, and not the immediate development benefits that Africa needs. The lack of compliance by developed countries with their commitment to provide lower-income countries with US $100 billion a year of climate finance will continue to put at risk the spirit of a global climate-change agreement that is built on trust and solidarity. Some see recent pledges of climate finance as simply juggling, redirecting, and relabeling development assistance, rather than allocating genuinely new resources to fund climate-change responses by lower-income nations.[63] Re-establishing trust, sanity, and transparency in international processes will be crucial in making progress. While pledges by developed countries at COP26 began this process, much more ambition is needed in advance of Egypt's COP27 in November 2022, if there is to be any chance of meeting the post-2020 ambitions under the Paris Agreement.

Under the Paris Agreement, countries are expected to develop a Long-Term Strategy (LTS) to achieve net-zero emissions by 2050. Each strategy allows for staged planning in support of a just transition, green jobs training, and strengthened risk management. It could be argued that, if the transition to a low-carbon economy related to a single target, namely the reduction in greenhouse gas emissions, then Africa would not need to prioritize decarbonization. This is because of Africa's very small share of total global emissions (at less than 5% of the global total), and the continent's multiple development challenges, which have been further amplified by COVID-19 and the consequent reductions in economic growth. As argued earlier, the green transition should have far-reaching benefits beyond the global goal of cutting GHG emissions and towards other environmental, social, and economic systems, especially in the long term, if they are well-tailored and executed. Furthermore, while the benefits of the low-carbon transition are well understood, there is a cost to a green transition, and there will also be unintended consequences from the transition to a low-carbon economy.[64] Using the cases of cobalt mining in the DRC and electronic waste processing and recycling in Ghana, the risks of a "decarbonization divide" have become evident. The drive for low-carbon transitions in mobility and electricity, for instance, has direct implications for toxic pollution, the loss of biodiversity, the exploitation of child labour, increasing gender inequalities, and the oppression of ethnic minorities. There are thus very significant challenges to Africa's sustainability from the low-carbon transition both globally, and for the African continent as a whole.

[63] Michael Igoe (2020), Is climate finance diverting from development assistance? Devex Inside Development – Climate Finance.

[64] Sovacool et. al. (2020), The decarbonisation divide: Contextualizing landscapes of low-carbon exploitation and toxicity in Africa. Global Environmental Change 60 (2020) 102028

Conclusion

There are clear development choices facing Africa's governments, but making the right choices is challenging, given the current climate emergency and the COVID-19 pandemic. Faced with these global crises and multidimensional sources of fragility, decision-makers must balance today's needs and future options in a context of unpredictable shifts in social, economic, and environmental pressures. The degree of stability and resilience expected from greening the economy is uncertain, and its contours are poorly sketched out. In many countries, short-term, urgent social development needs currently overwhelm the resources available to invest in a green transition.

Achieving the promise of a green transition in Africa will depend on diversifying the economy, creating jobs, restoring eco-systems, and strengthening the underlying institutions needed for their management. Building resilience and investing in a green transition are frequently offered as obvious policy approaches for governments worldwide, but how these policies are followed will determine whether they bring sustained progress, especially for more vulnerable groups. In the African context, an understanding of fragility needs to be built into all policy measures in order to strengthen system stability. However, none of the positive benefits expected from the green transition will be possible without the means of implementation. It is therefore vital that African governments can access global funds to combine with their domestic resources, and to leverage investments in a broad range of transformative assets and activities. Some progress with financial commitments was made at COP26 in Glasgow in November 2021, but much more needs to be achieved before COP27 takes place in Egypt in November 2022.