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Land availability and land-use changes in Africa

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Cover image: An oil palm nursery in Kango, just outside Libreville in Gabon. *(Photo: XAVIER BOURGOIS/AFP via Getty Images)*

This page: Vegetable stand in Madagascar *(Photo: Lesley Derksen, Unsplash)*

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Abbreviations and acronyms

ACMI	Africa Carbon Markets Initiative
ADQ	Abu Dhabi Developmental Holding Company
AfDB	African Development Bank
AFSA	Alliance for Food Sovereignty in Africa
AGRA	Alliance for a Green Revolution in Africa
AU	African Union
BRI	Belt and Road Initiative
CAF	Central Africa
CEC	Commission of the European Communities
CEDAW	Convention on the Elimination of All Forms of Discrimination Against Women
CFI	Corporate Finance Institute
CMOC	China Molybdenum Co Ltd
CRMs	Critical raw minerals
CSO	Civil society organisation
DFC	Development Finance Corporation
DFIs	Development finance institutions
DRC	Democratic Republic of the Congo
EAF	Eastern Africa
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FPIC	Free, prior, and informed consent
FPA	Foreign Policy Association
FTF	Feed the Future
G7	Group of Seven
GCC	Gulf Cooperation Council
GDP	Gross domestic product
GHG	Greenhouse gas
GWMI	Global Woods Market Info
IEA	International Energy Agency
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFIs	International financial institutions
IFPRI	International Food Policy Research Institute
IHC	International Holding Company
ILC	International Land Coalition
ILO	International Labour Organisation
IMF	International Monetary Fund
IPS	Institute for Policy Studies
IPCC	Intergovernmental Panel on Climate Change
KFC	Kentucky Fried Chicken
LULC	Land use and land cover
MDBs	Multilateral development banks
MFIs	Multilateral financial institutions
MNCs	Multinational corporations
MRA	Mining Review Africa

NAF	Northern Africa
NGO	Non-governmental organisation
ODA	Official development assistance
OECD	Organisation for Economic Co-operation and Development
PACJA	Pan African Climate Justice Alliance
PPP	Public-private partnership
RED	Renewable energy directive
RoC	Republic of the Congo
SAF	Southern Africa
SFD	Saudi Fund for Development
SDGs	Sustainable development goals
SOCFIN	Société Financière des Caoutchoucs
SPAR6C	Supporting Preparedness for Article 6 Co-operation
SSA	Sub-Saharan Africa
TAAT	Technologies for African Agricultural Transformation
UJ	University of Johannesburg
UN	United Nations
UNCTAD	United Nations Trade and Development
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNDROP	United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
WAF	Western Africa
WEF	World Economic Forum
WFP	World Food Programme
WHO	World Health Organisation
WTO	World Trade Organisation
ZDA	Zambia Development Agency

Figures and tables

This report challenges the dominant narrative that Africa holds vast expanses of "unused" or "underutilised" land available for large-scale industrial agriculture and other land-based investments.

Smoke from the breakfast fire hangs over a rural village in Zithulele, South Africa

(Photo: Joshua Gaunt, Unsplash)

Executive summary

This report challenges the dominant narrative that Africa holds vast expanses of "unused" or "underutilised" land available for large-scale industrial agriculture and other land-based investments. This narrative, promoted by institutions like the African Development Bank, (AfDB), underpins strategies such as the "Feed Africa" initiative and is often used to justify the conversion of land into agro-industrial production zones to serve global markets. However, this report demonstrates that such understandings are deeply flawed, both empirically and ideologically, and that they obscure the real dynamics of land use, tenure, and ecological value across the continent.

This report, which is based on a comprehensive review of literature, spatial-data analysis, and key informant interviews with farmers in Zambia, Mozambique, South Africa, and Zimbabwe, interrogates five core assumptions behind the idea of land abundance in Africa, which are listed below.

1. That vast quantities of unused arable land are available for cultivation;
2. That modern technology can solve Africa's food crisis;
3. That smallholder farming is inherently unproductive and incapable of feeding the continent;
4. That markets and higher yields automatically improve food access and nutrition; and
5. That industrial agriculture will generate millions of decent jobs.

Each of these assumptions is dismantled with evidence that points to a far more complex and constrained land reality.

First, the idea that Africa possesses large reserves of unused land relies on colonial-era concepts of land, often based on narrow definitions that ignore the diverse and multifunctional uses of land by rural communities. Much of the land labelled as "underutilised" is, in fact, used for grazing, shifting cultivation, gathering wild foods, spiritual practices, or is part of ecologically significant systems such as forests, wetlands, or savannahs. These uses are often invisible in formal land registries or economic metrics but are essential for local livelihoods and biodiversity. Moreover, the land often carries layered customary claims and is far from being available for simple expropriation.

Second, although technological solutions – such as improved seeds, synthetic fertilisers, and irrigation – are frequently touted as silver bullets for Africa's food security, history suggests otherwise. The Alliance for a Green Revolution in Africa (AGRA), for example, spent more than a decade promoting such technologies with little success in improving yields or reducing hunger. Indeed, the number of severely hungry people in AGRA focus countries increased during the alliance's intervention period. High-input technological models often fail to account for local agro-ecological conditions, economic inequalities, and the political economy of food systems. They also tend to increase dependency on external inputs, deepening debt for smallholders and undermining seed sovereignty.

Third, the claim that small-scale farmers are incapable of feeding Africa is not supported by evidence. Africa has an estimated 33 million smallholder farmers, who manage 80% of the

continent's farmland and produce up to 80% of its food. Rather than being inefficient, small-scale agro-ecological farming offers numerous advantages: it is more labour-intensive, resilient to shocks, adaptable to local environments, and embedded in cultural and social life. Dismissing this sector in favour of large-scale, mechanised monocultures undermines food sovereignty, biodiversity, and rural employment.

Fourth, the assumption that increasing yields and expanding markets will automatically improve food access overlooks the structural causes of food insecurity. Food production is only one piece of the puzzle: people's ability – particularly the poor and marginalised – to access nutritious food depends on land rights, income distribution, gender equity, and political systems. In many countries, high agricultural productivity coexists with hunger and malnutrition because food systems are oriented towards export and profit rather than equitable distribution and local nourishment.

Finally, the promise that agro-industrial expansion will create millions of decent jobs is historically and economically questionable. Agro-industrial models tend to displace labour through mechanisation and concentrate benefits in the hands of large companies. Most industrial agriculture jobs are seasonal, poorly paid, and insecure. In contrast, smallholder farming remains the main source of employment across Africa, particularly for youth and women. The idea that technology-intensive farming will be a panacea for unemployment ignores the structural realities of African economies and the failures of previous industrialisation efforts.

Beyond challenging these five assumptions, the report highlights a much broader and more pressing issue: Africa is already experiencing a dramatic and accelerating squeeze on land due to competing demands. These include:

- Rapid population growth and urbanisation, with Africa's population projected to reach 2.5 billion by 2050, one billion of whom will live in urban areas;
- Expansion of mining operations, especially for critical minerals like cobalt, lithium, and rare-earth elements, which are central to the global green transition;
- The proliferation of carbon-offset projects, often requiring vast tracts of land for afforestation or reforestation schemes that displace existing land users;
- Rising global demand for timber, which is increasing deforestation and land competition; and
- Agricultural expansion for commodity crops, including large-scale plantations of palm oil, sugarcane, tobacco, and rubber.

Drawing on satellite data and projections, the report shows that future land use changes in Africa will be characterised by the large-scale conversion of forests, grasslands, and pasturelands into cropland, urban areas, and industrial sites. Forest loss, particularly in Central and West Africa, is accelerating, with more than 3.9 million hectares lost annually between 2010 and 2020 – the highest deforestation rate globally. Grasslands are also rapidly disappearing, even though they are vital carbon sinks and grazing ecosystems.

A constellation of powerful actors drive these dynamics: African governments seeking foreign investment, Gulf states securing food and energy reserves, Chinese companies operating under the Belt and Road Initiative (BRI), multinational agribusiness and mining corporations, and global climate-finance mechanisms. These actors often operate through opaque deals that bypass local communities and disregard customary land rights. The result is widespread dispossession, environmental degradation, and deepening inequality.

A woman weaves a basket while her granddaughter washes dishes on the outskirts of Kampala, Uganda. *(Photo: Lisa Marie Theck, Unsplash)*

In light of these findings, the report calls for a shift away from the hi-tech, market-driven, land-intensive model of development toward a more just, sustainable, and locally grounded vision. Key policy alternatives proposed include:

- Promoting agro-ecology as a viable pathway for food sovereignty, ecological regeneration, and rural livelihoods;
- Reducing the need for cropland expansion through improved agro-ecological productivity, food redistribution, and less waste;
- Avoiding the use of carbon markets that commodify land, instead prioritising direct emissions reductions and genuine forest protection;
- Planning for urbanisation in ways that protect tenure rights, particularly in informal settlements;
- Meeting timber demand through better management of existing timberlands rather than frontier expansion;
- Reducing global demand for critical minerals through circular economies and resource efficiency;
- Legally recognising and securing customary land rights, particularly for women and indigenous communities; and
- Upholding the principle of free, prior, and informed consent (FPIC) for all land-based investments.

This report is a foundational contribution to a growing body of evidence that refutes the myth of African land abundance and highlights the urgent need for land-governance approaches rooted in justice, ecological sustainability, and democratic accountability. It underscores that the future of African land should not be dictated by global capital or outdated development theories, but shaped by the knowledge, needs, and rights of the people who live on and care for it.

A woman harvests food in Sierra Leone. *(Photo: Annie Spratt, Unsplash)*

CHAPTER 1

Revisiting the ‘land availability’ assumptions

1.1 Introduction

Our main argument is that the narrative about the existence and availability of unused arable lands – politically framed as empty, vacant, uninhabited, unproductive, underutilised, marginal, idle, fallow, degraded, and free lands – that can be intensively cultivated into agro-industrial production zones, turn Africa into a breadbasket for the world, and meet other rising global demands for land, is not only fundamentally flawed but undermines the land's environmental and social functions, as well as local livelihoods and food systems.

The president of the African Development Bank (AfDB) and 2017 World Food Prize laureate, Dr Akinwumi Ayodeji Adesina, launched a more than $60 billion agriculture initiative to transform agriculture in 40 African countries at the Feed Africa: Food Sovereignty and Resilience summit, held in January 2023 in Dakar, Senegal (AfDB, 2024). The initiative will require at least 25.7 million hectares of land and affect 11,117,000 smallholder farmers (AFSA, 2024). Four specific goals underpin this vision: (i) contributing to the end of poverty; (ii) ending hunger and malnutrition; (iii) making Africa a net food exporter; and (iv) moving Africa to the top of export-oriented value chains, where it has comparative advantage.

In his remarks at the Extra-ordinary Summit of the African Union (AU) on Industrialisation, Economic Diversification, and the African Continental Free Trade Area on 25 November 2022, Adesina (2022) noted that "Africa has 65% of the uncultivated arable land left to feed the world, therefore, how Africa develops its agriculture will determine the future of food in the world". The AfDB has insisted that Africa's arable land can feed the world's nine billion people by 2050, if turned into intensive agro-industrial zones (AfDB, 2023a). In his charismatic style, Adesina has insisted that unlocking that "potential" must begin with the savannahs of Africa, which cover "a mind-boggling 600 million hectares of which 400 million hectares are cultivable" (Adesina, 2017). To drive the agricultural industrialisation of Africa and revive its rural economies, the AfDB committed to invest "$24 billion in agriculture and agribusiness over the next 10 years". (Adesina, 2017). Arising from this initiative, the AfDB projected that the "continent's food and agriculture market could increase from $280 billion per year to $1 trillion by 2030" (AfDB, 2023b).

The AfDB's flagship policy frameworks – the Feed Africa Strategy (2016 to 2025), the Technologies for African Agricultural Transformation (TAAT) initiative, the Special Agro-Industrial Processing Zones programme, and the Country Food and Agriculture Delivery Compacts formalised at the Dakar 2 Summit: Feed Africa (January 2023) – reflect a distinctly neoliberal orientation toward agricultural transformation. These initiatives collectively emphasise narrow agricultural productivity metrics, framing the solution to Africa's food crisis in terms of modernisation, technology-led interventions, and the integration of African agriculture into competitive international markets.

Central to this vision is the structural transition from smallholder subsistence farming to agro-industrial production systems, where agriculture is conceived primarily as a business enterprise. This model privileges large-scale investment in modern technologies, high-quality seed systems, mechanisation, and agro-processing infrastructure, positioning these as prerequisites for achieving both domestic food security and competitiveness in global value chains. Through these strategies, the AfDB seeks to reconfigure African agriculture into a globally competitive agro-industrial hub, thereby phasing out subsistence farming in favour of export-oriented, market-integrated production systems (AfDB, 2016; 2018b; 2020; 2023c).

"Africa has 65% of the uncultivated arable land left to feed the world, therefore, how Africa develops its agriculture will determine the future of food in the world"

Akinwumi A. Adesina, President of the African Development Bank (AfDB), at the Extra-ordinary Summit of the African Union (AU) on Industrialisation, Economic Diversification, and the African Continental Free Trade Area on 25 November 2022.

Although the idea of feeding Africa is noble and well-intentioned, Adesina's use of the terms "unused" and "available" requires serious interrogation. Key questions around this include: what is the ideological genealogy and grounding of these terms? Who defines "unused" and "unavailable" land and how? What are the key assumptions that prevail in this approach? What are the other ongoing land-use changes on the continent and how do these processes interact with this approach? Who are the key actors driving this process and why? What is likely to be the impact on smallholder farmers, the environment, and food systems? What could the alternatives be?

To answer the above questions, we carried out desktop research, complemented by select key informant interviews. We carried out a systematic and scrupulous content analysis of primary materials, such as AfDB, World Bank, Alliance for Food Sovereignty in Africa (AFSA), and other civil-society reports, as well as peer-reviewed academic literature. These studies were competent sources of evidence that they used various methodologies, such as: (1) spatial-autocorrelation analysis, global principal-component analysis, and geographic-detector model of remote sensing data analysis (Xiao et al., 2022); (2) satellite imagery-based data and analysis to assess deforestation and forest degradation (Shapiro et al., 2023), to assess land use and land cover (LULC) in mining areas (Tiamgne et al., 2021) and grasslands (Yan et al., 2023); (3) semi-systematic literature-review approach to assess urbanisation (Li et al., 2022), grasslands (Bengtsson et al., 2019), and mining (Boafo et al., 2024); (4) statistical grasslands analysis method based on multiple and partial regression (Yan et al., 2023) and (5) ecological-timeline approach for grazing lands (Gebremedhin et al., 2017), among others.

We also conducted content analysis of media stories to understand the views of various stakeholders. Independent and liberal press critical of large-scale interventions at the expense of smallholder farmers and the state-controlled media sympathetic to the agro-industrial agenda offered distinctively different views, but a careful reading of both and triangulation exposed the related political rhetoric (see Alexander, 2006, p. 108).

We also conducted interviews with smallholder farmers and investors in Zambia, Zimbabwe, South Africa, and Mozambique to gain an in-depth understanding of their perspectives on the existence of "vacant land" and their preferred agrarian policy interventions. Personal observations were key to understanding what was actually happening in the setting. Analysing data from diverse sources results in a satisfactory account and systematic exposition of how the idea of cultivating "vacant land" into agro-industrial production zones is not only fundamentally flawed, but also undermines the land's environmental and social functions, local livelihoods, and food systems. We now elaborate, beginning with the ideological positioning of these terms.

1.2 What is the ideological grounding of these terms?

The empty or vacant land theory is implicitly a renewed ideological belief in the replacement of smallholder farms in marginalised rural Africa by large-scale industrialised farms in ways that reflect Eurocentric and development-economist trajectories (Rostow, 1959). The empty or vacant land theory was propagated by European settlers in the 19th century to support their claims to land (Marks, 1980). To legitimise European settlement, they argued that Africa had mostly been an "empty land" (Crais, 1991). The genealogy of this modernisation perspective can partly be traced to the late 18th century when rural agrarian societies in England industrialised after the introduction of new large-scale production methods.

During the Cold War, development economists such as Rostow (1959) continued to argue that every developing country had to go through five linear stages of economic growth modelled on the Western path. The linear development theory identifies the stages as moving from a traditional society, characterised by subsistence agriculture and barter trade, to the age of high mass consumption, characterised by mass production and consumerism, with exploitation of comparative advantages in international trade. The goal is an industrialised capitalist society as in Western Europe.

The model ignores each country's local and historical conditions as it assumes that development is "one size fits all" and romanticises the need for an initial external stimulus for the Global South to develop. Accordingly, this linear development did not materialise in Africa (Moyo et al., 2013). Nevertheless, at the end of the Cold War in 1991, a resurgent Western Marxist view again placed the issue of capitalist or socialist transition to industrialisation at the centre of the agrarian question (Byres, 1991). As Moyo et al. (2013) argue, this was akin to exporting the agrarian question from the north to the south. Smallholder perspectives in Africa were subsumed under externally imposed models, leaving little opportunity for an original African path to development.

This resurgent modernisation perspective towards big agricultural farms inadvertently feeds into the myths that the millions of hectares of customary land in sub-Saharan Africa being acquired for large-scale investments are "vacant", "underutilised", "uncultivated", and "available" (Cotula, 2009, p.62). After the Second World War, in the 1940s and 1950s, modernisation became the most dominant school of thought (Scott, 1998). Agriculture by smallholder farmers was seen as traditional, unproductive, and backward (Wiggins et al., 2010, p.1341). The settler colonial states such as Britain designed a range of agricultural interventionist strategies to "modernise and transform Africa agriculture" (Cousins and Scoones, 2010, p. 34). However, most African farmers rejected the type of modernisation on offer and the results were disastrous (Alexander, 2006).

Even though Africa is argued to have missed out, it is clear that "the global neoliberal restructuring in the 1990s continued to sideline the smallholder farmers''. The structural adjustment programmes based on free-market principles meant a reduction in state expenditure, hence smallholder farmers were left with little government support (McMichael, 2012). Bryceson et al. (2000) argue that in sub-Saharan Africa this partly led to "depeasantisation", referring to the shrinkage in numbers of small-scale, community-based family farmers, as well as their loss of economic capacity and social coherence. This trend signifies "the expulsion of small producers from the land, … a premise of theories of capitalist modernity" (McMichael, 2012, p. 1).

The modernity narratives were vigorously revitalised in the context of the renewed rush for land in the Global South (Hall et al., 2017) in 2007 to 2008. Africa was not to be left behind. Aspiration 1 of the AU Agenda 2063 stipulates that "the continent needs to invest in **modern agriculture** for increased productivity and production". This goal was to be realised through the Comprehensive Africa Agriculture Development Programme, adopted in June 2014 by African governments. Nevertheless, the debate is informed by conventional metrics on productivity and sometimes ideological persuasions that miss diverse local realities of land uses. This seems to be the ideological perspective that informs the AfDB's framing of the food crisis in Africa and attendant policies.

1.3 AfDB assumptions

It appears that the AfDB approach is anchored on five dangerous assumptions. The argument that Africa needs to feed Africa is noble, but it can be achieved independent of assumptions that tend to undermine the very same objective. These assumptions are couched in neoliberal politics and they are associated with repeated failures. The first is that unused arable land is available in large quantities. The second is that technology will provide a quick fix to Africa's food crisis. The third is that small-scale agriculture cannot feed Africa. The fourth is that markets and yields will increase access to affordable and nutritious food and the fifth is that modern agro-industrial agriculture will create millions of decent jobs. These assumptions can all be challenged in the African context as follows.

1.3.1 Assumption 1: Unused arable land is available in large quantities

The first assumption is that sufficient quantities of "unused arable land" exist in Africa to produce a substantial amount of food to feed Africa. It is important to note that the terms used by the AfDB, "uncultivated" and "available", are part of a family of related concepts vaguely used to characterise land seen as empty, vacant, inhabited, unproductive, underutilised, marginal, idle, fallow, degraded, and free. The September 2010 World Bank report on land grabbing (Food and Agriculture Organisation (FAO, IFAD, UNCTAD Secretariat, and World Bank, 2010; Deininger, 2011) estimates this "global land reserve" to be at a minimum of "445 million ha to a maximum of 1.7 billion ha". (Borras et al., 2011). Globally, Young (1999) states that:

> "Certain estimates of spare land that could be used to address hunger in developing countries are unrealistic and unhelpful as they significantly overestimate the amount of cultivable land, underestimate current cultivation of land, and do not take sufficient account of other uses of that land."

We are inclined to agree with Shortall (2013) that the definition is notoriously ambiguous. As indicated earlier, the empty or vacant land theory was propagated by European settlers in 19th century South Africa to support their claims to land. Today, this theory is described as a myth. To legitimise European settlement in South Africa, Hadebe (2018) argued that Europeans and Bantu tribes had entered South Africa at about the same time and that, until that point, South Africa had mostly been an "empty land". The definition of unused and available lands, more broadly, tends to be based mainly on economic terms of land, labour, and capital and draws from an ideology of modernisation. As Borras et al. (2011) argue, lands are identified "mainly based on what the official state records tell us about this land", that is, "size

A man fishes with a net on a stick at the top of Victoria Falls, Zimbabwe.

(Photo: Ed Wingate, Unsplash)

of land and production statistics". The state loves binaries of available and unavailable land, cultivated and uncultivated land.

This approach is flawed in three interrelated ways. First, as Cousins and Scoones (2010, p.19) argue, this version of modernity reflects "narrow, technical, and economic terms and centres… wholly on agricultural production, emphasising efficiency". As such, it focuses on investment returns on land, labour, and capital rather than wider resource uses. Land value cannot be limited to neoclassical economic interpretations, but should take into account food-oriented production, which is used mainly to feed the local population "despite these products not usually [being] valued in monetary terms and not captured in official state censuses" (Borras et al., 2011). Production systems non-legible to the state, like *chitemene* (shifting cultivation), are also prevalent in some parts of Africa. As stated above, these harvests are not legible to the state and this land, which has flexible and adaptable boundaries, is usually under claim or even multiple claims from the local land users (Chitonge et al., 2017). It is clear that "the complex land-based social relations that exist in these spaces are too complicated for the state to understand and record" (Borras et al., 2011). These lands include forest lands, agroforestry, drylands, and wetlands and, if cultivated, will have greater consequences for climate change because forests act as "carbon sinks, sequestering atmospheric carbon dioxide, and keeping it in soil and biomass" (Borras et al., 2011). These lands are also important habitats for wildlife and cultivation can lead to biodiversity loss. Soil and water quality were not officially recorded, probably because they were not in straight lines.

For example, in Zambia we interviewed Loveness Kalasha, who cultivated cassava, groundnuts, pumpkins, and sweet potatoes under *chitemene* (Kalasha, 2018, int). Households also produced vegetables for relish in homestead gardens, such as *chiwawa* (pumpkin leaves), *kalembula* (sweet-potato leaves), and beans. They also gathered bondwe (wild vegetable) from the forest during the rainy season. To ignore such land uses is akin to ignoring the realities of diverse livelihoods. Land used for extensive livestock and crop production by many farmers in sub-Saharan Africa may be referred to as "underutilised" and "available", but this is certainly not how the local land users view such land.. Borras and Franco (2010) point out that "even when it is not farmed, marginal land is often used for another purpose, such as gathering firewood, and the people who use it often lack the political power to defend this use", a prevalent phenomenon even during the colonial era (Moore and Vaughan, 1987).

Second, the conceptualisation of unutilised land ignores the cultural, spiritual, and historical significance of land, because it reduces land to a commodity whose value must be narrowly measured according to simplified agricultural productive metrics on the farm. Incorporeal possessions, or intangible land uses, are a way of life to most inhabitants. Third, terms such as "vacant" and "available" are also a result of simplification of complex living customary tenure systems that are not static (Scott, 1998).

1.3.2 Assumption 2: Technology will provide a quick fix to Africa's food crisis

The AfDB assumes that technology will spur quick-fix solutions, despite "the repeated failures of crop technology-led agricultural development" in Africa (Fischer, 2022). This silver-bullet technical assumption is problematic because it ignores historical and social circumstances. After all, what the AfDB is proposing is not new. As Levidow and Paul (2008) have argued, "such technological promises are problematic and are a way of raising expectations about as yet largely unproven technologies".

The African Development Bank is already working in partnership with the World Bank, the Bill and Melinda Gates Foundation, the Alliance for a Green Revolution in Africa (AGRA), and other donor partners on a $1 billion TAAT initiative (AfDB, 2018). The AfDB is focusing on providing modern technologies, quality seeds and inputs, modernising agricultural tools, setting up standard processing infrastructures, and adding value. The aim is to move from traditional subsistence agriculture to a modern and competitive African agro-industrial sector that can feed the entire continent and even compete on international markets. (AfDB, 2023b). This is a renewed push for technology-driven agriculture, envisaged to "catalyse an African revolution" without taking historical circumstances into account.

The provision of technologies is not guaranteed to increased yields. AGRA, which promotes technologies to enhance breeding of new varieties for higher yields, genetic modification, improved fertilisation, enhanced soil productivity, chemical inputs and irrigation, and genetic resistance to pests was not successful. AGRA failed to improve maize yields in 15 years; increase intake of new seed varieties and fertilisers by farmers; and decrease gender inequalities (IATP, 2022). In fact, the "number of severely hungry people had increased by 31% in AGRA's focus countries and jumped by 50% in sub-Saharan Africa as a whole since AGRA was founded in 2006" (IATP, 2022).

The green-revolution techniques also resulted in "environmental degradation and increased income inequality, inequitable asset distribution, and worsened absolute poverty" in the 1960s and 1970s (IFPRI, 2002, p.3). Social differentiation is increasing, as the poorest farmers fail to afford the new technologies and are excluded in market integration (IATP, 2022). The AfDB approach also isolates crop agency (see Scott, 2017). In using similar technological approaches, the AfDB seems to be set for failure, just as AGRA failed to catalyse an African revolution.

1.3.3 Assumption 3: Small-scale agriculture cannot feed Africa

The AfDB (2023b) is clear that current production practices are too often outdated, small scale and unsuited to the demands of markets and a fast-growing population. This dominant narrative can be conceptualised as proposing the transitional path (de Schutter, 2011). Its proponents argue that agricultural investments must replace "backward" peasant practices with big, modern, and efficient agriculture, characterised by speedy, inclusive economic and food-security benefits (AfDB, 2023c; Byres, 1991; Collier, 2008; Deininger and Byerlee, 2011). This is despite the fact that Africa has an estimated 33 million smallholder farmers (Wiggins and Keats, 2013, p.10), who manage 80% of the farmland and contribute up to 80% of sub-Saharan Africa's food supply (FAO, 2013, p.1).

According to the AfDB, this efficiency can be achieved by a switch to large farms in relatively land-abundant regions of Africa. As FAO (2013, p.1) argues, under this model the fate of smallholder farmers "is either to disappear and become purely self-subsistence producers or to grow into larger units that can compete with large industrialised farms". Collier (2008, p.71) overtly states that "the mode of peasant production in Africa is ill-suited to modern agricultural production" because it cannot use economies of scale to cope with investment, technology, marketing chains, and regulation. However, Moyo et al. (2013, p.104) differ because they see "co-operativism" as being able to improve the smallholder production in terms of economies of scale, while:

> "enhancing its many unique advantages in terms of labour absorption, versatility in production, low energy requirements, regard for ecological balance, and popular participation".

In addition, such land-based, large-scale investments result in a type of farming that has "much less powerful poverty-reducing impacts, than if access to land and water were improved for the local farming communities" (de Schutter, 2011, p.249; see also Belay, 2024; AFSA, 2024). On the other hand, the AfDB's approach places agrarian capital's contribution to industrialisation at the centre of resolving the agrarian question. However, Moyo et al. (2013, p.93) have long long argued that, for historical reasons, the region's "land and peasant components… are irreducible to industrialisation" and aptly caution us that "there is no automatic connection between the flow of capital and successful capitalist transitions in agriculture and elsewhere" (Moyo et al., 2013, p.102). Smallholder farmers continue to feed the nation in countries such as Zambia, Zimbabwe, and Malawi. A study by Seufert et al. (2012) has shown that there is a smaller yield gap between organic and conventional chemical intensive farming than critics of organic and smallholder agriculture have assumed (Holt-Giménez et al., 2012).

1.3.4 Assumption 4: Markets and yields will increase access to affordable and nutritious food

The AfDB makes an assumption that increasing crop yields will increase household food security. The "Feed Africa" strategy focuses on improving agricultural productivity, promoting agribusiness and food industry, and *increasing access to affordable and nutritious food"* (authors' emphasis). This is not always the case and the framing is consistent with neoliberal politics that ignore the structural question of food access. Food access refers to "access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources)" (FAO, 2006). Despite an emphasis on the need to "feed Africa", the proposals are silent on the policy, land rights, and market restructuring that is required to ensure the poorest and marginalised can gain access to affordable and nutritious food. Conceptualising food insecurity:

> "principally in terms of crop yields and market access… overlooks the many political, socioeconomic, and biophysical dynamics that contribute to hunger and malnutrition – or 'hunger vulnerability'". (Moseley, 2017).

The world "produces more than 1½times enough food to feed everyone on the planet. That's already enough to feed 10 billion people, the world's 2050 projected population peak." (Holt-Giménez et al., 2012). Countries like South Africa are food secure at national level without access to nutritious and affordable food for all households. There is a long history of malnutrition in wealthy rural areas of African countries that have adopted commercial agriculture. For example, malnutrition is rampant in southern Mali and southwestern Burkina Faso, which are wealthy rural areas that have adopted commercial agriculture (UNICEF, 2023). Malnutrition can also be a result of less nutritious crops being produced through commercial agriculture. As Amartya Sen (1982) has argued in his seminal book,

Poverty and Famines: An Essay on Entitlement and Deprivation, improving household food security for the poor involves more than just increasing crop-production metrics and improving market efficiency. Redistributive politics that enables access of nutritious food to the poor and marginalised should be at the heart of a food-security approach (Sen, 1982).

As argued by Lewis (2023), "Even if we produce enough food to feed the population, many people still go hungry because of inefficient distribution. Global agricultural systems produce 4 million metric tonnes of food each year. If the food were equitably distributed, this would feed an extra one billion people." It is, therefore, crucial for the AfDB to go beyond a narrow technical approach that focuses on production metrics and markets and factor in the distribution question to ensure nutritious food access for all. The global markets have proven to be more exclusionary for the poor than "agro-ecological approaches and structural reforms that ensure that resource-poor farmers have the land and resources they need for sustainable livelihoods" (Holt-Giménez et al., 2012).

1.3.5 Assumption 5: Agro-industrial agriculture will create millions of decent jobs

The Feed Africa strategy, like most modernist projects, has a grandiose vision to create "18 million jobs and increase agricultural productivity by 50% in the next 10 years" (NRCRI, 2024). The transition to intensive agro-industrial agriculture is envisaged to create emancipatory jobs for many, grow rural economies, and, therefore, reduce poverty and eliminate hunger in Africa. These big claims turn a blind eye to the fact that agro-capitalism is already failing to provide decent wages to sustain livelihoods and, therefore, creating surplus labour (Bernstein, 2010).

Following Wily (2012, p.775):

> "One is reminded that even the much more expansive industrialisation of the nineteenth century enclosures could not produce the number of jobs required…"

As in many large-scale, land-based investments across Africa, the promise of decent jobs continues to be elusive, hence the need for an alternative transition path (Joala et al., 2016). Rather, countries with the most industrialised agriculture are registering high unemployment rates. For example, South Africa's unemployment rate is one of the highest on the continent reaching 31.9% in the fourth quarter of 2024 (Statistics SA, 2024). On the other hand, smallholder agriculture in Zimbabwe is providing significant employment for poor households even though the quality of jobs still needs to improve. According to the International Labour Organisation (ILO) (2024):

> "Agriculture remains the primary source of employment for young workers in sub-Saharan Africa, accounting for 60% of employment in 2021, the highest share of all the world's regions."

It is important to note how agriculture is structured in sub-Saharan Africa, with the smallholder-farming system dominating. There is a real possibility that hi-tech-driven intensive agro-industrial production zones will displace labour in a context in which industrialisation rates are very low.

1.4 Conclusion

Our discussion above shows that the dominant narrative about the existence and availability of unused arable lands – politically framed as empty, vacant, uninhabited, unproductive, underutilised, marginal, idle, fallow, degraded, and free lands – that can be intensively cultivated into agro-industrial production zones meant to transform African agriculture and turn the continent into a breadbasket for the world is fundamentally flawed and can even undermine the land's environmental and social functions, local livelihoods, and food systems. The argument that Africa needs to feed Africa is noble but it can be achieved independent of assumptions that tend to undermine the very same objective. These assumptions are couched in neoliberal politics and associated with repeated failures.

First, Africa does not have vast tracts of unused arable land that can be used for agro-industrial agriculture to address hunger. Such framing overestimates the amount of cultivable land, underestimates current cultivation of land, and does not consider other multiple land uses that are important for environmental, social, and livelihood functions for the poor. Second, it is ahistorical to imagine that technology will provide a quick-fix to Africa's hunger problems. Such propositions should be placed within historical and social circumstances of repeated failures of crop-technology agricultural development in Africa. Third, the argument that small-scale agriculture is outdated to feed Africa is largely driven by ideological persuasions. Evidence shows that Africa has an estimated 33 million smallholder farmers (Wiggins and Keats, 2013, p.10), who manage 80% of the farmland and contribute up to 80% of sub-Saharan Africa's food supply (FAO, 2013, p.1).

Fourth, as Sen (1982) has argued in his seminal book, *Poverty and Famine*, improving household food security for the poor involves more than just increasing crop production metrics and improving market efficiency. Redistributive politics that enable access to nutritious food by the poor and marginalised should be at the heart of a food-security approach. After all, we are already producing enough to feed the world but the majority of people are becoming hungrier. Fifth, the bold assertion that the Feed Africa project will create 18 million jobs turns a blind eye to history as even the more expansive industrialisation of the 19th century failed to produce the number of jobs required (Wily, 2012) and contemporary capitalism is already failing to provide decent wages to sustain livelihoods and, therefore, creating surplus labour (Bernstein, 2010). Amid these assumptions, Africa is facing a host of land-use changes that even make it more difficult for its land to be available, as discussed in the next section.

Farming on the urban edge in Madagascar.

(Photo: Falco Negenman, Unsplash)

CHAPTER 2

Realities and drivers of land-use changes amid scarcity

2.1 Introduction

This section characterises the current and predicted future geospatial and temporal trends in land-use and land-cover (LULC) change on the African continent; examines the drivers and effects of this LULC change in the context of proposed intensive agro-industrial models; and proposes policy alternatives for sustainable management of Africa's land. To accomplish this, studies that have assessed the trends and drivers of LULC across the continent were analysed. These studies used various methodologies such as: (1) spatial autocorrelation analysis, global principal component analysis, and geographic-detector model of remote-sensing data analysis (Xiao et al., 2022); (2) satellite imagery-based data and analysis to assess deforestation and forest degradation (Shapiro et al., 2023) to assess LULC in mining areas (Tiamgne et al., 2021) and grasslands (Yan et al., 2023); (3) semi-systematic literature-review approach to assess urbanisation (Li et al., 2022), grasslands (Bengtsson et al., 2019), and mining (Boafo et al., 2024); (4) statistical grasslands analysis method based on multiple and partial regression (Yan et al., 2023) and (5) ecological timeline approach for grazing lands (Gebremedhin et al., 2017), among others.

Although there are increasing endeavours to simulate localities of historical and future changes in land use, there is inconsistent categorisation of land-use types (Malbranque et al., 2024). Nonetheless, this section draws many insights from Yahaya et al.'s (2024) study, a comprehensive analysis of current and projected land-use patterns using the coupled model intercomparison project phase 6, which provides information on land-use changes and uses the harmonisation of global land-use change and management. Different categorisations of land-use present major challenges for consistency and comparison. However, for the purpose of this report, we focused less on the specific percentages and more on the overall pattern of dynamic land-use change occurring across the continent. Yahaya et al.'s research used observational, historical, and simulated projections of land use under various shared socioeconomic pathways scenarios to predict changes and conversion of land-use patterns in Africa and its sub-regions. It also predicted their relationships with socioeconomic changes in different time scales, using the most recent socioeconomic pathways and potential future socioeconomic conditions to project future land-use changes. Analysis used observational data for 2020 and applied this methodology to future data (up to 2100). The years 1995 to 2014 were used as a baseline period. The study projected land-use change over three different time periods to assess Africa's response to future climate change.

This section used a mix of methodological approaches based on Yahaya's study, and combined the analysis with that of the aforementioned studies, to answer these specific questions: (1) What are the dominant land-use conversion patterns observed in Africa? (2) How and why are these conversion patterns taking place in the continent? (3) What are the trends and drivers of each land-conversion type and what are their drivers? This information may be useful as a baseline for policymakers and decision makers in managing Africa's current and future land use.

2.2 What are the types of land-use changes, nature and scale?

An investigation by Yahaya et al. (2024) using observational land-use data for 2020 and projected land-use under seven shared socioeconomic pathways scenarios, found temporal changes and spatial distribution features of land-use types in Africa. Figure 1 below demonstrates the different land-use types in Africa that Yahaya et al. (2024) identified for 2020. *Encyclopaedia Britannica* (2024) estimates Africa's total land area to be about 30,365,000km^2. Yahaya et al. (2024) identified **grassland** as the major land-use type, predominantly distributed in Africa's southern,

eastern, and western regions and in some northern and Saharan regions. The United Nationals Educational, Scientific, and Cultural Organisation defines grassland as "land covered with herbaceous plants with less than 10% tree and shrub cover" and wooded grassland as 10% to 40% percent tree and shrub cover (FAO, 2005). **Barren land** was the second, covering 21.9% of land, mostly in the northern and Saharan region. Barren land refers to areas covered with either sparse vegetation or bare soil, usually areas characterised by environmental constraints, climatic elements, or in which human-made influence on the environment occurs, resulting in damaging conditions for plant growth (Eliades et al., 2024). Barren land may be covered by ice, desert, or almost desert, and it is not synonymous with unused and available land. These were followed by **forest land** and **urban land**, which accounted for 16.53% (mainly central region) and 15.12% (dominantly in Africa's western region), respectively. The **cropland** type**,** which dominated Africa's western region, was distributed across the continent's regions, and accounted for 1.26% of total area. The **water bodies** covered 1.12% of Africa's land, mainly in the eastern region, where crop land was scarce. Urban land and water bodies dominated in western and eastern regions, respectively (Yahaya et al., 2024).

Figure 1: Land-use types in Africa in 2020 (% of total area in Africa)

LAND USE	% OF TOTAL AREA	AREA (KM²)
Grassland	44.78	13,597,977
'Barren'/sparsely vegetated land	21.19	6,434,343
Forest land	16.53	5,019,334
Urban land	15.12	4,591,188
Cropland	1.26	382,599
Water bodies	1.12	340,088

Source: Yahaya et al. (2024); Encyclopaedia Britannica (2024)

Note: *Data are drawn from Yahaya et al. (2024), which combines historical LUH2 model-based reconstructions (1995–2014) with 2020 ESA WorldCover satellite observations. Differences may appear when compared with other reports - for example, in the estimated percentage of cropland - due to variations in how land categories are defined and classified across datasets, particularly between modelled and remote-sensing approaches.Other sources often report a higher share of cropland, reflecting broader classification methods than those used in the Yahaya et al. (2024) study.*

2.3 Projected land-use changes

Figure 2 below, projecting Africa's dynamics of future land-use changes under future climate change over three time periods [(2021 to 2040), (2041 to 2060), and (2081 to 2100)] relative to a historical period (1995 to 2014), suggests a substantial transfer of barren land to cropland and a huge transfer of forest land to cropland. Relative to the "reference period (1995 to 2014), for (2021 to 2040), (2041 to 2060), and (2081 to 2100), barren land and forest land are projected to decrease by an average of (6%, 11%, and 16%) and (9%, 19%, and 38%) respectively, whereas cropland, grassland and urban-land area are projected to increase by (36%, 58%, and 105%), (4%, 7%, and 11%), and (139%, 275%, and 450%) respectively" (Yahaya et al., 2024).

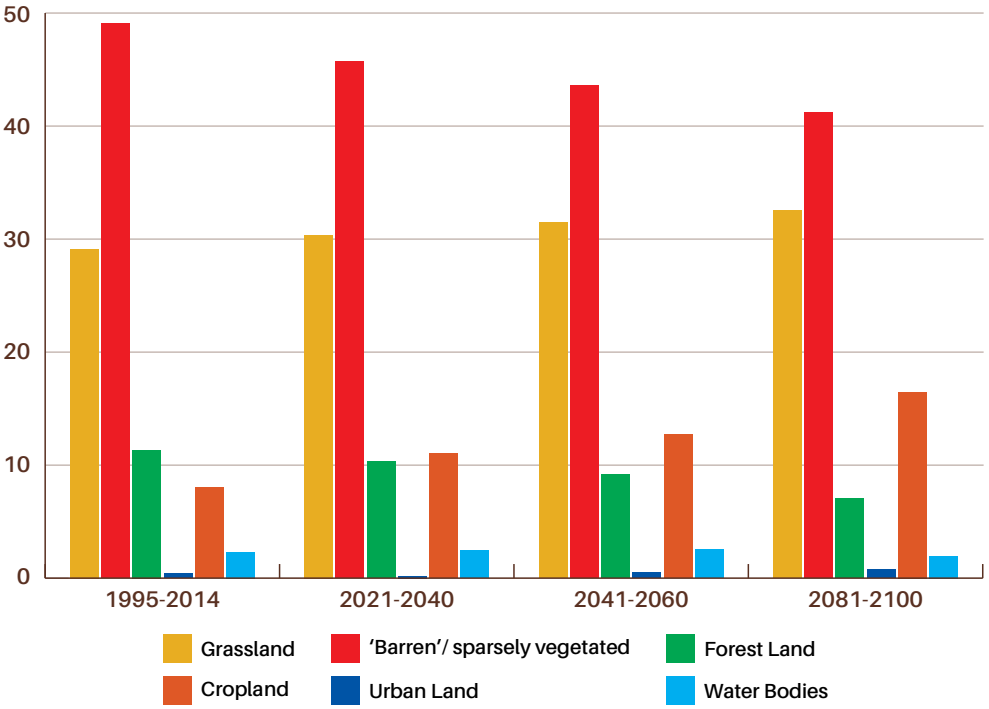
Comparison of Africa's distinct regions in Yahaya et al.'s results (2024) predict a reduction of 1.7%, 3.9%, and 4.4% in northern Africa (NAF); 2.2%, 3.4%, and 6.9% in the Sahara region (SAH); 6%, 43%, and 55% in western Africa (WAF); and 14%, 24%, and 36% in the central region (CAF). Similar results were observed in eastern Africa (EAF) and southern Africa (SAF) respectively, relative to the historical period (1995 to 2014). The cropland area is projected to increase across all regions. The forest land in both NAF and SAH remained unchanged (0%) in both the historical data and future projections, while decreasing by 14%, 28%, 50% in WAF; 6%, 14%, and 35% in CAF and by about 14×104km^2, 12×104km^2, 10×104km^2 in EAF.

Similarly, the forestland in SAF was projected to reduce by 22×104km^2, 19×104km^2, and 16×104km^2, respectively, relative to the historical 26×104km2 (Yahaya et al., 2024). Although alerts have been sounded about the threats facing African forests due to human activities like deforestation and degradation (Nzabarinda et al., 2025; Ritchie, 2021), it is important to note the difference between deforestation and forest degradation. Some ambiguity in defining the term "forest" and, therefore, "deforestation", has made the analysis of forest loss difficult.

The United Nations Food and Agriculture Organisation (FAO), the United Nations Framework Convention on Climate Change (UNFCCC), and the European Union (EU), among other organisations and countries, have each defined these terms in their own way, dependent on different variables (Blaise, 2023). FAO (2020a) defines deforestation as "the conversion of forest to other land use independently of whether human-induced or not". Ritchie (2021) defines forest degradation as "the temporary thinning of forests, which then later regrow. The environmental impacts of deforestation are more severe and permanent than degradation." This article focuses on conversion of forest land due to deforestation and considers the definition that includes agricultural tree-crop plantations (for example oil-palm plantations), as well as various types of planted forests (such as rubber plantations), since the article uses approximations used in remote-sensing-based methodology studies.

A reduction of grassland area by 73×104km^2, 72×104km^2, and 68×104km^2 is projected for NAF compared to the historical 72×104km^2 and by 284×104km^2, 284×104km^2, and 276×104km^2 in SAF relative to there historical 281×104km^2. There is a projected increase of grassland in SAH accounting for 3%, 6%, and 15%; in WAF of 8%, 12%, and 6%; and in CAF of 11%, 27%, and 56%, respectively, compared to the historical period (1995 to 2014) (Yahaya et al., 2024). Likewise, grassland area in EAF is anticipated to increase by 149×104km^2, 152×104km^2, and 149×104km^2 compared to the historical 144×104km^2 (Yahaya et al., 2024). The urban-land area in all African regions is also projected to increase relative to the historical period.

Figure 2: Land-use changes projected for Africa (percentage change of land use)



Source: Yahaya et al. (2024)

Based on the predicted analysis of land-use conversion, Yahaya et al.'s (2024) results suggest a sudden change of declining rates of barren-land use in tandem with increasing cropland use observed in Africa. The transition from barren land to cropland is hypothesised to be related to market changes influenced by global economic forces and a food crisis (2007 to 2009), followed by crop to barren, forest to crop, and other reciprocal conversions of grass to crop, which are the dominant land-use conversions in Africa (Yahaya et al., 2024) . Urban-land conversions were negligible. The land-use conversions of Africa's land during the mid-term (2041 to 2060) are anticipated to be similar to that of the near-term (2021 to 2040) in other land-conversion categories, with nominal conversions of barren land to grassland anticipated. During the long-term period (2081 to 2100), the conversion area of barren land to cropland and of forest to cropland is projected to be significant.

2.4 What are the drivers of land uses?

2.4.1 Conversion of forest to agricultural land

Historically, deforestation of African forests coincided with colonisation in the late 19th and early 20th centuries, when colonialists harvested natural resources for export at unprecedented rates (Cerutti et al., 2024). Throughout the 20th century, large tracts of forested land were acquired in the form of concessions, resulting in the conversion of the original forests to commercial crops. In the 1960s, as several African countries became independent, new governments mostly preserved the concession model, transferring contracts to the same or similar new private companies to assist with their chosen "development" model (Cerutti et al., 2024). Some of the models encouraged deforestation of both the rainforest and dry forests and resulted in some countries losing as much as 80% of their forests between 1900 and 2021 (Cerutti et al., 2024).

Africa is the world's third-biggest continent in terms of forest landmass. Africa's forest distribution is uneven due to differences in geographical location, precipitation, soil properties, natural conditions, sunshine, and other factors (Xiao et al., 2022). Most of the forests are found in central and southern countries known for their tropical climate, such as Angola, Zambia, Tanzania, and the Democratic Republic of the Congo (DRC) (Davey, 2023). The DRC contains the world's second-largest rainforest, with almost 152 million hectares of forests, earning the nickname the "lungs of the planet" (Davey, 2023).

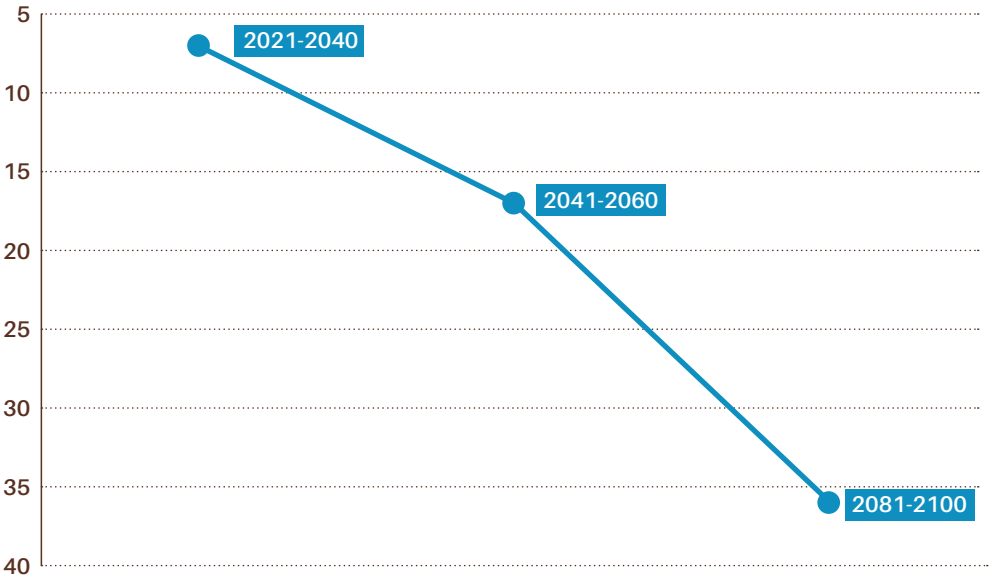
Dry forests (66%) span a larger area of Africa than rainforests, characterised by hot and arid climate with tree coverage of about 17% of the total land (Cerutti et al., 2024; Davey, 2023). The dry forests of WAF, EAF, and SAF do not receive as much attention as the Congo basin rainforests in central Africa, yet they have experienced much bigger conversions (Cerutti et al., 2024). About 26% of African land is categorised as forest, containing almost 43 billion trees, many of which are located in Ethiopia, South Africa, and Nigeria (Davey, 2023).

Currently, spatial land-use projection models in Africa demonstrate large-scale conversion from forest land or woodyvegetation cover to agricultural land (Yahaya et al. 2024; Gebremedhin et al., 2017; Brandt et al., 2018) and more conversions are expected by 2050 (FAO, 2024; Yahaya et al. 2024). The FAO (2022a) estimates that the 3.9 million ha conversion that Africa experienced between 2010 and 2020 was the highest annual rate of net forest loss, followed by South America, at 2.6 million ha. Africa's rate of net forest loss has increased since 1990 (FAO, 2024).

Agriculture (subsistence and industrial) is the dominant driver of forestland conversions, accounting for 75% (Cerutti et al., 2024; Yahaya et al. 2024; Brandt et al., 2018; FAO, 2022b), as well as climate-change-induced low yields (Yonaba et al. 2021). This includes commodity-driven conversion, shifting agriculture, and forestry production (Potapov et al., 2022; Ritchie, 2021). In general, subsistence agriculture is the major driver of forest conversion in Africa, mainly in Madagascar, the DRC, and the Sahel (Potapov et al., 2022; Shapiro et al., 2023; Masolele et al., 2024) and is often linked to poverty, population expansion, changing diets, and bad governance (Jayne et al., 2021; Cerutti et al., 2024). However, the link between population growth and deforestation is still unclear: it is argued to be negatively correlated with rural population expansion (DeFries et al., 2010, cited in Jayne et al., 2021) and positively correlated with both migration and urbanisation (Kong et al., 2019, cited in Jayne et al., 2021). Subsistence agriculture appears to be concentrated around settlements and prevailing clearings (Shapiro et al., 2023) and account for about 27% of global deforestation, 92% of it in Africa, between 2001 and 2015 (Curtis et al., 2018).

Although sub-Saharan Africa has achieved the highest rate of agricultural advancement of all regions in the world since 2000, 74% of this expansion was achieved through area expansion rather than yield growth (Jayne and Sanchez, 2021). Since then, medium-scale farmers owning 5ha to 100ha of land have occupied a dominant share of this growth of cultivated area in many African countries. In Ghana they have accounted for more than 50% and about 40% in Zambia and Tanzania (Jayne et al., 2019). In Zimbabwe, Africa's largest and world's sixth-largest tobacco producer is losing on average 330,000ha of forest land per year, attributed to expansion, tobacco curing, and over-reliance on fuel-wood energy. Much cropland was gained in areas far away from major roads, mostly remote forests (Akinyemi and Speranza, 2022). This is characteristic of African subsistence farming, which is known for an unpredictable production environment, worsened by market inaccessibility and expensive transport costs (Akinyemi and Speranza, 2022). Figure 3 below illustrates the loss of forest land over three time periods.

Figure 3: Projected forest decrease rate in Africa (%)



Source: Yahaya et al. (2024)

In western and central Africa, between 2000 and 2018, cropland replaced forests at an average rate of 976,200 ha a year (79% of observed deforestation), whereas conversion to grassland accounted for 165,900 ha a year (13%) on average. In eastern and southern Africa, there were similar dynamics, with cropland replacing forest at an average of 1,050,400 ha a year (74% of observed deforestation), and conversion to grassland driving deforestation of 270,100 ha a year (19% of deforestation). At least 45% of forests are spread across CAF, 30% across EAF, 13% in WAF, 6.2% in SAF and 4.2% in NAF (Xiao et al., 2022, p. 6).

Regional variation analysis shows that the transfer of forest to cropland is highest in the humid forests of western and central Africa, where commodity crops like oil palm, cacao, and rubber are predominantly produced (Masolele et al., 2024; Brandt et al., 2018; Xiao et al., 2022; FAO, 2020b). The highest transfer is in West Africa, which lost more than 12% between 2000 and 2020 (Xiao et al., 2022, p. 6). Between 2000 and 2018, cropland substituted forest at an average rate of 976,200 ha a year (79% of observed deforestation) in WAF and CAF, whereas in EAF and SAF, conversion to grassland drove deforestation of 270,100 ha a year (19% of deforestation).

The cashew hotspots increasingly dominate in western and southeastern African dry forests, whereas large-scale croplands hotspots were noticed in Nigeria and Zambia (Masolele et al., 2024), with Zambia becoming a net maize exporter (Akinyemi and Speranza, 2022). The growth of cacao, cashew, oil-palm, rubber, and large-scale croplands seen in these humid and dry forest Africa regions indicates they are exposed to future land-use changes by commodity crops. At least 80% of forest loss occurred in the following countries: the DRC, Angola, Tanzania, Mozambique, Sudan, Nigeria, Botswana, Côte d'Ivoire, Zambia, Chad, Somalia, Ethiopia, Namibia, and Cameroon (Xiao et al., 2022), as well as the Central African Republic (CAR). The latter experienced a substantial proportion of deforestation, about a quarter of Africa's total forest loss. (Xiao et al., 2022). Only seven countries have had a net increase in their forest area over the past 20 years. Countries such as Morocco, Algeria, and Tunisia in NAF and Eswatini in SAF seem to have experienced forest improvement, but the forest-growth

area covers only 1% of the loss area (Xiao, et al., 2022). More countries have considered the necessity of forest protection and put regulations in place, such as Rwanda, Kenya, and Ghana, which has reduced the rate of deforestation. The next section analyses changes related to grassland.

2.4.2 Conversion of grassland land to cropland

Grassland is the second-biggest planetary ecosystem, occupying at least 40% of the land in the world (Yan et al., 2022). Grasslands are hyper-diverse and a vital livestock base. They also have several non-physical service roles, such as sustaining biodiversity, increasing carbon emissions, and playing a role of natural carbon sinks, capturing atmospheric carbon and keeping a portion of it as soil organic matter (Yan et al, 2023; Carbutt and Kirkman, 2022; NASA Harvest, 2023). They have commonly been used for livestock farming, enabling some natural ecological processes to persist fairly undisturbed (Slooten et al., 2023).

Only 2% of grassland is formally preserved, probably the lowest rate of protection globally (Carbutt and Kirkman, 2022). Grasslands conditions globally are varied, but are currently generally unsatisfactory (FAO, 2005). About five-sixths of the world's grasslands are on land of poor quality (Buringh and Dudal, 1987), therefore, the potential for expansion of cropland from grassland with an objective of making profit appears low (FAO, 2005). Grasslands globally have been experiencing degradation and conversion since 2000. The leading affected continents are Africa (39.35%) and Asia (19.58%), followed by South America (18.65%), Oceania (9.34%), North America (8.41%), and Europe (4.66%) (Yan et al, 2023). Grassland degradation occurs primarily in tropical savannah regions, particularly in Africa, South America, and Oceania. Among these, EAF, SAF, Madagascar, and areas surrounding the Congo Basin are the most affected areas (Yan at al., 2023).

Several efforts have been made to evaluate global land degradation and conversion since the 1990s and, recently, a growing number of scholars have carried out research related to degradation. However, they have not assessed grassland degradation and conversion, although at least 40% of the world's grassland has been lost due to specific ecological conditions and use (Carbutt and Kirkman, 2022; Yan et al., 2023). This is because grasslands remain under-appreciated in ecosystem-services frameworks compared to, for example, forests and cropland, as well as the fallacies surrounding the origins and age of many grasslands (Ibid).

Grasslands have also been joined with other rangelands, such as shrub land, deserts and savannahs, in studies and receive less attention even in global policy agendas (Bengtsson et al., 2019). Therefore, studies on the conversion of grassland to cropland are generally fragmented and limited in scope, compared to forest-to-cropland conversion, even though the widest grassland cover in the world is found in Africa (Yan et al., 2023; Muraina et al., 2023). Studies have often combined the effects of climate change and human activities. Existing literature on grasslands degradation and conversion mostly have a regional focus, leaving questions about their global applicability (Yan et al., 2023).

Until now, the divergent views on scientific and complete information of the location, size, extent, and trends of grassland loss have become a hindrance to understanding this type of land-use conversion. Still, it is essential to estimate the current state, as this will provide some insights important to formulating long-term sustainable development policies on future land use and responses to climate change in Africa.

The major drivers of grassland conversions, degradation, and improvement processes are human-activity related, with climate change contributing less than 1% of change (Yan et al., 2023). Most high-quality grassland in many developing and least-developed countries is increasingly being transformed for agricultural expansion to increase farm profits and satisfy ever-increasing demands for food, feed, and fibre (Castaño-Sánchez et al. 2021; Carbutt and Kirkman, 2022; Yan et al., 2023); overgrazing (Little et al., 2015; O'Connor et al. 2011; Neke and Du Plessis, 2004) and economic growth (FAO, 2005; Slooten et al., 2023). Originally comprising more than 25% of the earth's land surface, global grasslands are much less widespread today. Originally constituting more than 25% of the earth's land surface, global grasslands are currently much less widespread. About 50% of temperate and 16% of tropical grasslands have disappeared through transfer to agricultural or industrial uses (NASA Harvest, 2023). Sub-Saharan Africa has experienced the most extreme land degradation and conversion of grasslands (Carbutt and Kirkman, 2022).

Most of the grassland in commercial areas of South Africa has been converted for intensive agriculture, with some enterprises changing to game ranching. It is estimated that in South Africa only 15% continues as natural grassland, with 60% having been invariably transformed (Little et al., 2015). About 20% of the grassland ecosystem is comparably degraded and almost 2% is officially conserved (Carbutt et al. 2011; Little et al., 2015). Of particular concern is that the majority of the remaining natural grassland is highly fragmented and mostly poorly managed (Mucina and Rutherford, 2006, p.362, cited in Little et al., 2015; South African National Biodiversity Institute, 2014, cited in Little et al., 2015).

In West and North Africa, an increase in human population has resulted in decreased grassland (Carbutt and Kirkman, 2022). Similar experiences are occurring in Botswana and Zimbabwe (Akinyemi and Speranza, 2022). In countries like Algeria, Morocco (on the North African Mediterranean coast), grasslands conversion was possible through irrigation (Akinyemi and Speranza, 2022). Almost all cultivable grassland and large tracts of semi-arid marginal land have been converted for subsistence crops. Tribal authority, which had regulated grazing practice, broke down in many countries when they gained their independence, leaving grassland as an open-access resource (FAO, 2005) and, therefore, susceptible to conversion to other uses.

One of the main causes influencing farmers to convert grassland to cropland in sub-Saharan Africa is the low livestock productivity. However in WAF and CAF, between 2000 and 2018 conversion to grassland was 165,900 ha a year (13%) on average. In EAF and SAF, there were similar dynamics of conversion to grassland driving deforestation of 270,100 ha a year (19% of deforestation). Yan et al. (2023) indicate that even though grassland degradation in Africa reached 39.4%, (in tropical regions of EAF, SAF, Madagascar, and areas near the Congo Basin), there has been a 11.7% improvement in savannah regions of the Sahel, predominantly in WAF and SAF, close to the Kalahari Basin in Namibia.

Grassland transfer to cropland and deforestation are the main factors driving land-use and land-cover change. Other factors include plantation forestry, urban growth, and mining, as well as hostile non-native vegetation and rural extension (Carbutt and Kirkman, 2022; Lipsey and Hockey, 2010; Allan et al., 1997) and large-scale, persistent burning (Uys, Bond, and Everson 2004). Grassland improvements are dominantly observed from other types of land, such as in Namibia, and from agricultural land and forest land in Kenya. In South Africa, improvement occurred as a result of conservative management such as biennial burning, which resulted in high vegetation biomatter, together with a massive decrease in grass spe-

cies amount and increased overall vegetation palatability (Little et al., 2015). Cropland degradation and drought motivated farmers to transfer croplands to grassland for pastures in the Mount Kenya region (Akinyemi and Speranza, 2022).

2.4.3 Conversion to grazing land or pastureland

Although the definition and categorisation of grazing lands depend on various factors concerning the nature of grazing activity, animal density, vegetation form, and initial biome (Oliveira et al., 2020; Hill et al., 1999), there are estimations on their size. (FAO,1996) estimates that grazing land covers almost 60% of the global agricultural land and supports almost 360 million cattle and at least 600 million sheep and goats. These livestock supply almost 10% of global beef production and almost 30% of the global sheep- and goat-meat production (FAO, 1996). For about 100 million inhabitants in arid areas and similar zones, grazing livestock is the dominant livelihood source (FAO, 1996). Different livestock species make different combinations of meat, traction, transport, or dairy products at different levels, with productivity depending on the species, age, and sex composition of the herd, among other factors (Behnke and Kerven, 2013).

With population expansion and without agricultural intensification, smallholder farmers require more land for agriculture. This has led to communal grazing land conversion to agricultural land to increase production and feed the growing population. On the other hand, most African states are prioritising the conversion of pastures to plantation cash crops for better economic gains (McMillan, 2013). Africa's current "land grabs" are linked to the World Bank's perception of Africa's vast unfenced savannah land as "the world's last large reserve of underused land" (McMillan, 2013). This conversion often occurs at the expense of other land, for example communal grazing land (Gebremedhin et al., 2017). Communal grazing lands are a common land resource, which are key sources of livestock feed. However, the grazing areas are on the decline.

Although conversion to cropland is considered one of the dominant changes in grazing land use (Menale et al., 2011), many studies have focused on the transfer of grazing land to other land-use types and not cultivation (Gebremedhin et al., 2017). This has led to less documented information on the conversion of grazing land to cropland. However, available studies indicate that globally about 4.7 million km^2 of grassland has been transferred to croplands since 1850 (Lambin et al., 2003, cited in Gebremedhin et al., 2017). Due to population growth and policies inclined towards cropping, most of the prime pasture has converted to cropland, 'although it is not entirely suitable (FAO, 1996). In tropical areas only, cropland area has increased from about 300 million to 400 million hectares in 1700 to 1,500 million to 1,800 million hectares in 1990 (Lambin et al. 2003, cited in Gebremedhin et al., 2017), through clearing pastures, forests, and grassland. A study in Ethiopia shows that when the population in the Dejena subdistrict of the Welkait district in the Tigray region rose from 7,858 in 1992 to 13,555 in 2012 (a 42% increase), the cultivation area rose from 4,150 to 6,507 ha, causing a 41.88% land-use change. The population pressure index was 2.06 and 2.02 during the two periods, indicating high population pressure (Lambin et al., 2003, cited in Gebremedhin et al., 2017).

The major cause of grazing-land conversion in Ethiopia has been the growth of private and state farms, the growing livestock population, and the illegal extraction of resources (Gebremedhin et al., 2017). In EAF**,** pastoral lands are shrinking due to the expansion of croplands (FAO, 2005). National land-tenure law is not linked to customary grazing rights and disadvantages pastoralism, unlike crops (FAO, 2005). Major conversions to agriculture were triggered

by various policies that were instituted for economic or social purposes (FAO, 1996). These include land-redistribution programmes, unlawful cropland expansion into nearby communal grazing lands, and new infrastructure in Ethiopia; seeking to settle pastoralists in central Africa, leading to the privatisation of land; and fuel and agro-chemicals subsidies in North Africa, which have often motivated the transfer of pastures to marginal agricultural land (Gebremedhin et al., 2017; FAO, 1996).

Behnke and Kerven (2013) have, however, argued that these government programmes have not been a solution, but rather a cause of rising instability in already unreliable pastoral-livelihood support structures. Gamaledinn (1987) emphasises that the concepts of land use and control that governments import do not include empirical experience accumulated over time by agriculturalists and pastoralists. Gameledinn (1987) adds that these concepts represent a threat to rural herders, who cannot resort to alternative state income.

2.4.4 Population

The global human population continues to increase, although at a slower pace than previously. The slowdown in growth is mostly attributed to the fertility decline in a growing number of countries (Cilluffo and Ruis, 2019). In 1950, Africans accounted for 8% of global inhabitants (Walsh, 2023). A hundred years later, they will represent one-quarter of the global population and more than one-third of young people aged 15 to 24 (Walsh, 2023). The United Nations (UN) 2024 edition of World Population Prospects demonstrates that the global population is expected to reach a peak of about 10.3 billion in the mid-2080s before slowly declining to 10.2 billion by the end of the century.

This represents a shift from previous projections, which anticipated a higher peak and continued growth throughout the 21st century. However, Walsh (2023) posits that estimating population patterns is a loaded and disputed issue, with a history of erroneous forecasts. He based this logic on discourse in the 1970s, for example, the book *The Population Bomb* by Paul R Ehrlich, which publicised alarm that an overpopulated Earth would result in mass malnourishment and social collapse.

Still, experts contend that these demographic forecasts should be trusted and that a momentous change is occurring. In fact, the 2050 predictions are likely, given that the majority of 2050's mothers have already been born. Unless Africa experiences an unanticipated disruption, its youthful wave will probably lead the next seismic shift, with its complexities, differentiation, and contrasts. (Walsh, 2023). African youths are sharpening their talents, sensing greater opportunities politically, economically, socially, and even in global culture, such as music and fashion.

Sub-Saharan African countries are estimated to account for most of the increase (Dodman et al., 2017), tripling in population by 2100 (Cilluffo and Ruis, 2019). Human population in Africa is anticipated to rise from 476 million in 1980 to 2.5 billion by 2050, when two-fifths of global births are projected to be African (Coromina, 2021). Six countries are estimated to account for more than 50% of the global population growth by 2100, with five of these countries in Africa (Cilluffo and Ruis, 2019).

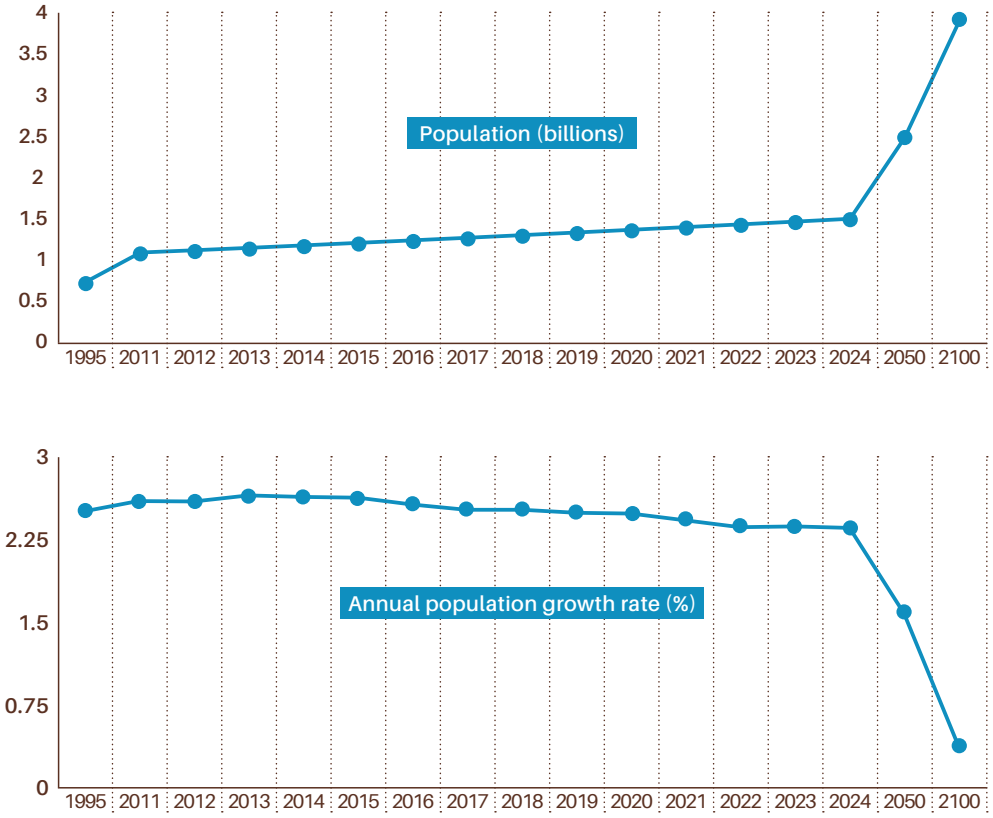
Kaneda et al. (2021) collated the different projections of population growth for the year 2100 by various organisations: 3.8 billion (UN); 3.1 billion (Institute for Health Metrics and Evaluation) and 2.6 billion (International Institute for Applied Systems Analysis). More than 50% of this increase is estimated to come from Nigeria, the DRC, Tanzania, Ethiopia, and Angola.

Nigeria is predicted to overtake the United States (US) as the world's third-most-populous country by 2050, surpassing China in the number of births by 2070 (*The Economist*, 2020; Cilluffo and Ruis, 2019). The DRC, sitting at a population of 81 million in 2019, will increase to 195 million, while Ethiopia, which was 105 million in 2019, will grow to 188 million (Anoba, 2019). In 2019, Tanzania had a population of 57 million and Uganda 42 million, which will surge to 129 million and 101 million people, respectively, by 2050 (Anoba, 2019).

High-density countries in Africa with rural population densities surpassing 100 people per square kilometre include Rwanda (420 people per km^2), Burundi (339), Comoros (309), Malawi (209), Uganda (201), Ethiopia (194), the DRC (187), Benin (152), Kenya (113), The Gambia (108), Nigeria (106), and Sierra Leone (104) (Headey and Jayne, 2014).

Figure 4 below demonstrates Africa's population from 1995 to 2024 based on data from Macrotrends (2024). UN projections for the years 2050 and 2100 are also included.

Figure 4: Africa population growth rate (1995-2100)



Source: Macrotrends (2024)

Generally, women are currently having relatively fewer children than 30 years ago (BIPD, 2024). However, there are differences across regions and countries, indicating different points in demographic transition for different countries (BIPD, 2024). Although North American, Latin American, and Asian countries saw a sharp decline in the number of children per woman between 1960 and 1980, the number began to drop in Africa only in the1980s and at a slower pace (BIPD, 2024). Despite the fall in fertility rates in Africa ever since, fertility is still higher in some countries, at four children per woman (BIPD, 2024).

The level of fertility decline stalled substantially in sub-Saharan Africa in about the 1990s and early 2000s (AfDB, 2012). Although mortality rates in the continent's countries have significantly dropped, there are differences in fertility rates – South African and Tunisian women, for example, give birth to an average of two children and other countries like Ethiopia are seeing a declining birth rates, from seven children per woman in 1994 to fewer than four children in 2024 (Ezzeh and Feyissa, 2019; BIPD, 2024).

One reason that African women still have more children is that they become mothers for the first time on average more than four years earlier than the global average of 26 (Ezzeh and Feyissa, 2019). Ezzeh and Feyissa (2019) argue that the early childbearing witnessed in Africa through high adolescent birth rates contributes towards rapid population growth. This is heightened by poverty, which increases the chance of coercive relationships, early marriages, and religion in some countries. Islam, Christianity, and traditional belief systems in some instances promote early marriages, discourage the use of contraceptives, and/or emphasise on the social value of large families. Furthermore, differences in family-planning-programme endeavours and social dynamics in different countries also contribute towards population growth (Ibid).

The authors assert that about one in four women in Africa have an unmet family planning need, which is the portion of sexually active women who wish to stop or postpone childbearing for more than two years without using modern contraceptive methods. Africa's demographic patterns demonstrate a growing ageing population and a striking expansion of the youth population. The "youthquake" has huge yet uncertain implications, which probably vary greatly on this continent of different cultures (Walsh, 2023). Again, the ageing of Africa's population is anticipated to intensify between 2010 and 2030 (AfDB, 2012). By 2030, the average life expectancy is estimated to be 64 years, compared to 57 years in 2010, with NAF and EAF estimated to have the highest life expectancy of 76 and 64 years, respectively, compared to 56 years for CAF (AfDB, 2012).

2.4.5 Urbanisation

Globally, cities are growing. The most urbanised region is North America, with 82% of the population residing in urban areas, followed by Latin America and Europe at 74% (Bos, 2023). In comparison, Africa is still fairly rural and one of the least urbanised regions globally, with about 43% of people living in cities (OECD/UNECA/AfDB, 2022; Bos, 2023; AfDB, 2012). However, the continent is urbanising at an accelerated speed, experiencing the largest urban growth in the past 20 years at 3.5% per year. The average distance between metropolitan areas had contracted by 40km by 2015, from 61km in 1950 (Bos, 2023).

The rapid expansion is region-specific and is attributed to various development trends, mainly economic growth and population increase; reclassification of rural land; rural-urban migration; youth surge; and conflict and hunger that has led to populations being internally displaced (Boadi et al., 2005; OECD/UNECA/AfDB, 2022). In addition, there has been insufficient planning and inadequate financial or technical capability to supply large-scale infrastructure projects able to carry habitable density (Dodman et al., 2017). The situation coincided with the imposition of Western development policies, such as structural-adjustment programmes, in Africa, which eroded rural communities' agricultural-subsistence prospects and increased rural-urban migration (Boadi et al., 2005) in the context of climate change.

Africa's urbanisation pace is projected to follow trends of the fastest-growing world regions

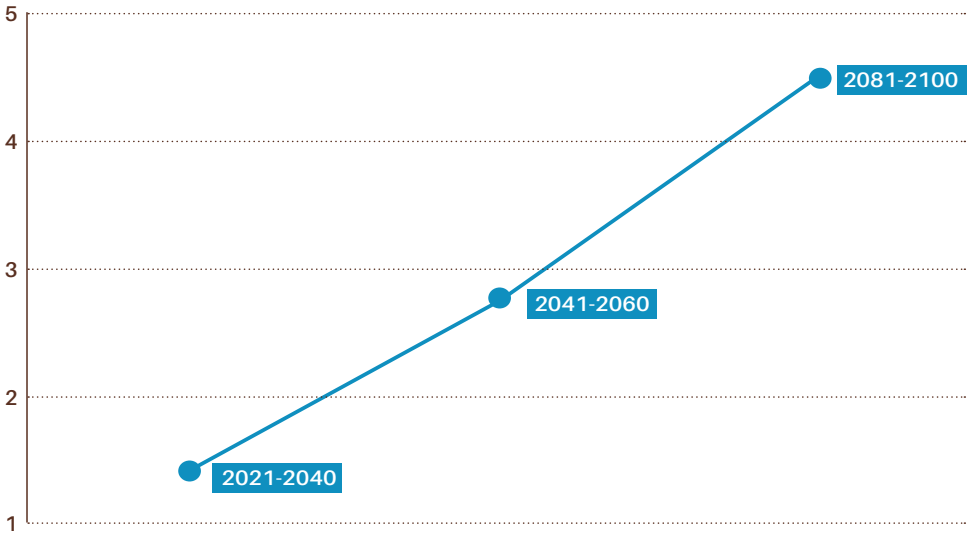
A man and his donkey on their way home with berseem clover, a common fodder in Egypt.
(Photo: Unsplash)

in the near future, making it one of the biggest land conversions in the region this century (OECD/UNECA/AfDB, 2022). In 1950, Africa's urban population stood at 27 million people, less than 5% of the current urban population of about 567 million people (OECD/UNECA/AfDB, 2022). The population was still predominantly rural by 1960 (Boadi et al., 2005). Since 1990, the number of African cities has more than doubled from 3,300 to 7,600 (OECD/UNECA/AfDB, 2022) and between 1990 and 2015, 4,500 new cities had emerged (Li et al., 2022).

Since early 2000, Africa's city population has increased, reaching more than 600 million in 2020. About 609 million of Africa's population resided in urban areas in 2021 (Galal, 2023). Rapid urbanisation has also stimulated the increase of megacities. There are seven megacities in Africa – Lagos, Kinshasa, Cairo, Accra, Nairobi, Johannesburg-Pretoria, and Khartoum – currently housing more than 10 million residents each. For example, in Accra urban-land area expanded more than double the rate of its urban population between 1985 and 2000 (Dodman et al., 2017). Other cities, like Luanda and Dar es Salaam, are set to graduate to megacity level in the next 10 years. At least 90% of Africa's smaller cities have fewer than 100,000 residents (Bos, 2023).

If existing expansion is maintained, the urban population is anticipated to double again by 2050 to nearly 60% of Africa's population (Li et al., 2022). In Africa, the annual rate of urban-area expansion has surpassed the rate of urban-population growth (Li et al., 2022), mainly due to an expansive population growth instead of a compact one. This has resulted in reducing urban-population densities and a greater degree of land-use change (Dodman et al., 2017). The continent's number of urban inhabitants has been expanding yearly and is forecast to reach 722 million by 2026. It is estimated that almost one billion more people will reside in Africa's cities by 2050, with two-thirds residing in urban areas, intensifying pressure on land (Spooner, 2024; OECD/UNECA/AfDB, 2022). Figure 5 below illustrates the projected urban growth.

Figure 5: Projected urban increase rate in Africa (%)



Source: Yahaya et al. (2024)

Previously, China topped the list of urbanisation-growth rate between 1978 and 2010, with more than 700 million people migrating to China's cities (Spooner, 2024). Currently, Africa's urban population is estimated as 45% of the continent's total population (Africa Center for Strategic Studies, 2025) with Southern, North, and Central Africa being the most urbanised

regions (Bos, 2023). Libya, Gabon, and Djibouti have the highest urbanisation rate. Other countries, for example, Burundi, Niger, Malawi, and Rwanda, remain predominantly rural, with one-fifth of people living in an urban area (Bos,2023). Nigeria has Africa's largest rural population (95 million), with Ethiopia (85 million) second (Bos, 2023).

Three main urban types were identified for African cities in 2015: (i) the transitional urban type, distinguished by built-up sprawling urbanisation and a reduction in open space, as seen in Cairo, Gombe, Khartoum. Kigali, Luanda, and Marrakesh; (ii) the compact-grey type, which is dense and simple in shape, for example, Alexandria and Kairouan; and (iii) the ragged-small type, which is less complex and less irregular in shape, for example Arusha, Nakuru, and Beira (Li et al., 2022).

2.4.6 Critical minerals

The decarbonisation of the international economy and the movement towards technological advancement featuring 5G networks and artificial intelligence (AI) are stimulating the global demand for critical raw minerals (CRMs) (Kalantzakos, 2019). The demand is anticipated to more than double by 2030 and quadruple by 2050, with annual revenues reaching $400 billion (International Energy Agency, 2022; Holechek et al., 2022). The Pan African Climate Justice Alliance (PACJA) (2024) explains that decarbonisation, which is needed to meet global climate goals, promotes the phasing out of fossil fuels (coal, natural gas, and oil) as primary sources of energy generation. The way forward is considered to be electrification, which uses renewable energy to provide domestic and industrial energy requirements, particularly in the transport and industrial sectors (Boafo et al., 2024; Kalantzakos, 2019). The minerals or metals required for decarbonisation or the production of green or clean energy technologies, such as electric vehicles, solar panels, battery storage, wind turbines, hydrogen electrolysers, and fuel cells, are generally known as "green minerals or metals" (Hammond and Brady, 2022). Examples of these "green metals" are cobalt, chromium, copper, high-purity iron ore, bauxite, lithium, platinum group metals, and rare-earth metals, among others (Boafo et al., 2024; Hammond and Brady, 2022; Kalantzakos, 2019 and 2020).

Critical minerals are categories of "green minerals" with two major distinct features: (1) they are vital for the operation of modern economies, technologies, or national security; and (2) there is a danger that their supply chains could be interrupted (Hine et al., 2023; Pitron, 2022). Therefore, not all green metals qualify as critical minerals, unless they meet the two criteria. Different markets and geopolitical conditions have different assessments of a mineral's criticality at any specific point in time and are subject to change (Boafo et al., 2024).

Therefore, different countries and regions have established their own lists of critical minerals based on diverse parameters, with decarbonisation as the common goal among the indicators (Kalantzakos, 2019; Boafo et al., 2024). The US has classified 35 critical minerals, including lithium, cobalt, and rare-earth elements; the EU has 34 critical minerals; Australia's list of 47 minerals includes rare-earth and platinum-group elements; and Japan has seven minerals on its list (Hine et al., 2023; Kalantzakos, 2019).

Despite Africa accounting for almost 30% of global critical-mineral reserves, most of them crucial for the development of renewable and low-carbon technologies, the AU has neither developed a strategy on critical minerals, nor developed its own list of critical minerals founded on well-specified parameters (Boafo et al., 2024). The African Development Bank is, however, currently creating an African green minerals strategy and has identified critical 19 minerals (Ibid).

China has a strong and growing influence over the critical-mineral industry (Kalantzakos, 2019), supplying 29 commodities, including 22 metals and seven industrial minerals (Renneboog et al., 2022). Although China does not produce critical minerals, such as lithium, cobalt, copper, or graphite, it purchases, beneficiates, and exports globally, making the country the most central customer and supplier of CRMs in the world (Renneboog et al., 2022).

Figure 6: Map showing the distribution of Lithium on the African continent based on the 11 countries listed.

Source: Institute for Poverty, Land and Agrarian Studies. British Geological Survey: Lithium resources, and their potential to support battery supply chains, in Africa (2021)

Considering that critical minerals are located in significant geographic concentration, often in developing countries, the battle to acquire the minerals and supply chains from mine to the market is creating hotspots of dispute, while provoking geopolitical rivalries (Kalantzakos, 2019) centred on countries' attention on Africa. The continent has extensive deposits of critical minerals, such as cobalt, copper, and lithium, as well as graphite, chromium, manganese, rare-earth minerals, and platinum-group metals (Boafo et al., 2024; UNCTAD, 2024). As of 2023, Africa owned 48% of the global reserves of cobalt, 40% of manganese, and 22% of graphite (PACJA, 2024).

Critical-mineral mining has typically converted several hectares of vegetation land to mining activities. Mines for different minerals have used vast land in the various countries in which they are found.

LITHIUM

There are about 11 African countries involved in the lithium supply chain (Goodenough et al., 2021). Five countries' lithium activities are at advanced stages (past the resource-definition phase). These are Zimbabwe, Namibia, the DRC, Mali, and Ghana (Barich, 2022). These five countries together possess lithium resources of 4.38 million tonnes, with the DRC owning more than 60% (Barich, 2022). In Ghana, the Cape Coast Lithium Portfolio (including Egyasimanku Hill Lithium Project and the Ewoyaa Lithium Project) covers 509km2. The Uis Lithium Project (Namibia), Manono Project (southern DRC), Goulamina Lithium Project (Mali), Karibib Lithium Project (Namibia), and Arcadia Lithium Project (Zimbabwe) cover 308km2, 188km^2, 100km^2, 68km^2 and 9km^2 of land, respectively (Boafo et al., 2024).

COBALT

The DRC possesses more than half of global cobalt reserves, estimated at about 4 million tonnes in 2022, and currently produces about 70% of cobalt globally (Boafo et al., 2024). As

electrification intensifies, demand for cobalt has surged. In 2021, cobalt's market grew by 22% and is anticipated to expand by 13% a year until 2030 (Davey, 2023). Therefore, both legal and illegal mines have appeared throughout the country, threatening vegetation. It is unclear how much of Congo Basin has been deforested for cobalt mines because the DRC's other natural resources contribute towards land conversion to mining (Davey, 2023), as well as the fact that cobalt is produced as a byproduct of either nickel or copper production (Crundwell et al. 2020). However, it is estimated that millions of trees have been cut down by major mining companies (Davey, 2023).

COPPER

Copper comes primarily from the DRC, Zambia, South Africa, and, recently, Namibia (Pistilli, 2021). Mining giants Glencore and Ivanhoe have established substantial operations in the DRC, covering huge tracts of land (Pistilli, 2021). In Solwezi copper-mining district in Zambia, forestland, cropland, and barren areas were among the main land conversions two mining land between 1995 and 2019 (Tiagmne et al., 2021). The mined area had a net increase of 4706.01ha from 1995 to 2019 (Tiagmne et al., 2021). The Mining area continuously increased between 1995 and 2019 at a net rate of 196.08ha a year, experiencing a maximum increase rate of 374.54ha a year between 2015 and 2019.

2.4.7 Carbon markets

Carbon markets are driving land-use changes through promoting appropriation of huge tracts of land used by smallholder farmers and pastoralists for top-down green grabs, which include tree planting, carbon sequestration, and biodiversity-offset schemes. Globally, the "green grabs" constitute about 20% of total land grabs today. Governments around the world have also pledged "one billion ha of land for land-based carbon removal as part of their climate mitigation pledge", which is equivalent to the world's cropland and bigger than the combined areas of South Africa, India, the EU, and Türkiye (Allen et al., 2023). Most of the targeted land is in Africa.

The Africa Carbon Markets Initiative (ACMI) was launched at COP27 in Egypt to support voluntary carbon markets in Africa. ACMI's specific objectives include: growing African voluntary carbon markets to produce 300 million carbon credits annually by 2030 and 1.5 billion credits annually by 2050; unlocking $6 billion in revenue by 2030 and more than $120 billion by 2050; supporting 30 million jobs by 2030 and more than 110 million jobs by 2050 (Murombedzi and Munangi, n.d.). As Leach and Scoones have argued, "Policies and projects promoting forest carbon offsetting all assume and depend on the idea of carbon as a commodity: isolated, tamed, priced, and exchangeable." (Leach and Scoones, 2015) leading to a massive impact on land-use changes.

2.4.8 Timber and construction

The growing global demand for timber is increasing competition for land uses in Africa. Searchinger et al., 2023) project a "54% global increase in wood demand between 2010 and 2050". Land is not available if wood is demanded at a large scale because wood requires huge tracts of land. In addition, harvesting wood "will likely increase atmospheric carbon for decades" (Searchinger et al., 2023). It is also important to note that wood harvesting leads to social, cultural, environmental, and biodiversity loss, as well as reducing carbon stored in forests. It affects poor people's livelihoods and food supply. A significant amount of land has already been harvested for wood as demands for construction continue to rise.

2.5 Conclusion

This section reviewed literature on current land use and land cover, as well as historical and projected trends for changes and land-use conversion in Africa and their associations with socioeconomic changes in different time periods. It provided generalisable insights into land use and issues in Africa. The section found that land-use conversions were caused largely by anthropogenic factors. The dominant factor was linked to population growth, which has necessitated the need for urban expansion; increased food and energy demand; changes in socioeconomic conditions, which have influenced dietary changes; agricultural productivity, encouraging expanding global financialisation and market integration in different regions; and land-use regulations (Malbranque et al., 2024). Findings show that many African regions were affected by the factors between 1995 and 2019 (Tiagme et al., 2021).

Land-use changes in Africa linked to these factors reflect the continent's history associated with economic advancement, population expansion, and technological and environmental changes. One of the key findings is that with population growth, increased urbanisation, and development, farmers have been forced out of lands closer to urban areas. New agricultural lands have been established in remote forestlands, grasslands, and pastures further from urban areas (Potapov et al., 2022). More subsistence farming is occurring in poorer areas. Some African countries, such as Zambia, Angola, the DRC, Nigeria, and Ethiopia have experienced huge foreign investments, particularly from China, for the production of export goods (Potapov et al., 2022). The section illustrated that the combined methodologies used in this study can measure and evaluate the type, amount, and degree of LULCs, contributing to a better appreciation of land-use and land-cover changes in Africa.

This section concludes that, over time, there will be higher expansion of cropland, urban land, and grassland than of barren land and forest land in the region. The largest agricultural expansion across Africa will be due to increasing food demand. However, if current trends of land conversions continue unabated, this could lead to an ecosystem imbalance, causing biodiversity loss and reduced carbon storage, threatening people's livelihoods in the long run. Climate change will also influence climatic and socioeconomic changes that may affect the future use of agricultural land.

The conversion of agricultural land is motivated by both demand and supply factors. Therefore, policy alternatives should focus on improvements targeting management to minimise land competition. On the supply side, enhancing crop yields on the continent has the ability to release about half of the cropland area, while sustaining current levels of crop production (Malbranque et al., 2024). On the demand size, movement towards less intense demand (diets and accumulation) have the ability to lessen land demand and reduce deforestation and other land conversions.

Overall, this section concluded that more intensive research into additional concerns around large-scale cropland and mining expansion in Africa and the effects of climate change is needed. This section's findings are important for policy discussions on current and future land use in Africa in the context of climate change. These findings are vital in informing land policy and are an effective instrument for research and early monitoring to contribute towards future sustainable and equitable land use and management (Yahaya et al., 2024). The next section discusses the powerful actors involved in driving land-use changes and increasing the demand for land-based products and analyses their interests.

Men process hibuscus at the Obeid market in Sudan.

(Photo: Mohamed Mahmoud, Wikimedia)

CHAPTER 3

Actors and Interests

3.1 Introduction

This section interrogates the dominant actors affecting land use and land cover change in Africa. It examines the role and motivations of these various actors – such as states, corporations, and organisations, exhibiting both formal and informal standards and processes – that construct interactions within and between governments and societies that are used to enable, accelerate, smoothen, or validate land-use and land-cover change (Borras et al., 2020; Wolford et al., 2013). Similar to the previous section, this section draws insights from various studies that analysed main actors influencing land use across the continent. This section specifically focuses on the actors driving land use changes amid scarcity, as well as their role, interests, and motivations. It narrows its focus to African states, Gulf states, China, international financial institutions, Group of Seven (G7) countries, the EU, the Rockefeller Foundation, and multinational corporations.

3.2 Central and local governments in Africa

Governments are critical actors in the promotion of industrial and monocrop agriculture, capitalising on the calls to increase food production to feed Africa; extraction of green-transition minerals as a way to raise funds and aid the transition to clean energy; carbon markets to leverage capital for green growth; timber exports to raise capital; and urbanisation to cater for the growing population and modernise their countries. Governments are decision-making actors that influence land-use changes through leasing and selling land; adopt domestic policy, legal, and institutional reforms that facilitate large land-based investments and "green grabbing"; and promote policy biases against the bulk of smallholder producers on the continent.

To illustrate, most African governments have facilitated transnational land deals since the 2007 to 2008 global economic crisis, the Covid -19 pandemic, and the Russia-Ukraine war, which has led to an increase in food prices and revived modernisation narratives for investments in large-scale industrial and monocrop agriculture to increase food production to feed the world, as well as to increase foreign investments for cash-strapped governments. According to the Land Matrix data, the biggest and most contentious land grabs of recent years have taken place in African countries. About 27% of transnational land grabs since 2019 have occurred in Africa, up from 21% in 2016 to 2019 (Land Matrix, 2024). Most of the land was used by smallholder producers for food crops and constituted a natural environment important for biodiversity conservation.

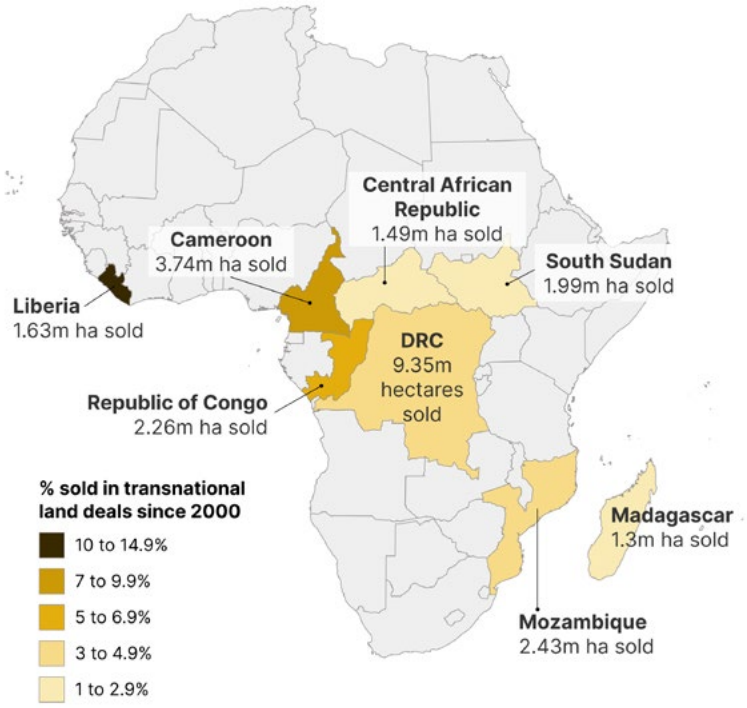
Table 1: African countries with the most hectares bought in transnational agricultural land deals since 2000

COUNTRY	DEAL SIZE (MILLION HA)	SHARE OF COUNTRY'S TOTAL AREA
DRC	9.35	4%
Cameroon	3.74	7.9%
Mozambique	2.43	3%
Republic of the Congo	2.26	6.6%
South Sudan	1.99	3.1%
Liberia	1.63	14.6%
CAR	1.49	2.4%
Madagascar	1.30	2.2%

Source: Buchholz, 2022

Various studies show that large-scale land acquisitions on the continent involve African governments and private investors from both developed countries and emerging economies acquiring vast tracts of land through long-term leases with a duration of up to 99 years or through purchase agreements (Antonelli et al., 2015).

Figure 7: Transnational agricultural land deals in Africa.



Land contracts involve five separate types of actors: (i) private corporations; (ii) state-owned companies; (iii) investment funds; (iv) public-private partnerships; and (v) private individuals (Anseeuw et al., 2012). Most of these actors compete for land with local rural communities, whose livelihoods are centred on agriculture. About 45% of the land transactions target croplands or crop-vegetation areas resulting in intense competition for cropland with locals. About30% of these projects concentrate only on food production and the rest are usually for export, with investors having the flexibility to adjust between non-food and food production (Anseeuw et al., 2012). They control various phases of the value chain while "independent farmers become 'service-providers' of these institutions and, in several cases, do not even own the land". (Anseeuw and Ducastel, 2013).

For the AfDB plan to feed Africa to succeed, 23 African governments have agreed to acquire 25.7 million hectares of land to be brought into industrial production for large agribusiness-led block farms. The total land required is 257,000km½which is larger than Ghana or Uganda (AFSA, 2024). Tanzanian President Samia Suluhu Hassan has been a fervent supporter of the AfDB's Feed Africa initiative, as has Sierra Leone's President Julius Maada Bio, who adopted the Feed Salone program (AfDB, 2024).

Algerian President Abdelmadjid Tebboune announced on 17 September 2024 that the country was on track to expand barley and corn production, aiming for complete self-sufficiency in these crops. Consequently, the government has committed to expand cultivated irrigated farmland by one million hectares in Algeria's desert by 2028 to grow wheat, barley, corn, and legumes. The government is banking on foreign investment, largely from Qatar and Italy (*Miller Magazine*, 2024).

3.2 Green grabs

African governments are eyeing carbon-market potential as a source of foreign currency "allowing a new economic value of forest resources to be unlocked and deployed for economic growth under the sovereign control of the state" (Leach and Scoones, 2015). As Adam Hanieh (2024) has argued, most African governments are monetising nature as an economic-development strategy. African governments see this as an opportunity to lever-

age the continent's renewable resources to unlock billions of dollars from climate finance, while advancing climate goals and economic growth. This is in a context in which there is an escalating debt crisis in Africa, exacerbated by Covid-19, the Russia-Ukraine war, and corruption. Debt service exceeds social spending (health, education, social protection, and) by 50% in Africa (Debt Service Watch, n.d.). Given the fiscal stress, African leaders see commodification of land through carbon and biodiversity offsets as an economic and climate solution (Hanieh, 2024).

African states have, therefore, adopted policies and programmes that actively support carbon markets and green grabs. For example, ACMI was launched at COP27 in Egypt to support voluntary carbon markets in Africa. ACMI was founded in collaboration with other international actors, that is, the Global Energy Alliance for People and Planet, Sustainable Energy for All, and the UN Economic Commission for Africa (UNECA), with the support of the UN climate change high-level champions, namely Mahmoud Mohieldin and Nigel Topping. ACMI's specific objectives include growing African voluntary carbon markets to produce 300 million carbon credits annually by 2030 and 1.5 billion credits annually by 2050; unlocking $6 billion in revenue by 2030 and more than $120 billion by 2050; supporting 30 million jobs by 2030 and more than 110 million jobs by 2050 (Murombedzi and Munangi, n.d.).

As Scoones has argued, "policies and projects promoting forest carbon offsetting all assume and depend on the idea of carbon as a commodity: isolated, tamed, priced, and exchangeable". (Leach and Scoones, 2015). It is, therefore, not surprising that the world's largest carbon-credit auction was held in June 2023 in Nairobi, Kenya, at which more than 2.2 million tonnes of carbon credits were sold.

A number of African states are adopting policies and actively promoting carbon markets that have a huge impact on land uses. For example, Rwanda launched its National Carbon Market Framework during COP28 (Goosen, 2024). In March 2023, Togo "adopted a new decree to support the country's efforts to strengthen carbon management mechanisms and help boost carbon storage" (Dossavi, 2023) In Gabon, the government resolved that carbon credits will be marketed by the country's sovereign wealth fund. The Malawian government has already registered 11 carbon-trading projects. Mozambique is frantically working to establish a regulatory framework to market its carbon. The Nigerian government set up a technical committee to support a carbon market worth $2.5 billion. Burundi is also initiating carbon-market policies.

However, the drive towards carbon-market shares is not uniform across African. Five African countries account for about "65% of carbon credit issuances made across the continent, with more than 70% of those projects in forestry and land use. Kenya leads, with a 23% share; followed by Zimbabwe, on 13%; the DRC, with 12%; Ethiopia, on 9%; and Uganda, narrowly behind on 8%. Combined, total credit issuances in Africa stand at 116.2 million tonnes CO2 equivalent (mt CO2e), according to the ACMI's latest report" (Aslan, 2024). According to Leach and Scoones (2015) "forest carbon projects arguably rely even more strongly on deforestation narratives than previous forest policy interventions, since these are necessary to construct a 'baseline scenario' against which sustained or increased carbon stocks can be measured and verified".

African governments are also shaping land-use changes through adopting policies favourable to multinational companies to expand mining for green-transition minerals to meet the rising global demand. In most African countries, for example, Ghana, Kenya, Zimbabwe,

Governments play contradictory roles – facilitating land transactions (capital accumulation) and sustaining a degree of political legitimacy. Therefore, the state is both contributing towards and an arbitrator of Africa's land-use and land-cover change, leaving Africa's land governance intrinsically loaded with contradictions (Borras et al., 2020).

and South Africa, mining laws trump land rights. African states' primary motivation is to maximise tax revenues from the mining regime, therefore increasing pressures on farmland as a source of government revenue. A global mining boom to support the green transition is placing huge pressures on farmland and destroying biodiversity and the environment in general.

In addition, governments are also adopting policies to build smart and megacities with a huge impact on land-use changes. It is estimated that about "3.3 million hectares of the world's farmland will have been swallowed up by expanding megacities over the 2000 to 2030 period, with 80% of land loss occurring in Asia and Africa" (Jacobs, 2024). As African states benefit from China's Belt and Road Initiative (BRI), mega infrastructure and construction projects for roads, airports, trade centres, houses, dams, et cetera, there is bound to be conversion of cropland and grassland, negatively affecting smallholder farmers and pastoralists (see Potapov et al., 2022).

African governments are also facilitating land-use changes through a new wave of deregulation, neoliberal, and pro-investor policies at the expense of smallholder producers and pastoralists. African governments continue to adopt formalisation policies that accelerate the development of land markets. They do this as a way to receive rewards from powerful Western countries through the World Bank and other multilateral institutions. For example, the World Bank's Business Ready 2024 report has "indicators that continue to reward countries for lifting restrictions on domestic or foreign firms to own or lease land" (cited in Jacobs, 2024). Consequently, most African governments are classifying land used by smallholder producers as "unused", "uncultivated", "empty", and "available" to both foreign and domestic investors for large-scale industrial agriculture, in line with the global complex of food regimes.

Land-use changes are also being fast-tracked by African states through the adoption of special-economic-zones policies. Special economic zones, "geographically delimited areas within which governments facilitate industrial activity through fiscal and regulatory incentives and infrastructure support, are widely used across most developing and many developed economies". (UNCTAD, 2019). These zones are usually given to foreign investors to establish large-scale agricultural projects. Even though many such zones have failed, most African governments continue to develop them in a bid to attract international capital. Much of the land set aside is cropland.

3.3 Gulf nations and companies

The Gulf region is a major driver of land-use changes in Africa. Most Gulf Cooperation Council (GCC) countries have established carbon-market initiatives. The GCC is a regional organisation comprising six countries in the Middle East: Kuwait, the United Arab Emirates (UAE), Oman, Saudi Arabia, Qatar, and Bahrain. The UAE carbon alliance was launched in June 2023. The UAE committed to buying $450 million of carbon credits from ACMI over six years from September 2023 (Hanieh, 2024). The financial incentives are critical for African governments to adopt offset initiatives.

ACMI's carbon-market initiatives are closely linked to the Gulf. Gulf companies, "especially fossil fuel producers, are now the key source of demand for future African carbon credits" (Hanieh, 2024). The UAE intends to acquire millions of hectares of land across Africa for carbon-offset projects. Blue Carbon, a Gulf-based carbon-offset firm, recently negotiated for MOUs with African countries to lease about 25 million hectares of land in Liberia, Zimbabwe, Zambia, and Tanzania (Acland and Barrett, 2023). The MOUs show that it has agreed with the government of Liberia to lease 10% of its land area and with the government of Zimbabwe to lease 20% of its landmass (Acland and Barrett, 2023). This is estimated to generate 2.5 billion of carbon credits annually.

Some analysts have called this "greenwashing" (Source Material, 2024). However, the deals are still to be signed due to domestic and international public resistance. The carbon credits will be used by UAE and other rich polluting countries as a justification to increase their fossil-fuel production. In October 2023, the Abu Dhabi National Oil Company announced its plans to increase oil production from 4.85 to 5 million barrels a day by 2027 (Holtmeier, 2024).

3.4 Critical minerals

GCC countries and companies have joined Chinese and Western companies' race for green-transition minerals in Africa. For example, Manara Minerals, a government-backed Saudi Arabian fund, is reported to have $15 billion to spend on foreign mining projects (*The Economist*, 2024). In March 2024, International Holding Company (IHC), an Emirati company with an estimated capitalisation of $240 billion (worth that of Blackrock and BP combined) bought a 51% stake in Zambia's Mopani Copper Mines (*The Economist*, 2024; Ross, 2024).

This followed Saudi Arabia's announcement in January 2024 that it had signed MOUs for mining collaborations with Egypt, the DRC, and Morocco. Saudi Arabia's minister of investment, Khalid Al-Falih, noted that the collaborations were necessitated by the vast amount of critical minerals needed to drive the transition towards net-zero (Ross, 2024).

It is important to note that Gulf countries are becoming major players in Africa and some of the land-based investments have implications for land use. Over the past 10 years, GCC countries have collectively invested more than $100 billion in Africa (Munyati, 2024). The UAE has invested $59.4 billion. Saudi Arabia and Qatar have invested $25.6 billion and $7.2 billion, respectively (Munyati 2024). The UAE has been the fourth-largest foreign direct investor in Africa, behind China, the EU, and the US (Munyati, 2024). The new partnership between the Gulf countries and Africa is expected to grow in the areas of food security, energy transition, and infrastructure development, putting more pressure on farmland in Africa.

3.5 Agriculture

The GCC countries import about 90% of their food, "with rice imports comprising virtually all consumption, around 93% of cereals, and about 62% of meat and 56% of vegetables" (Ghazaly, Rabbat, and Mokhtar, 2020). To secure and stabilise their food supply they have sought strategic partnerships with Africa because of its good climatic conditions, agricultural potential, and proximity to the Middle East. The UAE, Saudi Arabia, Kuwait, and Qatar have massively invested in agriculture through land acquisitions, joint ventures, and financing irrigation, dam projects, livestock production, and large-scale farming (Gulf Research Center, 2024).

3.5.1 Saudi Arabia

Saudi Arabia has contributed to land-use changes due to its investments in agricultural projects in Africa. The Saudi Fund for Development's (SFD) annual report for the fiscal year 2023 showed that the country funded 34 agricultural dams, irrigation channels, and hydroelectric dams in African countries in the name of enhancing food and clean-energy security (SFD, 2024). Dams were constructed in several countries, including Tunisia (Matmata Tunnel, Sidi Saad Dam, El Haouareb Dam, Wadi Sajnan Al Saud Dam), Burkina Faso (Bagre Dam, Samendeni Dam), Mali (Selenji Dam), Mauritania (Senegal River Basin Development), Senegal (Senegal River Basin Development), Algeria (Keddara Dam, Ain Dalia Dam, Beni Haroun Dam), Morocco (Ait Ayoub Dam, Tascourt Dam, and Moulay Bouchta Dam), Niger (Kandadji Dam), and Sudan (Roseires Dam Heightening) (SFD, 2024, p. 94-106).

Irrigation schemes to promote intensive agriculture were constructed in Senegal, Morocco, Egypt, and Cape Verde (SFD, 2024). The SFD also invested in irrigation and drainage in Sudan and Egypt, as well as in hydroelectric dams in Ghana, Kenya, Cameroon, Burkina Faso, Guinea Konakry, Sudan, Madagascar, and Morocco (SFD, 2024). The SFD has also supported large-scale monocrop agriculture, particularly cotton and sugar-cane plantations in CAR, Somalia, Sudan, and Uganda (Gulf Research Center, 2024). All of these activities contribute to the expansion of agricultural land in Africa.

3.5.2 United Arab Emirates

The UAE has many companies that are involved in the expansion of agricultural land in Africa to secure its food supply and, therefore, contributing to a land squeeze. For example, in Zimbabwe, Global Carbon Investments signed an MOU to acquire 7.5 million hectares of

land (20% of the country's area) for $1.5 billion (Scoones, 2024). IHC, the UAE's largest listed corporation, and Jenaan Investments are farming more than 50 000ha of land in Sudan. IHC, in partnership with the DAL Group, Sudan's largest private company, are developing an additional 162,000ha of farmland in Abu Hamad (Gulf Research Centre, 2024). The motivation is to link the agricultural area to a new Red Sea port, Abu Amama Port (Rinaldi, 2024). This will enhance the UAE's military, security, and logistical strategies. The project is of geostrategic importance, hence the UAE initially provided $6 billion (Rinaldi, 2024). The UAE is essentially involved in land banking in Sudan.

Al Dahra, a multinational agribusiness company, with land banks in Morocco, Namibia, and Egypt, farms more than 260,000ha of fruits and cereals, mainly wheat in Egypt (Rinaldi,

2024). Jenaan Investments has more than 52,000ha of fruit, dairy farms, and fodder crops in Egypt (GRAIN, 2024). The UAE also agreed to build the world's first agricultural zone, 2 500ha large, in Uganda. An agricultural zone is a designated area set aside specifically for farming and agricultural activities. This is meant to process and ship sugar, tea, beef, and maize from Uganda to the UAE to ensure food security in the Emirates and investment in Africa (GRAIN, 2024).

Otterlo Business Corporation (OBC), a trophy hunting company linked to the UAE royal family, has participated in forcibly evicting about 150,000 Maasai from indigenous communities from the Loliondo and the Ngorongoro Conservation Area to the Tanga region for game reserves (ILC, 2022). The land used by Maasai pastoralists is being converted to game ranches. This is because the Tanzanian government wants big tourism money but pastoralists do not want to lose their land-based livelihood (Tullis, 2023).

Al Rawabi Dairy Company was granted **7**,000ha for dairy-livestock production and to improve the Ankole breed by Uganda. Al Rawabi is producing dairy products for the UAE and Oman and seeks to expand to Botswana and Nigeria (Gulf Research Centre, 2024). Abu Dhabi Developmental Holding Company (ADQ) pledged to invest $500 million in Kenya, including in food production, taking advantage of the UAE-Kenya free trade agreement (GRAIN, 2024). Through its investments, ADQ is deeply involved in logistics, that is, "shipping, trading, ports, and retail. Least-developed countries alone account for 10% of global farm trade, and [are] heavily engaged in the global supply-chain logistics industry" (GRAIN, 2024). ADQ is chaired by the UAE's national security advisor.

E20 Investment, a UAE agribusiness investment firm, owns 4,000ha of farm operations in Angola, France, and Uzbekistan. E20 Investment formed a joint venture with Israel's Netafim in 2023 to carry out large-scale farming projects in North Africa (GRAIN, 2024). Elite Agro Projects, a UAE-headquartered specialist agricultural engineering, procurement, and construction company, planned to establish a $200 million wheat farm in Ethiopia and a tea factory in Uganda (Zawya Projects, 2023). In Zimbabwe, Elite Agro-Projects intended to intensify and expand production of tobacco, macadamia nuts, bananas, avocados, citrus, and berries for export (GRAIN, 2024). The UAE also wants to acquire farmland in Zambia to produce grains, sugar, beans, and seeds, as well as to conduct dairy and goat farming (Townsend, 2020).

3.5.3 Qatar

In Qatar, Hassad Food, a wholly owned subsidiary of the Qatar Investment Authority, established during the global food crisis in 2008, committed $500 million to Sudan's agriculture and food sector from 2018 to 2021 (Xuequan, 2018). Hassad Food is Qatar's premier investor in the food and agri-business sectors and promotes agro-industrial agriculture (*Gulf Times, 2023).* The overarching idea is to ensure Qatar achieves food self-sufficiency (*Gulf Times, 2023).*

In Algeria, Qatar's Baladna dairy company is investing in large-scale agricultural projects to produce milk and meat in the Adrar province. Baladna was established in 2014 and is Qatar's "largest dairy and beverage producer, supplying over 95% of the country's fresh milk" (Peys, 2024). Baladna signed the investment deal in April 2024 with the Algerian ministry of agriculture and rural development. Baladna owns 51% and Algeria's National Investment Fund 49%.

The partnership will invest $3.5 billion dollars and cover 117,000ha for arable farming and dairy farming. There is an annual production target of 1.7 billion litres of milk, some 270, 000 animals being farmed for livestock production, and a powdered-milk manufacturing facility (Gulf Research Centre, 2024; Peys, 2024). This will make it the largest integrated dairy-farming and arable-production project in the world. Qatar Holding has also invested in agricultural supply-chains in East Africa.

3.5.4 Kuwait

Kuwait is also becoming a significant actor in the expansion of agricultural area in Africa. Agricultural production in Kuwait is difficult, given the hot temperatures, hot winds, sandstorms, sand encroachment, groundwater salinity, and accelerated processes of desertification. The prospects of growing crops on such arid land, where annual rainfall cannot sustain dryland farming, remain slim. Consequently, Kuwait has imported more than $4.78 billion of food and agricultural products from African countries (Gulf Research Centre, 2024). As a result, Kuwait has joined the race to seek African fertile lands to invest in agricultural production.

In 2022, Kuwait's bilateral official development assistance (ODA) prioritised Africa. According to the Organisation for Economic Co-operation and Development (OECD) (2023), "$301.3 million was allocated to Africa and $94 million to Central, South and East Asia, accounting for 57.6% and 18% of gross bilateral ODA, respectively. $50.6 million was allocated to the Middle East (9.7%)." Meanwhile, "the Kuwait Fund for Arab Economic Development has financed more than 45 agricultural projects in 21 African countries, most frequently in Sudan, Senegal, and Mali". (Gulf Research Centre, 2024). The Kuwait Fund committed to finance agricultural projects in the Republic of the Congo (RoC) to the tune of $23.8 million for livestock feed, fishing, roads, and irrigation development in 2019 (RoC, 2019).

Kuwait also launched the Al Rahma African charity fund to teach what it mischaracterises as "novice farmers" to tender for plantations in Tanzania, Sudan, Uganda and other countries (Kuwait News Agency, 2016). The Kuwait Fund co-financed about $14 million alongside the International Fund for Agricultural Development (IFAD), and other partners for a total project cost of $65.77 million in Guinea-Bissau to support the family farming project (IFAD, 2024). The project (2019 to 2026) aims to support farmers to access markets and to become climate resilient. Kuwait has also introduced mechanised raised-bed technology in irrigation-crop production in Central and North Africa and is intensifying investments in Sudan, Egypt, Morocco, and Tunisia.

It is important to highlight that, since the global food crisis of 2007 to 2008, the Covid-19 pandemic and the Russia-Ukraine war have significantly disrupted food supplies for Gulf states. As a result, the Emirates alone has amassed some "960,000ha of farms overseas" (GRAIN, 2024). The prospect of growing crops on arid land to feed the hungry is limited, whereas "the GCC has among the lowest proportion of arable land in the world" (Townsend, 2020).

However, overseas food production requires security and logistical strategies to move goods from overseas farms to the Gulf states. This brings a security dimension to the land squeeze, which overlaps with geopolitical and military interests (GRAIN, 2024). In addition, the Gulf countries do not only want to become food self-sufficient, but also to become superpowers in the world's changing agri-food trade system (GRAIN, 2024).

Platinum mine in South Africa
(Photo: Wikimedia)

3.6 China

China and its companies play a significant role in driving land-use changes in Africa. China-Africa relations have strengthened from the early 2000s, with co-operation in mining, agriculture, infrastructure, and renewable energy.

3.6.1 The global renewable-energy race

China is driving the expansion of mining areas as the global renewable-energy race with the US and Europe intensifies (Johnston, 2024). There is a rush for green-transition minerals in Africa. China controls about 6% of Africa's mining sector (Risi and Doyle, 2023). Chinese mining operations in Africa are concentrated in five countries, namely Guinea, Zambia, South Africa, Zimbabwe, and the DRC (Johnston, 2024).

China has a near monopoly in the DRC, which has high-grade copper and the world's largest reserve of cobalt (Egyin, 2024). China owns 72% of the DRC's cobalt mines, which are key for lithium batteries (Egyin, 2024). China Molybdenum Co Ltd (CMOC), based in Luoyang, is the world's leading cobalt-mining company. CMOC became the world's number one cobalt-mining company in 2023 "with production of some 55,000 tonnes, and could further outpace rivals, including Glencore, after raising its output forecast this year [2024] to 60,000 tonnes to 70,000 tonnes" (Njini and Brown, 2024).

In Zambia, China continues to expand copper mines, which will add pressure on farmland. In November 2024, China announced plans to "inject up to $5 billion into Zambia's copper industry by 2031 to increase the production of copper and cobalt, with the investment made through a new body, the Chinese Mining Enterprise Association in Zambia" (Namala, 2024). According to the Chinese ambassador to Zambia, Han Jing, there are "now more than 20 Chinese-funded mining enterprises in Zambia, with a total investment of more than $3.5 billion" (Xinhua, 2024).

Zimbabwe is another country in which there are massive land use changes due to the race for renewable energy. It has the world's fifth-largest lithium reserves (Matanzima, 2024). The key actors in the expansion of mining land include China's Sinomine Resource Group, which aims to produce 300,000 metric tonnes of spodumene concentrate, which is key to produce lithium minerals used to manufacture batteries; and Eagle Canyon International Group Holding and Pacific Goal Investment, which signed a $13 billion deal with the government of Zimbabwe to construct a mine to energy industrial park in 2022 in Mapinga, Mashonaland West province. However, the latter will require 5 000ha of land (Kazunga, 2023).

China Natural Resources is also seeking to purchase lithium mines in Zimbabwe. China aims to be a global leader in renewable-energy technology. Prospect Lithium Zimbabwe, a subsidiary of Chinese company Zhejiang Huayou Cobalt, opened a $300 million lithium-processing plant in Goromonzi in 2023, with the capacity to process 4.5 million metric tonnes of hard-rock lithium into concentrate for export annually (Mutsaka, 2023).

China is also playing a leading role in expanding mining areas in Africa for steel, which is also important for renewable energy. Dinson Iron and Steel Company, a subsidiary of China's stainless-steel producer, Tsingshan Holdings Group, invested in the $1.5 billion Manhize Steel Plant in Zimbabwe (Chitumba, 2024). Consistent with the mischaracterisation of African lands displayed by the AfDB, *The Herald*, a state-owned newspaper, praised the investment

as: "Once a dense forest, the landscape has been transformed into a thriving industrial hub, with buildings rising from previously virgin land. Staff housing, warehouses, and other essential infrastructure have been built, paving the way for the steel giant to start production" (Chitumba, 2024).

Chinalco Mining Corporation International is one of the companies granted a permit to mine "the world's largest untapped high-grade iron-ore deposit", Simandou iron-ore deposit in Guinea, from 2026 (Johnston, 2024). Steel is important in renewable energy for wind turbines and solar panels.

China is also investing in factories that will require more land to maintain the supply of critical minerals. In Morocco, through Gotion High Tech, China is building the first $1.3 billion electric-vehicle battery gigafactory in Africa (Agbetiloye, 2024). It is also expanding the solar-belt initiative in Africa, one of the world's largest solar energy projects, with massive investments in Kenya. China is home to 80% of the world's renewable-energy manufacturing. All of these projects will require vast tracts of land to maintain the supply of critical minerals.

3.6.2 Carbon markets

China is the world's largest emitter of carbon dioxide, accounting for 35% of the world's total greenhouse gas emissions, and is involved in land-intensive carbon-offset projects. For example, through the Guangxi Fenglin Wood Industry Group and Development Company, China signed an MOU with the Zambian government for a carbon-offset venture that covers 4 million hectares of land, the equivalent of 5% of the country's land mass. The plan is "to plant trees and preserve and rehabilitate forest over 4 million hectares of land with the Chinese companies" (Mitimingi, 2023). This will include establishing 100,000ha of plantations of slash pine (Mitimingi 2023). The investment is expected to "produce 23.25 million carbon credits a year and employ 65 600 people" (Mitimingi, 2023).

3.6.3 Agriculture

China is involved in extraterritorial investments in African agriculture in ways that increase the demand for land. This is not new, but the scale has dramatically increased since China began investing in African agriculture in the 1950s. China's agricultural plan for Africa is pinned on modernisation. It now has more than 1,000 enterprises involved in agricultural production overseas and more than $10 billion of cumulative overseas investment in agriculture (FAO, 2020). Most of the investments have been in western, southern, and eastern Africa, specifically in Mozambique, Zimbabwe, Madagascar, Mali, the DRC, Ethiopia, and Sudan (Jann et al., 2021). However, Chinese companies have extended their agricultural operations to Cameroon, Zambia, Benin, and Tanzania (Hoffman and Ho, 2012). China's land leases are mainly in southern Africa, where it has strong diplomatic ties, followed by West Africa, East Africa, and North Africa. The Chinese invest largely in crops.

China has been investing in African agriculture for a number of reasons. The potential for expansion of cropland in China is slim. Due to the narrative of "empty lands" in Africa (AfDB, 2023a), China sees the continent as a source of food. This is in a context in which China is expected to feed "20% of the global population with about 5% of the Earth's water resources and 7% of its 'arable' land" (FAO, 2020). Consequently, food security has been one of the major drivers for extraterritorial investments in Africa. It is crucial for China to make use of both

domestic and international markets and resources. In addition, such land-based investments are premised on increasing China's global competitiveness in agriculture, exploiting cheaper production costs on the African continent, positioning itself as the market destination for Africa's agricultural products, developing agricultural supply chains, and diversifying and modernising African agriculture (FAO, 2020).

The above motivations have informed the Chinese government's policy position of supporting state-owned and private companies to invest in African agriculture. However, some of the proposals are increasing the continental demand for land. They also premised on exporting China's agrarian question to Africa in the hope for quick technical fixes. For example, during the China-Africa summit in September 2024, China pledged to establish "about 6,670ha of agricultural demonstration centres and provide 500 agricultural experts to create a China-Africa agricultural science and technology innovation alliance" (Motsi, 2024).

China's official plan has always been to acquire land and develop the "Common Africa Agro-Parks Programme and support the African agricultural demonstration centres in helping African villages and towns foster agricultural industries with local features in a market-oriented manner, covering the entire industrial chain of seed breeding and production, planting, processing, warehousing, and sales" (China-Africa Business Council, 2021). Demonstration centres were tried during the colonial era by the British and were hardly a success (see Alexander, 2006).

3.6.4 Construction

China's role in construction in Africa has led to a number of land-use changes through land acquisition. China's foreign policy continues to increase land-use demands in Africa and worsen the continent's land squeeze. Construction expansion is accelerating the shrinkage of land in Africa. At the centre of this has been China's Belt and Road Initiative (BRI). Since the BRI was launched in 2013, 53 of 55 AU member states have participated in different ways (de Kluiver, 2024). In 2023, African countries received a total of $21.7 billion in BRI deals (de Kluiver, 2024). This has funded infrastructure on the continent, including "electrification infrastructure (both coal and hydropower); ports; railway provision; and information and communications technology (ICT)" (de Kluiver, 2024). Chinese companies dominate the construction industry in many African countries. For example, they accounted for "31% of all construction projects in Africa with a value of $50 million or more in 2020". (Kenny, 2022).

China is determined to challenge Western hegemony in Africa and to become the leading global superpower, with key allies from the Global South (de Kluiver, 2024). However, some of the projects have been accompanied by human-rights abuses, environmental degradation, and local resistance. It seems China will continue to fund construction, but the question is where the land will come from as the continent feels the land squeeze.

3.6.5 Timber

China's growing demand for African timber increases demand for land. According to Global Wood Markets Info (GWMI) (2024), China "imported a total of up to 1.46 million cubic metres of African timber from January to June 2024, achieving a remarkable growth of 16% compared to the previous year". It is clear that China is the largest importer of tropical wood and is "the destination of more than three-quarters of Africa's timber exports" (Weng et al., 2014).

This demand raises concerns about "the environmental and socioeconomic impacts of Chinese timber supply chains in Africa" (Weng et al., 2014). Africa's deforestation is partly caused by China's increasing demand for timber, with detrimental effects on biodiversity and climate-change mitigation (Rotberg, 2019). Timber, "mostly unprocessed whole logs, is Africa's third-largest export to China, after oil and minerals" (Rotberg, 2024).

For example, "Mozambique shipped 20,000 metric tonnes of the internationally protected timber to China in 2023 alone, despite a long-standing ban on exporting logs. In doing so, Mozambique overtook Madagascar, Nigeria, and Senegal as China's major rosewood source' (ADF, 2024). The Mozambique government is trying to implement projects to protect the region's tropical forests, with little success and devastating consequences on biodiversity and people's livelihoods (Rotberg, 2019).

The many types of Chinese actors active in the timber industry include concession logging companies and timber-trading companies. The size of logging concessions vary from as little as 5,000ha to as high as 1 million hectares. Unfortunately, most of the trees that China imports from Africa come from "the shrinking forests of Cameroon, Gabon, the Republic of the Congo, CAR, the DRC, Mozambique, Namibia, and Zambia, with Kenya, Tanzania, and Uganda supplying lesser amounts. Until very recently, the cutting down of towering African trees and their shipment to Guangdong, Zhejiang, Shanghai, and Jiangsu – where China's main timber processing plants flourish – was almost entirely a 'Wild West' free for all" (Rotberg, 2019). The use of wood or mass timber can increase carbon emissions.

3.7 Multinational corporations (mining, food, and energy)

Multinational corporations (MNCs) are companies that own operational facilities and other assets in their home country and other countries around the world (CFI, 2022; Oyier, 2017). They maintain a central office in one country, which co-ordinates the management of the rest of its other offices, for example, administrative branches or factories (CFI, 2022). The growth of MNCs can be ascribed to globalisation, which has promoted a shift from disparate national economies to one global economy, characterised by larger firms that grow and control major sectors of the global economy (Oyier, 2017).

There are different types of MNCs: centralised, regional, and multinational MNCs (CFI, 2022). Centralised MNCs have an executive head office in their home country and build several manufacturing plants and production facilities in other countries. The executive headquarters directly manages the offices and facilities in other countries. An example is Kentucky Fried Chicken (KFC), which has at least 750 KFCs in sub-Saharan Africa, under the chain's parent company, Yum Brands (Parks and Jones, 2014). It has promoted the intensive production of soya, a high-protein crop, in Mozambique and Zambia, which is turned into chicken feed (Parks and Jones, 2014).

Other MNCs in the agricultural space include: Cargill, John Deere, Archer-Daniels-Midland Company, and Bayer. Examples in the mining sector include: Anglo-American, which is headquartered in London and involved in mining mainly in South Africa, BHP Billiton, Rio Tinto, Anglo American, and Xstrata. Other examples include US video-streaming company Netflix, technology bigwig Apple and British multinational oil and gas company Shell, which are among the top global MNCs profiting from Kenya's voluntary carbon market (Musau, 2024). Other leading companies in the carbon-credit markets include Aramco, Nespresso, and Air France.

Regional MNCs have their head office in one country and manage a set of offices located in other countries. Contrary to centralised MNCs, the regionalised version comprises subsidiaries and affiliates that all report to the regional head office, which reports to the central head office (CFI, 2022). An example is Tongaat Hulett, an agriculture and agri-processing business, concentrating on complementary feedstocks of sugarcane and maize. It operates in South Africa, Mozambique, Zimbabwe, Namibia, Botswana, and Eswatini. Other regional MNCs involved in Africa include Tiger Brands, Pioneer Foods Group, Cévital, Astral Foods, Flour Mills Nigeria, Illovo Sugar, Anglovaal Industries, and Rainbow Chicken. For multinational MNCs, a parent corporation operates in the home country and establishes subsidiaries in different countries. The difference from the two models above is that the subsidiaries and affiliates are generally allowed more independence in their operations.

A broad range of theories and motivations has attempted to elucidate the existence of MNCs in Africa. From a theoretical perspective, the "macroeconomic" theoretical perspectives attempt to justify MNCs from an international economics and trade angle, whereas the "microeconomic approaches" focus on the theories of company and industrial organisation (Oyier, 2017).

The first theory, which focuses on foreign direct investment by multinational corporations as global capital flows, argues that corporations operate in countries in which the return on investment is higher. This theory appreciates that export may not be the best choice due to trade barriers, perishability, or a requirement to manufacture a product fitted to the local market (Oyier, 2017). However, this has often been recognised as one of the causes of underdevelopment and dependency in Africa (Dass and Jamal, 2018).

Theory two, the location theory, rationalises how MNCs emerge. This theory focuses on cost-efficiency, arguing that production occurs where production-factor costs (raw materials, labour, and capital) are significantly lower (Oyier, 2017). The argument is that MNCs prefer tighter control over management, product quality and patented processes, thereby setting up local plants or companies (Ibid). Wegenast and Beck (2020) assert that, because of this, mining areas in Africa have often been faced with weak regulatory ability, corruption, poor administration, and unresponsive local governments, which has resulted in food insecurity among rural communities.

Theory three, the comparative-advantage theory, contends that MNCs spearhead the enhancement of production and exports if they are transferred as a bundle of capital, technology, and managerial skills from a comparatively disadvantaged industry located in the investing country, to one with comparative advantage in the recipient country, thus enhancing the host country's productivity and comparative advantage. Here, the corporations pursue to invest in and secure the production and import of products that the recipient country does not have or produces more expensively.

Motivations include those expanded on below(CFI, 2022). The first motivation is proximity to international and/or untapped markets, because it is favourable to establish business in countries in which the corporations' target consumer market is located. This helps them to reduce transport and marketing costs and gives MNCs access to consumer intelligence, feedback, and information, as well as increased visibility (CFI, 2022). Another motivation, linked to the second theory above is access to a bigger talent pool. MNCs also increase their ability to recruit good talent from Africa, allowing them to acquire good technical knowledge and innovative thinking for their product or service development.

The third motivation is "crony capitalism", in which MNCs from several sectors, such as finance, extractives, furniture, and garment manufacturers, among others, take advantage of their power and influence to effect regulatory changes, as well as national and international policies that ensure continued profitability (Oxfam, 2017, p.4). For example, in Nigeria, due to a massive 10-year tax break approved by the government to some of the world's largest oil and gas companies, such as Total, Shell, and ENI, the country lost about $3.3 billion in tax revenue, which would have been important to pay for development in various sectors. (Action Aid, 2016). Crony capitalism advantages the wealthy, mostly individuals owning and running these MNCs, at the expense of locals and poverty reduction (Oxfam, 2017). Usually small to medium businesses fight to compete and locals end up paying much more for goods and services, competing with MNCs' monopoly power and those people in close proximity to the government (Oxfam, 2017). Another motivation has been described as dodging tariffs (CFI, 2022). When MNCs produce or manufacture products in another country in which they also market their products, they are exempt from quotas and tariffs (Ibid).

Critics explain MNCs' existence in Africa as a type of neocolonialism (Oyier, 2017). Through exploiting natural resources, most corporations have persistently maintained the economic plunder of predecessor colonialist companies, whose interests they largely represent. Colonial companies extracted natural resources and imposed new forms of nationalised political authority over land and natural resources that had previously been controlled by local institutions and people.

Extractivist MNC operations in Africa contribute towards different forms of pollution (air and water) and deforestation. An example is Shell's reported 6.4 million litres of oil spilling into the Niger Delta over a period of more than 30 years. MNCs' economic power influences their dominant presence in the world economy and politics. Furthermore, big MNCs have huge budgets and economic power, influence policies of traditional nation-states, and are able to undermine their political sovereignty (Oyier, 2017). Oxfam (2017, p.3) reports that "the world's 10 biggest corporations together have revenue greater than that of the poorest 180 countries combined". Furthermore, since 2015, the wealthiest individuals occupy 1% of the world's population (Oxfam, 2017). The world's richest people, who are mainly from industrialised countries, largely the US (IPS, 2019), control a large volume of the world's trade through MNCs (Oyier, 2017).

3.8 United States

Various US companies, non-governmental organisations (NGOs), and individuals are involved in influencing land use and land-use changes in Africa. Depending on their involvement, either as large-scale land investors, in resource extraction, or as development-assistance agencies, their presence has diverse political-economy implications.

3.8.1 Agriculture

The US is involved in Africa's agriculture through government agencies, NGOs, and corporations. Its involvement is mainly through financing land-related projects and large-scale land investments. These projects cover various themes, such as climate-change adaptation, agricultural development, and sustainable land management. These interventions have significantly influenced land-use and land-cover changes on the continent.

Until recently, development agencies such as USAID have provided support to African coun-

tries, mainly through the Feed the Future (FTF) initiative. The projects were implemented in Madagascar, Uganda, Ethiopia, Ghana, Kenya, Liberia. Mali, Malawi, Mozambique, Rwanda, Senegal, Tanzania, and Zambia (FPA), 2010). This assistance focused on agricultural productivity, strengthening value chains, enhancing land tenure, and promoting climate-resilient farming practices.

Drawing on the FTF case in Guatemala, Seay-Fleming (2023) argue that the initiative has a tendency of engaging in activities that valorise traditional crops, smallholder production, and agro-ecological practices. Food-studies scholars have characterised the USAID's FTF as market-based and as a neoliberal food security initiative that conforms to the "new green revolution" (Holt-Giménez and Altieri, 2013; Nally, 2016). Since Donald Trump's return to the US presidency in January 2025, he has reviewed the US foreign-development-assistance policy. He has alleged corruption by USAID and his executive orders have caused many USAID activities across Africa to being be negatively affected.

The US has also acquired land on a large scale in Africa through university endowment funds. Harvard and other large US universities have been associated with British hedge funds and European financial speculators in the purchase or lease of large tracts of land in Africa, seeing thousands of people being disposed of their land (Vidal and Provost, 2011). Investments include a $700 million project in Katumba and Mishamo in Tanzania and a 49-year lease of 400,000ha of land in Central Equatoria, South Sudan to exploit resources such as oil and timber (Vidal and Provost, 2011).

US corporations, mostly those involved in commodity trading and agricultural technology, also have interests in African land for large-scale farming operations. They have acquired land in the form of greenfield investments or partnerships with local companies. These corporations' investments have focused on grains and oilseeds, sugar and confectionery, and the food and beverage sectors. Some of the large US corporations involved in agriculture in the continent include Archer Daniels Midland, a food processing and commodities trading corporation; Bayer Crop Science, which offers a variety of products and services, such as crop protection, seeds, and digital solutions; Cargill, involved in grain and oilseed trading, processing, and sourcing; and Louis Dreyfus, involved in trading, distributing, and processing maize, wheat, oilseeds, and rice.

3.8.2 Mining

In an era of increasing global economic competition and geopolitical tensions, Africa has become a strategic area for investment, particularly in critical minerals. The US, recognising China's dominance in Africa's mineral sector, has been countering the former's influence by establishing new investments, partnerships, and policy initiatives (Mining Indaba, 2025). The US has cooperated with allies such as the EU, Canada, Japan, and Australia to create secure and diversified supply chains for critical minerals, reducing reliance on China.

However, in its escalating trade war with China, the US has revealed its deep reliance on China for essential minerals for its technological prowess, clean-energy transition, and national security. With China's latest restrictions on some of its rare earths, including dysprosium and terbium, it has put itself in a position of almost-100% global control of rare-earth refining and has a monopoly on heavy rare-earth processing (Zhang, 2025). These steps have seen the US focusing on diversifying its supply chains and minimising its reliance on China and Russia for

critical minerals. The country has increased its presence in Africa's mining sector through the US Development Finance Corporation's (DFC) financing of its mining projects. Since 2022, the US has supported mining projects in Zambia and the DRC (Stark, 2025; Mining Indaba, 2025).

The US-China rivalry over Africa's mining sector is anticipated to increase in the coming years. Although China has the advantage of existing infrastructure and long-term agreements, the US is focused on providing alternative investment models emphasising transparency, environmental standards, and fair labour practices (Mining Indaba, 2025).

One of the main differences between the US and China's strategies to critical-mineral investment in Africa is their governments' role. China's investment in the continent is largely state-driven, with Chinese state-owned enterprises benefiting from favourable financing terms from Chinese banks and political support from the Chinese government (Tucker, 2025). This allows them to secure long-term access to African resources. In contrast, the US strategy is largely market-driven, with private companies leading in investments. The DFC provides smaller-scale grants and loans, with the largest loan in 2024 just more than $500 million in comparison to a roughly $2 billion Chinese loan to MMG Limited (formerly known as Minerals and Metals Group), a subsidiary of one of the largest Chinese mining state-owned enterprises, China Minmetals Corporation the previous year (Tucker, 2025).

To strengthen its efforts, the US has invested in initiatives such as the Lobito Corridor Project, a network that expands the rail line, roads, communication technologies, and energy infrastructure connecting the mineral-rich areas of the DRC and Zambia to the Atlantic Ocean port of Lobito in Angola, to facilitate mineral exports through improving transport networks (Kamwengo, 2025; Mining Indaba, 2025; Zhang, 2025).

The Lobito Corridor Project goals align with the Trump administration's interest in purposely directing US foreign-development assistance to secure critical minerals (Kamwengo, 2025). However, it is not yet clear to what extent his administration will proceed with pledged commitments to the corridor's construction, given the speculation suggesting that cuts to US funding will delay its construction schedule (Kamwengo, 2025). The current administration's "America First" approach, trade policies, disengagement from multilateral agreements, and its stance on China, trade, and investment has indirect but significant consequences for Africa's mining industry (Mining Indaba, 2025). This has rekindled debates on risks surrounding reliance on investments from Western countries (Ibid).

3.8.3 Carbon markets

There is an increase in the global carbon market, with companies aiming to reduce emissions and achieve "net-zero" targets (Rugo, 2023; Arko, 2024). This has created a surge in demand for carbon credits, including those generated from African projects. These projects have sparked a new trend of land rights disputes in Africa, compounding the already complicated land ownership and use issues (Arko, 2024). US companies are the dominant buyers of carbon credits in Africa.

Of 279 large-scale carbon projects identified in 2016, half of them in China, India, Brazil, and Colombia, Africa hosted the largest expanse, covering at least 5.2 million hectares (Hanbury, 2024). The largest African carbon project is located in Niger's semi-arid Sahel region, covering 2.2 million hectares (Hanbury, 2024). This project also gave underground water rights to Nasdaq-listed African Agriculture Holdings (Ibid).

The main actors buying carbon credits in Africa to offset their emissions include Microsoft, Meta, Amazon, Rabobank, Total Energies, and BP. The financial returns are high, with the Verra and Gold Standard carbon registries expected to generate almost $25 billion worth of carbon credits during the project's lifetime (Hanbury, 2024).

Carbon markets allow corporations and individuals to buy carbon credits, which is different from compliance markets. Compliance markets feature legally binding emissions-reduction obligations, usually under cap-and-trade structures, such as those in the EU and California (Rugo, 2023). Although voluntary carbon markets are still relatively new, they have considerably grown. Their total value in 2022 exceeded $2 billion, a fourfold increase from 2020, with African credits expanding on average 36% over the past five years (Rugo, 2023).

However, this swift growth, combined with a lack of underlying structure, has resulted in many issues, including concerns about the standard and validity of many carbon credits sold, casting doubt on the credits' real contributions to climate-change mitigation (Rugo, 2023). Critics have argued that "it is just a transfer of pollution. It's not actually doing away with emissions." (Hanbury, 2024). Some carbon credits have hindered Africa's development. They have unveiled complex webs of injustice, power imbalances, and fights over land rights. They have been accused of prolonging colonial-era land grabs, dispossessing of local communities, and strengthening neoliberal agendas favouring foreign interests over the needs of Africa (Rugo, 2023; Arko, 2024).

The current system of carbon markets and offset projects entails the enclosure of large tracts of land, such as forests and ecosystems, perpetuating a legacy of land expropriation (Arko, 2024). Land dispossessions from ancestral lands and livelihoods disrupt local communities' subsistence farming, pastoralism, and cultural practices. For example, families were kicked off their land in the DRC to make way for a carbon offset project for Total Energies (Arko, 2024). In Kenya, the government's eviction of the Ogiek community from the Mau Forest for a climate action and forest protection project has led communities to seek legal action, challenging the government's claims of state ownership of carbon (Ibid).

3.9 The Group of Seven

The G7 comprises Canada, France, Germany, Japan, Italy, the United Kingdom (UK), and the US. The G7's primary purpose is to intervene in the world's financial and economic control. The G7 was established in 1975 to respond to the 1970s oil crisis and the exchange-rate changes emanating from the US's shift from the gold standard (Kubayi, 2022). To date, this forum has made decisions that have had a lasting impact on many African countries, some of which were, at the time of its formation, newly independent. Others were affected by war, with little to no industry, and economically marginalised, despite being endowed with abundant natural resources (Kubayi, 2022). The G7 countries' total gross domestic product (GDP) constitutes 45% of the global economy (UJ, 2021). They are among the leading 10 world exporters, leading 10 UN donors, and the top 15 of the countries with the most per capita income (UJ, 2021).

Critics contend that the first three industrial revolutions linked to colonisation facilitated the G7 countries' advancement – technologically, socially, and economically – at the expense of Africa's land and natural resources. This has resulted in African countries becoming net receivers of aid from the G7 over the years, a situation the former want to move away from

(UJ, 2021). Although African countries seek to become self-reliant sources of solutions and to their challenges, such as poverty, inequality, and underdevelopment, exclusion from global value chains, as well as pandemics and climate change, among other issues, mean they find themselves confronted with structural global inequality.

The current (fourth) industrial revolution, characterised by technological developments, arrives at a time when the effects of climate change require that alternative paths for economic progress be found. Consequently, climate change has ceased to be a mere buzzword, seeing a shift towards alternative means to avert, reverse, and alleviate the climate crisis and how such efforts can be funded (Kubayi, 2022).

Germany and France exemplify distinct modes of external engagement in Africa's natural resources and environmental governance. Germany has positioned itself as a main actor in global carbon markets since the beginning of the Clean Development Mechanism. The latter has been criticised for having a contentious history in the Kyoto Protocol's 2008-2012 First Commitment Period, with many of the credits granted argued to have no real benefit for climate (Millock, 2013). Germany actively supports carbon-market development across Africa, through initiatives such as Supporting Preparedness for Article 6 Co-operation (SPAR6C), a five-year programme financed by the German state to assist Zambia's preparations for carbon transactions, as well as the Eastern Africa Alliance on Carbon Markets and Climate Finance, a project that supports member countries, including Ethiopia, Burundi, Rwanda, Kenya, Uganda, Tanzania, and Sudan in their participation and readiness for the new generation of market mechanisms under Article 6 of the Paris Agreement (Republic of Zambia, 2024; Eastern Africa Alliance on Carbon Markets and Climate Finance, 2019).

In contrast, France's presence in Africa is more closely tied to strategic mineral extraction. In Gabon alone, 81 French companies are active, with the most strategic being Eramet. The latter is a mining giant, which stands out for its role in extracting and exporting manganese – one of the 23 critical raw materials identified by the EU (Bezat, 2023). However, France's mining interests face a bleak outlook as its influence wanes in the face of shifting African political and security dynamics across its former African spheres of influence (MRA, 2023).

With Africa at a disadvantage industrially and in terms of infrastructure, a just transition to sustainable energy is a challenge for the continent. Still, the G7 has brought about genuine, if somewhat weak, development collaborations that can assist Africa in shifting from aid politics and relations to more contemporary and innovative relations for the fourth industrial revolution. Even with the hosting of the first Italy-Africa Summit and the G7 Summit in Apulia in 2024, at which food and energy security, migration, climate change, and connectivity took centre-stage, considering the ongoing Russia-Ukraine war-induced energy crisis, the Italy-Africa partnerships established at these two Summits have not been very convincing (Bhattacharya and Brar, 2024).

3.10 The European Union

EU member states have increasingly become active actors in global agricultural land investments worldwide, particularly in Africa (Antonelli et al., 2015). This growing interest has caused the EU to incorporate specific references to land governance and social and environmental sustainability into its policies and directives. One example is the EU Policy Framework (2011, cited in Aggestam et al. 2017). Furthermore, the renewable energy directive, EU Directive 2009/28/EC, asserts that bilateral and multilateral deals for biofuel production must

conform to social and environmental sustainability standards. These measures reflect the EU's attempt to align its land-related investments with broader commitments to responsible and sustainable development.

Understanding the EU's role in the contemporary trend of transnational land deals is vital to advise policymakers and institutional actors, at EU and member-state level, on planning effective policies to improve environmental sustainability of the land transaction and to encourage progress in the target African countries (Antonelli et al., 2015). Although the EU's role as both financier and as a beneficiary of Africa's agricultural land investment is still to receive further research focus, Borras et al. (2020) and Von Witzke and Noleppa's (2010) note on the issue, provide some insights.

For the EU, motivations differ at each stage of involvement by different actors. Drawing from various existing literatures, Borras et al. (2020) summarised five broad institutional domains within the EU context that enable, accelerate, smoothen, or validate EU-based companies and their involvement in land-use and land-cover change in Africa. Their study emphasises the need to appreciate these five domains both in sum and in an interrelated way.

The first of the five domains are private corporations engaged in land agreements through standard official platforms in the EU (Van der Ploeg, et al., 2015) and outside the EU (Locher and Sulle, 2014), usually in the form of a multinational or transnational corporation. Land can be acquired by the local company or by the EU-based company through buying, renting, or being granted a concession from locals, private property-owners, or the government of the recipient country. One example is Société Financière des Caoutchoucs (SOCFIN), an agro-industrial alliance focused on oil-palm and rubber plantations, founded in Luxembourg with operational companies in Luxembourg, Belgium, and Switzerland, as well as a number of sub-Saharan and southeast Asian countries (SOCFIN, 2016, cited in Borras et al., 2020). In 2014, SOCFIN managed 181,000ha of plantations in Africa and southeast Asia.

The second domain is financial capital companies that are actively involved in land-based foreign investments. These include banks, brokerage firms, insurance companies, financial services, hedge funds, pension funds, investment companies, and venture-capital funds.

The third domain is public-private alliances that concentrate on investment in foreign assets, particularly in agricultural land. One such example is Agrivision Zambia, a Zambian-based commercial farming company owned by the Mauritius-based investment-company Agrivision Africa. In 2009, Agrivision Africa signed an investment promotion and protection agreement with the government of Zambia, which granted it tax incentives. By 2018, Agrivision had purchased about seven farms in Zambia, totalling about 19,219ha. This investment not only reflects the growing trend of global capital flows into African agriculture, but also raises critical questions about land governance, transparency, and sustainability – issues at the core of the EU Policy Framework for Development (2011).

The fourth domain is development finance institutions (DFIs) that aid land-use and land-cover changes. These institutions fund land contracts and investment developments. DFIs are specialised development banks, owned largely by states, which contribute towards the implementation of countries' foreign-development and co-operation policies. Very limited information on DFIs' activities is available to parliaments or the wider public. DFIs use their own funds and may obtain supplementary funds from national or international development capital, private funds, or government guarantees, ensuring their creditworthiness.

The fifth domain is companies taking advantage of EU policies to gain control of land via the supply chain, involving the large-scale movement and control of agricultural commodities – from land acquisition in Africa to final consumption in the EU – driven by EU demand, policies, and corporate actors. (Franco et al., 2010). This category is backed by Borras et al.'s (2020, p. 618) argument that the EU should not be interpreted only as a "home state", where land-seizing actors are based. It should also be appreciated in respect to the way in which it promotes land use and land cover in Africa through its domestic policies and global agreements, as well as through its position to influence non-state actors' conduct through these processes.

Examples include various investment policies; development policies; bioenergy policies; the EU RED, as mentioned above; and trade policies. These have generally benefited the EU more than African communities. Investment policies have often been imbalanced and single-sided, with only investors being able to raise treaty protections and issue rights against governments. This has resulted in the increased marginalisation of the land rights of local landowners and users in rural areas of host countries (Action Aid, 2016; Vermeulen and Cotula, 2010), including limited participation in processes that influence their livelihood trajectories (Robertson and Pinstrup-Andersen, 2010; Vermeulen and Cotula, 2010).

Furthermore, the EU development policies have of late progressively moved towards a private sector-led approach, which has resulted in the commodification of land, food, and seed markets, as well as the advancement of the agro-industry. The emphasis on private-sector engagement within EU development co-operation has also been critiqued in the context of the New Alliance for Food Security and Nutrition (Borras et al., 2020).

Although it is difficult to approximate the full degree of EU's involvement in land-use and land-cover change in Africa, due to limited access to data on land transitions, estimations provided by Land Matrix remain useful for analysis, despite its limitations (Borras et al., 2020). Land Matrix reported that, by 2019, EU-based corporations had been engaged in 909 land transactions worldwide (about 29 million hectares of land). About 66% of these deals (616) were for land in Africa, Asia, and Latin America (23 million hectares). The lands are grouped for a broad set of purposes, including agriculture, livestock, forestry for carbon sequestration, biofuel production, and conservation projects (Borras et al., 2020).

3.11 International Financial Institutions

International financial institutions (IFIs) involved in Africa's land-use and land-cover change are financial institutions that have been established by one country or more to provide financial support and professional advice for economic and social development activities in another country, usually developing countries (Andoh, 2017; Bhargava, 2006). IFI owners or shareholders are usually governments, although additional international institutions and other organisations sometimes participate as shareholders. The dominant IFIs were established by multiple countries with some bilateral financial institutions (created by two countries) also being categorised as IFIs (Nhlapo, 2020). IFIs realise their goals in Africa through providing loans, credits, and grants to countries. Such funding is generally linked to particular projects that focus on economic and socially sustainable development (Andoh, 2017).

Global IFIs operating on the continent include the World Bank, the International Monetary Fund (IMF), the AfDB, and the Islamic Development Bank. There are also various "subregional" multilateral development banks (MDBs), which give loans to their members (borrowing

countries), with the IFI borrowing from the international capital markets (Andoh, 2017). In Africa, examples of MDBs are the East African Development Bank and the West African Development Bank(Andoh, 2017). In addition to the above, there are also numerous multilateral financial institutions (MFIs) involved. MFIs are similar to MDBs, but have fewer members and often focus on financing specific projects. Examples of MFIs in Africa include the International Fund for Agricultural Development, the OPEC Fund for International Development, and the Arab Bank for Economic Development in Africa .

In Zimbabwe, the World Bank-IMF structural-adjustment programme implemented in 1991 resulted in farmers being hurt by high interest rates and the elimination of subsidies on agricultural inputs, causing a drastic reduction of acreage under cultivation (Ismi, 2004). In Ghana and Cote d'Ivoire, structural-adjustment programmes resulted in widespread child slavery in those countries' large cocoa plantations. The use of child labour increased for land clearance for cocoa-tree planting, weeding, and harvesting crops (Ismi, 2004).

IFIs' presence in Africa has often raised concerns about the continual reliance of African countries on these institutions, situated within the framework of dependency theory. This is considering the structural inequalities perpetuated by IFIs and how this dependency negatively affects Africa's sustainable development (Yongo, 2024). A major influence has been through conditions attached to IFI loans and structural-adjustment programmes, as well as the subsequent socioeconomic impacts on small-scale farmers and land users.

Although most of this dependency is a derivative of economic policies introduced by IFIs, the political and social dynamics that restrain agency and autonomy among African states also contribute to land-use and land-cover change that do not fully benefit them. IFIs' involvement in Africa has often lacked the critical appreciation and comprehension of the dynamics of African economies and rural societies. This calls for a need for policies that prioritise self-reliance and investment in local capacities, as well as the implementation of inclusive economic policies that empower marginalised communities.

3.12 Conclusion

Understanding the main actors involved in Africa's land-use and land-cover changes is important because it reveals the part governments are playing in Africa's land rush (Borras et al., 2020). This exposes the governments' contradictory role in facilitating land transactions (capital accumulation) while attempting to sustain a degree of political legitimacy (Borras et al., 2020; Harvey, 2005; Fox, 1993; O'Connor, 1973, cited in Borras et al., 2020). Therefore, the state is both contributing towards and an arbitrator of Africa's land-use and land-cover change. In that regard, the question of governing Africa's land-use changes is intrinsically loaded with contradictions (Borras et al., 2020). We now look at the impact of these interventions and discuss some broad alternative thinking.

A man ploughs a field for subsistence farming in Asmara, Eritrea. *(Photo: Unsplash)*

CHAPTER 4

Impact and alternatives

This chapter analyses the impact of land-use changes and increasing land demand on climate change, food security, livelihoods, and biodiversity. Furthermore, it discusses some alternatives.

4.1 Conversion of forest to agricultural land

The scale of deforestation on the continent has increased, weakening the capacity of Africa's ecosystem to resist climate change and sustain affordable food systems. Continuing forest loss has resulted in severe and extensive negative impacts, including damage to habitats, biodiversity, and ecosystem services important for global and human health. These include the provision of nutritive food, as well as climate and water regulation (Cerutti et al., 2024). Current conversion of forestland to cropland is accelerating in the context of the introduction of market-based agricultural systems (mainly palm oil, cocoa, and cotton in West Africa; pine, eucalyptus and acacia plantations in Southern Africa; and teak plantations in East and West Africa) (Assede et al., 2023).

However, financialisation has had a much higher impact on the conversion of forestland than that associated with timber and agricultural-commodity production (Cerutti et al., 2024). Indirect drivers involve the socioeconomic, environmental, and trade settings formed by existing laws, guidelines, and standards – or lack thereof (Cerutti et al., 2024). Their connection to centralised policies and governance has led to misalignment of modern agriculture with the complex and dynamic traditional agricultural system (Assede et al., 2023). As a result, there is an increase in the decline in soil fertility, the depletion of the most vulnerable soils, and erosion (Assede et al., 2023).

Policy alternatives for the conversion of forestland in Africa are non-universal because of differences in countries, cultures, and contexts (Cerutti et al., 2024). In addition, they are numerous and intersecting (Shapiro et al., 2023). It is essential to develop context-specific approaches to address the destructive conversion of forestland in a manner that promotes sustainable development in Africa (Cerutti et al., 2024) and makes efficient use of public and private investment. For instance, low-impact causes such as subsistence agriculture and forestry, are different from industrial drivers (Shapiro et al., 2023).

One of the best ways to address this is to stop deforestation completely. However, in Africa, attempts to deal with this are met with booming population challenges. Country efforts at forest management and conservation, with balanced agricultural expansion, should be prioritised, which will require an urgent shift in far-reaching policy thinking in the context of population growth and climate change.

Policy alternatives should consider the risks associated with efficiency-fuelled agricultural expansion at the design, implementation, and monitoring levels of intensification and value-chain development interventions (Adolph et al., 2023, see AfDB 2023c). Agricultural intensification with the anticipation of increased yields on existing land is an inadequate tool in the reduction of deforestation, contrary to the proposals by AfDB. Therefore, although the issue of renewable energy is contentious in Africa, industries and other private-sector entities involved in expanding agricultural land should be incorporated into strategies to reduce the negative impacts of forest loss through the "greening" of their supply-chain of commodities (Davey, 2023). Sustainable agricultural methods can help to minimise the pressure on land use, offering better crop yields and nutrition. Other alternatives can be achieved through regulation of this expansion, the promotion of forest-protection schemes, and different policies focusing on agricultural-related human activities.

FAO (2022b) estimates that Africa will need about 120 million hectares of additional arable land by 2050. Traditionally, increased food demand in sub-Saharan Africa has usually been accompanied by the expansion of cultivated area rather than improved productivity, which is detrimental to forests and other natural resources.

There are often land-tenure conflicts with communities surrounding forest areas because of the disconnection between market-oriented agricultural and communal land access and ownership objectives in national policy. Interventions need to consider the diverse existing land users and their indigenous methods of agriculture. These will acknowledge the land-based social relations among the differentiated land users (Franco and Borras, 2021). Communities in and around the forests should be involved so they can provide their innovative local knowledge and capacity, which may bring practical, effective solutions (Cerutti et al., 2024).

Large-scale corporations should engage in lawful and sustainable forestland conversions and trade to counter irresponsible deforestation and to create value for locals, forest communities, and the countries. Some conversions of forestland involve informal extraction, collection, and commercialisation of forest products, which remains a major complexity in finding policy alternatives. There needs to be a clear monitoring, management, and development framework for planning effective policies and forest monitoring, particularly in communal forest areas where tenure rights are not clear. The absence of articulate rules on land tenure, unclear sustainability requirements in trade agreements, or the failure to promote sustainable agriculture may lead to intensified and destructive ways of exploiting forests. However, most African states have recently placed agricultural and food security investment at the top of their plans, meaning that many countries still struggle to shift from inefficient, unequal, and unsustainable land-use models.

4.2 Conversion of grasslands

Recent studies (Yahaya et al., 2024; Yan et al., 2023) project significant shifts in Africa's land-use structure, with grasslands under increasing pressure from multiple conversion processes. Results indicate that grassland loss and expansion is occurring globally in parallel, indicating the grassland-loss crisis does exist (Yan et al., 2023). There is generally some contradiction in information revealed in different levels of grassland-conversion trends, but comparable spatial patterns can be detected. Although some model-based projections demonstrate localised grassland improvements, these improvements usually highlight the recategorisation of previously barren or degraded land, suggesting a broader trend of ecological stress and conversion instead of recovery. Grassland conversion has far-reaching ecological consequences. It causes water-access problems for livestock and wildlife, reduces lean-season grazing, fragments wildlife habitats, and obstructs migration routes (FAO, 2005). It converts

the ecosystem into a net carbon emitter, particularly when management practices are insufficient to retain the sequestered carbon in the soil (for example, through excessive soil tillage and inadequate nutrient management). The conversion of grassland negatively influences the habitat loss of local species and causes diminished flood mitigation. Therefore, grassland degradation and conversion not only result in the decline of the ecological environment, but also causes grassland animal husbandry to become more exposed and unbalanced (Yan et al., 2023; Bengtsson et al., 2019).

Across Africa, reports have been made of small increases in grassland area, simultaneously occurring with processes of regionally variable grassland degradation and conversion dynamics, emphasising how visible grassland area increases can mask a continuing loss of ecological system (Muraina et al., 2023). Even in areas where new grasslands appear, these are often degraded or result from deforestation or neglect rather than genuine ecological restoration. Therefore addressing grassland conversion requires coordinated scientific, legal, and policy responses, alongside participatory governance approaches that involve pastoral communities, researchers, and local authorities. This approach involving different interest groups helps to provide guidelines for scientific definitions and complete information on the nature of grassland degradation and conversion necessary to limit global degradation and conversion trends (Bardgett et al., 2021). These groups could develop a systematised technique to control conversions and promote sustainable grasslands expansion, and therefore formulate long-term policies necessary in the discourse for land-use in Africa (Yan et al., 2023; Castaño-Sánchez et al., 2021). A crucial policy priority should be to plan for long-term control of grassland degradation and conversion hotspots.

Carbutt and Kirkman (2022) call for a biodiversity and restoration approach, which includes revegetation with grasses, plugs, sods, forbs, or seeding to improve on grasslands areas. Carbutt and Kirkman (2022) also promote "standard policy remediation" for renewal, and emphasise the need for controlled grazing, and penalising of illegal conversions - to limit unnecessary grassland conversions to cropland, grazing, mowing (such as hay cutting), or any other use (Carbutt and Kirkman, 2022). This biodiversity approach, if implemented correctly, offers a viable way to regenerate grassland ecosystems while strengthening community resilience and ecosystems essential to African livelihoods. It has the potential to protect high-biodiversity-value grasslands and grasslands in rural communities from disturbance or unauthorised clearance. This should, however, be implemented through careful interpretation of contextual grasslands location, appreciating grasslands' historic vegetation variety. This will assist in the development of context-specific policies that prioritise grassland protection, biodiversity, sustainable pastoral systems, ecosystem management, and climate-change mitigation strategies. Such an approach provides an opportunity for relevant and timeous interventions appreciating the crucial links between land and sustainable use as key to individual, community, and cultural welfare and resilience (Carbutt and Kirkman, 2022). Furthermore, previous successes of grassland degradation and conversion management from particular improvement areas should be accessible for future use in addressing the grasslands loss.

4.3 Conversion of pastureland

Cultivation of communal grazing land leads to decline of vegetation cover and critical soil attributes. It substantially and negatively affects the soil's physical and chemical properties, as well as the diversity of trees. Various problems arise from converting pasture through land grabbing by investors and privatisation. This, together with the fragmentation of grazing land

by communal farmers and pastoralists, results in forced relocation from pastures for some land users. This has resulted in the relative overpopulation of the less fertile areas they relocate to, with resultant overgrazing and livestock starvation, leading to declining herds and malnutrition (Behnke and Kerven, 2013).

Furthermore, Behnke and Kerven (2013) assert that, for Awash Valley in Ethiopia, the government conversion programme to plantation agriculture is unlikely to have stabilised rural incomes. They suggest that, rather than accepting financial responsibility for risks characteristic in plantation agriculture, the Ethiopian state has passed the cost of these risks to either smallholder farmers who were forced to grow crops on contract or to pastoralists who were forced to offer their land to plantation farming.

Generally, converting pastures to cropland means that after a few years, when the croplands are depleted and returned to fallow, they do not revert to fertile pasture. Again, pastoralists make the best use of pastures by herding livestock between grazing lands. However, by converting pastures to cropland, the area of pastures is reduced, therefore restricting or preventing movement between grazing lands for pastoralists (FAO, 1996). This means that livestock are kept for too long in one area, leading to land degradation (FAO, 1996).

To control the loss of grazing lands and increase their use, different grazing land-management policies and approaches can be introduced. Management of wide-ranging grazing lands should be conducted within an extensive framework in a vast landscape to be effective in addressing a wide range of pastoral resources and products, accommodating the migration territories of nomadic groups and conserving wildlife and catchments (FAO, 2005). Better planning and management can be successful if pastoralists are helped to organise themselves into groups that can collaborate with one another and the authorities, as well as play a leading participatory role in the planning and management processes.

Clarification of communal grazing rights, through an appropriate legal framework that considers existing perceived rights, and allocation of security is needed before herders begin modifying existing grazing lands (FAO, 2005). Agro-silvopastoral practices; natural-vegetation restoration in grazing areas through zero grazing; use of the cut-and-carry system; otational grazing; and grazing-land enrichment through introducing improved grass seeds could be the major mechanisms, among others. Moreover, looking for off-farm income sources could be an option to reduce pressure on the grazing lands and existing cultivated lands.

4.4 Population growth

The demand for food, feed, and fibre is anticipated to increase to accommodate the growing population. Furthermore, there will be a specific growth in food demand, linked to income growth, which is argued to have resulted from the expansion in growth prospects of developing countries from about 1990, with more quick growth in emerging and developing economies compared to advanced economies (Fukase and Martin, 2020). This will create a move from dependency on the direct consumption of grains and other starch staples towards more diversified dietary regimes comprising edible oils and protein-rich animal products (Fukase and Martin, 2020).

Demand for cereals, accounting for some 50% of caloric intake for the sub-Saharan African population, is projected to nearly triple between 2010 and 2050. Compared to 2010, cereal-demand levels are projected to be higher by about 519% in Zambia, 237% in Ethiopia, and

372% in Ghana by 2050 (Adolph et al., 2023). Although much of the needed yield is being produced on less-than-expected cultivated land areas through modern agricultural technologies, additional agricultural land is still needed (Adolph et al., 2023). Moreover, modern agricultural technologies may not always align with the needs of the African agricultural system.

The increased demographic pressure has seen the significant conversion of non-agricultural lands into croplands, particularly barren lands and natural grasslands. FAO (2022b) estimates that the continent will need about 120 million hectares of additional arable land by 2050. Traditionally, increased food demand in sub-Saharan Africa has usually been accompanied by the expansion of cultivated area rather than improved productivity, which is detrimental to forests and other natural resources.

Population growth lowers the availability of forest land and fallow land and, if new markets develop, farmers are pressured to intensify agricultural production (Binswanger-Mkhize and Savastano, 2017). Studies have shown that poorer rural communities experience swift land-cover change, a higher need to shift forest cover for cultivated land, and the greater introduction of commercialised agricultural systems than other communities (Assede et al, 2023), due to their direct dependency on natural resources for their livelihoods.

Population growth in some regions of Africa is intensely affecting farming systems and economies in ways that necessitate a deeper discourse on African development issues. This is because of its connection to the following, as summarised by Jayne et al. (2014): (i) the most smallholder land-size shrinkages with time. In more highly populated areas, the burgeoning population has resulted in shrinking farm sizes, similar to east and southeast Asian levels (Headey and Jayne, 2014) (ii) unsustainable systems of agricultural intensification and continuous cultivation of fields, leading to land degradation; (iii) the commodification of land (rentals and purchase markets) and adjustments in land-allocation institutions, influencing farm structure and increasing the challenges sub-Saharan Africa is currently experiencing in achieving broad-based and inclusive forms of farm-income growth.

Africa's political influence is expanding owing to its huge reserves of the minerals required for the production of transition energy and electric vehicles. This has seen many allies, such as Russia, China, the US, Türkiye, and the Gulf petrostates all rushing to access these valuable resources (Walsh, 2023). International corporations are pursuing Africa's many new consumers emerging annually, constituting untapped markets for gadgets and organic foods. Africa's "youthquake" is pushing the continent to the centre of contemporary concerns such as climate change, migration, and the just energy transition.

Simultaneously, Africa's immense vulnerabilities are being revealed (Walsh, 2023). Although its expanding population is partly a result of economic development, frustrations of unemployment, poverty, and inequality have resulted in political violence and a huge exodus of youths to other countries in search of greener pastures, sending large remittances back home. Others, particularly from the Sahel region, join militant groups as a form of employment.

One of the chief purposes of development is to enhance people's quality of life. Therefore, populations and population composition are imperative in the discourse of economic growth through economic dividends (AfDB, 2012). Understanding demographic data affords African policymakers the ability to design informed interventions relevant for a particular population. Therefore, alternatives should consider development and implementation of appropriate land-management social sectors (education, health, and labour) and infrastructural develop-

ment strategies specific to the dynamics of the diverse African countries (Assede et al., 2023). This is facilitated by adoption and use of proper research methodologies relevant to Africa's regions and countries. Policy alternatives should consider these demographic trends and indicators and their impact on countries' resource allocation.

Africa's current and estimated demographic trends of population growth, urbanisation, and labour in turn require appropriate policy alternatives to address anticipated pressures on land, food, water, and energy resources. Policy formulation should consider the implications for migration, job demand, and the effects of climate change (AfDB, 2012). Therefore, countries should mainstream population as a cross-cutting theme in their sector policies and operations for sustainable development.

Population growth and control strategies should be included in long-term computation of on-site land information linked to prevailing land-use and land-cover changes in the context of climate change. These may involve supporting adjustment in individual reproductive behaviour, which is centred on the values of individual choice, religion, and culture (Ezzeh and Feyissa, 2019). Efforts may be made to encourage adjustments in fertility behaviour through various incentives and disincentives, as has been carried out in certain countries, although some governments have faced ethical dilemmas. Some examples of fertility adjustments include the more coercive policies such as the one child policy in China and involuntary sterilisation of mostly poor women in India (Ezzeh and Feyissa, 2019). However, most attempts aimed at (dis)incentivising fertility behaviours are more subtle. These attempts include financial disincentives and incentives to promote family planning. Some countries, such as Malawi, Kenya and Zambia, have also tried cash transfer programmes. Interventions to lower adolescent pregnancy include reducing child marriages, which are prevalent in a number of Africa countries; increasing access to contraceptives among married adolescents; and establishing policies that promote a reduction in unintended pregnancies.

4.5 Urbanisation

African urban areas are experiencing intense economic, social, spatial, and environmental changes. Economically, urbanisation has helped many people to improve their economic standards and welfare, assisting them to relocate from economically underperforming rural areas to access better opportunities, innovation, and social advancement. This has led to a rising demand for jobs, housing, and infrastructure. However, industry's failure to assimilate the expanding labour force creates high unemployment and increasing poverty in urban areas.

Despite urbanisation being contentiously associated with industrialisation in developed countries, Africa's urbanisation has not been accompanied by industrialisation (except for certain areas in South Africa and, recently, Rwanda and Kenya) to create labour.

Despite economic growth in most African countries, the gains have been unevenly distributed, with many people lacking adequate resources and provisions to meet their essential requirements, adding to safety and security concerns in most African urban areas (Dodman et al., 2017). This is reflected in fences, gates, rising prices, and private security in affluent areas (Dodman et al., 2017). With inequality, African cities have seen increased "urbanisation of violence" through political unrest in countries that encounter political instability (Dodman et al., 2017, p. 17).

Examples include youthful uprisings in 2011, during the Arab Spring in Tunisia, which in-

spired others in Egypt, Libya and, later, Nigeria, Senegal, Eswatini (Walsh, 2023), Côte d'Ivoire (2010 to 2011), Kenya (2002, 2007, 2008, and 2024), Zimbabwe (2008 and 2019), Niger (2024), Gabon, (2024), and Mozambique (2024). Xenophobia and anti-migrant sentiments have also emerged in some parts of South Africa (Dodman et al., 2017, p. 11).

The uneven provision of infrastructure and services in urban Africa is historically linked to colonial periods. Many postcolonial states have failed to adequately provide public water supplies, sanitation, and waste-disposal systems, as governments were incapable or unwilling to supply the expanding urban population (Dodman et al., 2017). In many countries, this political and socioeconomic environment is challenging, leading to inefficient urban spatial development, the spread of squatter settlements, and scarce basic amenities (Boadi et al., 2005; Spooner, 2024). Weak African urban policies, which are usually unreliable, random, and not consistently articulated (OECD/UNECA/AfDB, 2022) have worsened the situation in the face of growing inequality. However, the provision of services has improved in Kigali, Rwanda.

This rising unemployment and poverty have made Africa's urban governance increasingly complex. Changes caused by new technologies and geopolitical shifts, supplemented by new actors and funding arrangements, for example, private sector-led fiscal structures for urban construction and management, have transformed urban areas. Such arrangements have reduced the authority of local and national decision-makers to fund and control large infrastructure projects in a manner that equilibrates social and private returns.

The informal sector has grown in size, with many economic activities and service provision occurring outside official parameters. Therefore, urban growth has occurred outside the regulations of authorised spatial plans, building codes, or land and property markets, which are linked to the exclusionary colonial planning systems (Dodman et al., 2017). Increased urbanisation stimulates demand for land, leading to the consumption of arable land and green spaces and an increase in land prices. However, property owners are the biggest beneficiaries of high land prices (Spooner, 2024), highlighting class dynamics linked to increased urbanisation.

Some land under tribal authority, such as peri-urban land, is controlled by traditional leaders, who possess considerable power over natural and human resources and the focus of local development paths. Their roles have often been ambiguous and contested, in some areas of South Africa for example, with deleterious effects on urban risk management.

Substantial transformation of the natural landscape through the spatial expansion of cities in Africa has resulted in numerous ecological impacts, such as adjustments of hydrological cycles, reduced biodiversity, ecosystem degradation, reduced biodiversity, increased pressure on forests and land (Dodman et al, 2017), and a rise in land-use change as crop or natural lands are converted into expanding cities while increasing carbon emissions (Li et al., 2022). This ecological degradation creates new risks, such as landslides and flash flooding (Dodman et al, 2017).

About 60% of the sub-Saharan Africa urban population live in informal settlements, which are progressively becoming exposed to the effects of climate change. As a result, poor environmental sanitation increases their risk of infectious diseases and a decline in urban health due to high exposure to the diseases. The inhabitants usually lack secure tenure, reducing their motivation to upgrade homes and invest in amenities (Ibid). Future urban growth is predicted to result in substantial food-production and habitat loss. Socially, there has been erosion of

existing community networks and social cohesion in many places as cities house younger populations. This has given rise to huge inflows of illicit activities (Africa Centre for Stategic Studies, 2025).

Urban expansion is a double-edged sword. It promotes development, but without efficient policy responses to address particular challenges, land conversions will continue and the number of poor African urbanites will increase, weakening cities' ability to sustain themselves. This is particularly true given city populations' relative susceptibility to political, social, and economic dissatisfaction). Concerted efforts for positive urban growth in African cities whose infrastructure dates back to the colonial era, involving proper context-specific planning, as well as the spatial and infrastructural development necessary to service growing urban populations are required (Dodman et al, 2017).

City administrators have to lead in tackling urbanisation risks by providing key public infrastructure and services. This can be achieved through reducing corruption and strengthening tax and other revenue-collection capacity. Concerted efforts towards narrowing inequality by promoting skills, infrastructure, markets, a large middle class, and various enterprises to lessen informal settlements and economically excluded enclaves should be made ((Africa Centre for Stategic Studies, 2025). This includes factoring in proper urban mobility and developing public rather than private transport systems, which require fewer land resources, as well as streamlining public-transport institutions and assigning clear responsibility for efficient use of resources. Efforts should promote water, sanitation, and hygiene, as well as recycling activities to minimise the demand for landfills. Local governments need to develop or enhance current monitoring practices for the governance and law enforcement of land matters to make implementation more effective.

4.6 Green-transition minerals

At extraction sites, critical-mineral mining involves the conversion of large tracts of vegetative land for mining activities, which involve drilling and blasting, leading to substantial biodiversity loss and risks to the natural environment (Sonter et al., 2020). Deforestation of some of the oldest forest ecosystems in the world, for example in Central Africa, which are second to the Amazon rainforest in terms of size, strips the Earth of important "oxygen factories", as well as carbon sinks and storage needed to protect the planet from climate change and its effects (Boafo et al., 2024, p. 4). Land clearing exposes the soil surface to acute weather patterns, which affects habitats for human populations, wildlife, and other ecosystems (UNEP, 2000; Sonter et al., 2020).

Certain mining methods, such as open pit, open cast, and open cut; high wall; and placer mining use drilling and blasting processes, which cause physical disturbance, uncovering intact and broken rocks to air and water, and create open pits, producing a landform notably different from the natural landscape (Tiamgne et al., 2021). The pit walls and floors are latent sources of saline drainage, potentially forming pit lakes and affecting water safety.

Drilling and blasting produces huge noise, as well as air, water, and soil pollution. The dust increases respiratory risks and the large volumes of waste produced at various stages of production impact human and other environmental health at the extraction site and in nearby communities (Tiamgne et al., 2021).

Mining uses large water quantities, impacting surface and ground-water resources and disrupting the water cycle, affecting ecosystems and adjacent communities' supply for domes-

tic, irrigational, and recreational purposes (Boafo et al., 2024). The toxic chemicals (nitrogen oxide and carbon monoxide) that are products of detonations from blasting explosives in underground mining and surface mining (Zawadzka-Malota, 2015) and pollutants from heavy metals like lead, zinc, arsenic, chromium, copper, and cadmium are released into the environment with a detrimental effect on land and water quality of the adjacent farming and sensitive ecosystems (Tiamgne et al., 2021; Boafo, et al., 2024).

As extractivism increases in Africa, corruption, contamination, conflict, and violence also intensify (Mudimu et al., 2024; Boafo et al., 2024; Obodai et al., 2023; Hilson, 2002; Van Bockstael, 2019; Dietz and Engels, 2018; Bhatasara, 2013; Yankson and Gough, 2019; Stoltenborg and Boelens, 2016, cited in Mudimu et al., 2024). However, the tendency of the state to overlook inequality over access to land and natural resources intensifies sociopolitical crisis in many communities (Moyo, 2005), as well as resource poaching as marginalised people illegally mine the resources (Afriyie et al., 2016, cited in Boafo et al., 2024; Yankson and Gough, 2019; Mudimu et al., 2024).

The majority of these issues relate to increasingly hybrid forms of African customary land tenure (Chimhowu, 2019; Amin, 2010) and increased land commoditisation (Mudimu et al., 2024), with no consultation of local communities (PACJA, 2024). The conflicts have involved both state and non-state actors; large-scale corporations and artisanal miners (in Zimbabwe); and farmers (Hilson, 2002; Yankson and Gough, 2019; Obodai et al., 2023).

Allegations of corruption linking foreign-based mining companies and politically affiliated individuals in Africa (in the DRC, Namibia, and Zimbabwe) have exacerbated ongoing conflicts in the mining sector (Mudimu et al., 2024; Boafo et al., 2024). Growing exploration and extraction of critical minerals has increased mining-induced land dispossessions of communities, depriving them of their livelihoods (PACJA, 2024). Although governance structures provide for a compensation arrangement for victims of mining-induced dispossessions, the compensation and the accompanying complementary infrastructure do not align (PACJA, 2024; Boafo et al., 2024; Mudimu et al., 2024), as the development projects are characterised by tokenism (PACJA, 2024; Bhatasara, 2013) and employment opportunities for locals from the mining companies are limited (Boafo et al., 2024).

For those people employed in the mining sector, negative reports in Zimbabwe, Namibia, and the DRC (Müller et al., 2023; Global Witness, 2023, cited in Boafo et al., 2024) of human-rights abuses, child labour, and illegal employment practices described as modern-day slavery, highlighting the abuse of employees' constitutional and legal rights by the mining companies (PACJA, 2024). This results in increased agitation from locals, who anticipate development from their governments (Peters, 2013), particularly considering the fact that the critical minerals are generally extracted for use in western and eastern world regions with higher emissions and GDP than Africa (PACJA, 2024). Reports allege that some communities displaced to pave way for lithium mines in Zimbabwe and Ghana were offered relocation contracts or eviction without compensation if they accepted the offer (Surma, 2023). In Zimbabwe, the contracts were worth about $1,900 (Wolf et al., 2013; Surma, 2023).

African countries collect only about 40% of the potential revenue from the minerals (PACJA, 2024) because they do not themselves process or use critical minerals for producing low-carbon technologies, nor are they dependent on international supply chains for critical minerals (Müller et al., 2023). Currently, African demand for the minerals for the transition to a low carbon economy is low, because the continent is less industrialised and has a less-

er contribution to global carbon emissions than industrialised countries (PACJA, 2024). The considerable untapped opportunities for CRMs on the continent means African countries are key suppliers instead of consumers of critical minerals. However, with the mounting global demand, many African countries are strengthening their efforts by beginning to invest in mining activities for CRMs (Boafo et al., 2024).

Although African countries possess vast reserves of minerals, their extraction and the value chain are not adequately benefiting African countries and communities (PACJA, 2024). There is a need for transformation of colonist mining and land policies and laws by African states into progressive and inclusive systems that prioritise the countryside and the land question in the development agenda (Mudimu et al., 2024). Current customary laws regard the areas as labour bases, as they were in the colonial era.

This is centred on leadership, which influences the development of the critical-mineral sector in Africa (PACJA, 2024). The concept of Africa's governance and leadership having to intensify efforts aimed at advancing environmentally conscious, rights-based, and ecologically just extraction of minerals that allows local communities and stakeholders to benefit from the green wealth has gained traction. However, there is still no consensus for whom in these communities this justice should be achieved, and how it should be enacted, particularly for the youth who have to withstand inequality, dwindling natural resources, and climate-change impacts. They are also the ones expected to drive the energy transition.

Governments should use their comparative advantages in natural resources and knowledge of global finance to establish local-processing production to increase value-added production, high-skilled careers, and tax revenues. They should also make energy accessible to local communities. This is essential to reduce poverty and promote the sustainable development of critical minerals and the fair transition to clean energy. Through diversifying their economies and local processing, countries can gain some control in the commodity markets and reduce their vulnerability to commodity-price fluctuations, exchange-rate volatility, and foreign-currency reserve pressures (PACJA, 2024).

A focus on e-waste recycling will help to meet the mounting demand for critical minerals and control the environmental ruin and social stresses associated with mining (Davey, 2023). There is also a need to focus on other technologies and alternative energy, such as renewable energy from the sun and wind for cheaper production of a similar amount of energy.

Children collect wood for cooking in Tanzania.

(Photo: Utunzaji wa Mazingira, Unsplash)

CHAPTER 5

Conclusion

5.1 Land availability

Our report indicates that the dominant narrative about the existence and availability of unused arable lands – politically framed as empty, vacant, uninhabited, unproductive, underutilised, marginal, idle, fallow, degraded, and free lands – that can be intensively cultivated into agro-industrial production zones meant to turn Africa into a breadbasket for the world and cater for other rising demands for land is fundamentally flawed. As Searchinger et al (2024) have argued, that such "large tracts of do not exist in that sense, instead These areas portrayed as "empty" or "idle" are already socially and ecologically productive, carrying high opportunity costs. Treatment of such land as available for policy-driven demands risks dispossession, ecological harm, and the erasure of local livelihoods.

The argument that Africa needs to feed itself is noble, but it can be achieved independent of assumptions of land availability that tend to undermine the very same objective. These assumptions are largely couched in neoliberal politics and are associated with repeated failures.

First, Africa does not have vast tracts of unused arable land that can be used for industrial agriculture to address hunger and meet the rising global demand for land. Such framing overestimates the amount of cultivable land, underestimates the current cultivation of land, and does not consider other multiple land uses that are important for environmental, social, and livelihood functions for the poor.

Second, it is ahistorical to imagine that technology will provide a quick fix to Africa's hunger problems and land scarcity. Such propositions should be placed within the historical and social circumstances of repeated failures of crop-technology agricultural development in Africa.

Third, the argument that small-scale agriculture is outdated to feed Africa is largely driven by ideological persuasions. Evidence shows that Africa has an estimated 33 million smallholder farmers (Wiggins and Keats 2013, p.10), who manage 80% of the farmland and contribute up to 80% of sub-Saharan Africa's food supply (FAO, 2013, p.1).

Fourth, as Sen (1982) has argued, improving household food security for the poor involves more than just increasing crop-production metrics and improving market efficiency. Redistributive politics that enable access to nutritious food to the poor and marginalised should be at the heart of a food-security approach. After all, we are already producing enough to feed the world, but the majority of people are getting hungrier.

Fifth, the bold assertion that AfDB's Feed Africa project will create 18 million jobs turns a blind eye to history as even the more expansive industrialisation of the 19th century failed to produce the number of jobs required (Wiley, 2012) and contemporary capitalism is already failing to provide decent wages to sustain livelihoods and, therefore, creating surplus labour (Bernstein 2010). Even if there were some available land in Africa, expanding it into agricultural production would come with a cost of failure to meet any of the other rising demands for land that are leading to a raft of land-use changes.

5.2 Drivers of land-use changes in the context of scarcity

As our study has shown, there is a massive and rising demand for land, not only to cater for food production, but also for urban expansion, population growth, extraction of critical minerals, carbon markets, demand for timber, and to accommodate growing urban areas.

The argument that Africa needs to feed itself is noble, but it can be achieved independent of assumptions of land availability that tend to undermine the very same objective.

The potential land conversion by 2050 numbers in millions of hectares in African land across eight main categories, detailed below.

5.2.1 Forest land

Africa's dynamics of future land-use changes will be characterised by a substantial transfer of barren land to cropland and a huge transfer of forest land to cropland. This will have profound social and ecological consequences as it increases carbon-dioxide emissions and worsen the climate crisis. Based on the predicted analysis of land-use conversion, Yahaya et al.'s (2024) results suggest a sudden change, with declining rates of barren land use as they are converted to cropland use, largely in Africa.

During the long-term period (2081 to 2100), the conversion area of barren land to cropland and of forest to cropland is projected to be significant. According to the FAO (2022), for the period 2010 to 2020, Africa lost an average of 3.9 million hectares per year – the world's highest rate of net forest loss. South America followed with an average of 2.6 million hectares of forest loss annually. The baseline deforestation rate of ~0.8% per year and 3.9 million ha/year provides the reference point for projected declines: reducing forest cover by 15% by 2050 and 35% by 2100.

The conversions would increase carbon emissions and worsen the climate crisis.

5.2.2 Grassland

Originally constituting more than 25% of the earth's land surface, global grasslands are currently much less widespread. About 50% of temperate and 16% of tropical grasslands have disappeared through transfer to agricultural or industrial uses (NASA Harvest, 2023). Sub-Saharan Africa has experienced the most extreme conversion of grasslands (Carbutt and Kirkman, 2022). Most high-quality grassland is increasingly being transformed for agricultural expansion to increase farm profits and satisfy ever-increasing demands for food, feed, and fibre (Castaño-Sánchez et al., 2021; Carbutt and Kirkman, 2022; Yan et al., 2023) and grazing for livestock production (Little et al., 2015).

5.2.3 Grazing land

There is massive conversion of communal grazing land to cropland to increase production and feed the growing population. Most African states are prioritising the conversion of pastures to plantation cash crops for imagined better economic gains (McMillan, 2013).

5.2.4 Population

Human population in Africa is anticipated to rise from 476 million in 1980 to an estimate of 2.5 billion by 2050, where two-fifths of new births globally are projected to be African (Coromina, 2021). This will increase the need for land to feed the growing population.

5.2.5 Urbanisation

Africa's urbanisation pace is projected to follow trends of the fastest-growing world regions in the near future, making it one of the biggest land conversions in the region this century (AfDB, 2022). Sub-Saharan Africa's urban land cover is predicted to grow twelvefold between 2000 and 2025 (Dodman et al., 2017). In Africa, the annual rate of urban-area expansion has surpassed the rate of urban population growth (Li et al., 2022), mainly due to an expansive population growth instead of a compact one. It is estimated that almost 1 billion more people will reside in Africa's cities by 2050, with two-thirds residing in urban areas, intensifying pressure on land (Spooner, 2024; OECD/UNECA/AfDB, 2022). Africa's baseline urbanisation rate is about 43% as of 2022 and is expected to grow 250% by 2050.

5.2.6 Critical minerals

The extraction of critical minerals has typically converted several hectares of vegetation land for mining activities. Different minerals have used vast land in the different countries in which they are found.

5.2.7 Timber

The growing global demand for timber is increasing the demand for land.

5.2.8 Carbon markets

The adoption of policies that support carbon markets to leverage capital for green growth is increasing the demand for millions of hectares of land in Africa. If current trends of land conversions continue unabated, this could lead to an ecosystem imbalance, causing biodiversity loss and reduced carbon storage, threatening people's livelihoods in the long run. Climate change will influence climatic and socioeconomic changes that may affect the future use of agricultural land.

5.3 Impact of land-use changes

Policies that promote an increase in the demand for land can undermine the land's environmental and social functions and local livelihoods and food systems.

5.3.1 Forest land

The scale of deforestation in Africa weakens the capacity of Africa's ecosystem to resist climate change and sustain affordable food systems. Continuing forest loss has resulted in se-

vere and extensive negative impacts, including damage to habitats, biodiversity, and ecosystem services important for global and human health, including the provision of nutritive food, as well as climate and water regulation (Cerutti et al., 2024).

5.3.2 Grassland

Grassland conversion to croplands has led to water-access problems for livestock and wildlife, the loss of lean-season grazing, the fragmentation of wildlife habitat, and the obstruction of migration routes (FAO, 2005). It converts the ecosystem into a net carbon emitter, particularly when management practices are insufficient to retain the sequestered carbon in the soil. Grassland degradation and conversion not only results in the decline of the ecological environment, but also affects livestock (Yan et al., 2023; Bengtsson et al., 2019).

5.3.3 Population

The demand for food, feed, and fibre is anticipated to increase to accommodate the increasing population and growing middle class. This influences a move from dependency on direct consumption of grains and other starch staples, towards more diversified dietary regimes, comprising edible oils and protein-rich animal products (Fukase and Martin, 2020). Demand for cereals, accounting for some 50% of caloric intake for the sub-Saharan African population, is projected to nearly triple between 2010 and 2050.

In more highly populated areas, the burgeoning population has resulted in farm sizes shrinking, similar to east and southeast Asian levels (Headey and Jayne, 2014); unsustainable systems of agricultural intensification and continuous cultivation of fields, leading to land degradation; the commodification of land (rentals and purchase markets) and adjustments in land-allocation institutions, influencing farm structure increasing and the challenges sub-Saharan Africa is currently experiencing in achieving broad-based and inclusive forms of farm income growth. The increased demographic pressure has seen significant conversion of non-agricultural lands into croplands, particularly barren lands and natural grasslands. FAO (2022b) estimates that the continent will need about 120 million hectares of additional arable land by 2050.

5.3.4 Urbanisation

Increased urbanisation stimulates demand for land, leading to the consumption of arable land and green spaces and an increase in land prices. However, property owners are the biggest beneficiaries of high land prices (Spooner, 2024), highlighting class dynamics linked to increased urbanisation. Some customary land used by smallholder farmers is being converted into new urban landscapes. Substantial transformation of the natural landscape, through spatial expansion of cities in Africa, has resulted in numerous ecological impacts, such as adjustments of hydrological cycles, reduced biodiversity, ecosystem degradation, reduced biodiversity, increased pressure on forests and land (Dodman et al, 2017), and a rise in land-use change as crop or natural lands are converted into expanding cities while increasing carbon emissions (Li et al., 2022). This ecological degradation creates new risks, such as landslides and flash flooding (Dodman et al, 2017).

About 60% of sub-Saharan Africa's urban population live in informal settlements, which are pro-

gressively becoming exposed to the impacts of climate change. As a result, poor environmental sanitation increases their risk of infectious diseases and a decline of urban health due to their high exposure to these diseases. The inhabitants usually lack secure tenure, reducing their motivation to upgrade homes and invest in amenities. Future urban growth is predicted to result in substantial food-production and habitat loss. Socially, there has been erosion of existing community networks and social cohesion in many places, as cities house younger populations and have experienced huge inflows of illicit activities ((Africa Centre for Stategic Studies, 2025).

5.3.5 Critical minerals

At extraction sites, critical-mineral mining involves the conversion of large tracts of vegetative land for mining activities, which involve drilling and blasting, leading to substantial biodiversity loss and risks to the natural environment (Sonter et al., 2020). Deforestation of some of the oldest forest ecosystems in the world, for example in central Africa, which are second to the Amazon rainforest in terms of size, strips the Earth of important "oxygen factories", as well as carbon sinks and storage needed to protect the planet from climate change and its effects (Boafo et al., 2024, p. 4).

Growing exploration and extraction of critical minerals has increased mining-induced land dispossessions of communities, depriving them of their livelihoods (PACJA, 2024). Although governance structures prompt for a compensation arrangement for victims of mining-induced dispossessions, the compensation and the accompanying complementary infrastructure do not align (PACJA, 2024; Boafo et al., 2024; Mudimu et al., 2024), as the development projects are characterised by tokenism (PACJA, 2024; Bhatasara, 2013) and employment opportunities for locals from the mining companies are limited (Boafo et al., 2024). African countries collect only about 40% of the potential revenue from the minerals (PACJA, 2024).

5.3.6 Carbon markets

Planting new forests for carbon offsets requires a land-use change from existing activities. Land-use change is one of the major causes of biodiversity loss. This land-based approach to climate mitigation makes unrealistic demands for land in a context in which there is already a land squeeze. Forest plantations have led to the displacement of local land uses and users. Land has multiple functions and its narrow conversion can result in conflicts, food insecurity, poverty, and climate injustice, plunging the indigenous communities into poverty. In addition, the Global North uses carbon offsets to compensate for its lack of direct emissions reductions. As Dooley et al. (2022), have argued, "Direct emissions reductions in the next decade are the only way to limit warming to 1.5°C and scaling up land-based removals cannot reduce peak temperatures."

5.3.7 Timber

The growing demand for African timber is one of the major drivers for deforestation, increasing land-use competition on the continent. Land is not available if wood is demanded at a large scale because wood requires huge tracts of land. This results in serious consequences for biodiversity, climate resilience, and rural livelihoods. Unless stronger governance and sustainable management measures are implemented, timber exports will continue to reshape Africa's forests and land use in ecologically and socially damaging ways.

5.4 Actors and Interests

Most actors involved are powerful international and domestic forces, sometimes acting in alliance. Most dominant actors have their own interests, in contrast to the land uses and users that support millions of smallholder farmers and pastoralists on the African continent. These actors include the following.

5.4.1 African states

Central and local governments in Africa are critical actors in the promotion of industrial and monocrop agriculture capitalising on the calls to increase food production to feed Africa; extraction of green-transition minerals as a way to raise funds and aid the transition to clean energy; carbon markets to leverage capital for green growth; timber exports to raise capital; and urbanisation to cater for the growing population and modernise their countries.

Governments are decision-making actors that influence land-use changes through leasing and selling land; adopting domestic policy, legal, and institutional reforms that facilitate large land-based investments and "green grabbing"; and promote policy biases against the bulk of smallholder producers on the continent.

5.4.2 Gulf states and companies

The Gulf region is a major driver of land-use changes in Africa. Most GCC countries intend to acquire millions of hectares of land in Africa. Most GCC countries have established carbon market initiatives. The GCC companies and countries have also joined Chinese and Western companies in the race for green-transition minerals in Africa, increasing competition for land. The GCC countries import about 90% of their food, "with rice imports comprising virtually all consumption, about 93% of cereals, about 62% of meat, and 56% of vegetables" (Ghazaly, Rabbat, and Mokhtar, 2020).

To secure and stabilise their food supply they have sought strategic partnerships with Africa because of its good climatic conditions, agricultural potential, and proximity to the Middle East. The UAE, Saudi Arabia, Kuwait, and Qatar have massively invested in agriculture through land acquisitions and joint ventures, financing irrigation, dam projects, livestock production, and large-scale farming (Gulf Research Center, 2024).

5.4.3 China

China and its companies play a significant role in driving land-use changes in Africa. China-Africa relations have strengthened over the years, with co-operation in mining, agriculture, infrastructure, and renewable energy. China is driving the expansion of mining areas as the global renewable-energy race with the US and Europe intensifies (Johnston, 2024). Chinese mining operations in Africa are concentrated in five countries, namely, Guinea, Zambia, South Africa, Zimbabwe, and the DRC (Johnston, 2024). China is also playing a leading role in the expansion of mining areas on the continent for steel, which is also important for renewable energy. The superpower is also the world's largest emitter of carbon dioxide, accounting for 35% of the world's total greenhouse gas emissions, and is involved in land-intensive carbon offset projects, which are rarely made public.

Subsistence farmers in Miarinarivo, Madagascar, head home after selling their produce.

(Photo: Sandy Ravaloniaina, Unsplash)

China is further involved in extraterritorial investments in African agriculture in ways that increase the demand for land. This is not new, but the scale has dramatically increased since China began investing in African agriculture in the 1950s. China's agricultural plan for Africa is pinned on modernisation. It now has more than 1,000 enterprises involved in agricultural production overseas and more than $10 billion of cumulative overseas investment in agriculture, which has transformed the African landscape (FAO, 2020b).

In addition, China's role in construction in Africa has led to a number of land-use changes through land acquisition. China's increased role in construction has increased land-use demands in Africa and has worsened the continent's land squeeze. Construction expansion is accelerating the shrinkage of land in Africa. At the centre of this has been China's BRI. Since the initiative was launched in 2013, 53 of 55 AU member states have participated in different ways (de Kluiver, 2024).

Finally, the growing demand for timber in China is increasing the competition with natural land uses. According to GWMI (2024), China "imported a total of up to 1.46 million cubic metres of African timber from January to June 2024, achieving a remarkable growth of 16% compared to the previous year". China is the largest importer of tropical wood and is "the destination of more than three-quarters of Africa's timber exports" (Weng et al., 2014). This demand raises concerns about "the environmental and socioeconomic impacts of Chinese timber supply chains in Africa" (Weng et al., 2014). Africa's deforestation is partly caused by China's increasing demand for timber, with detrimental effects on biodiversity and climate change mitigation (Rotberg, 2019).

5.4.4 United States

The US is involved in Africa's agriculture through government agencies, NGOs, and corporations. Its involvement is mainly through financing land-related projects and large-scale land investments. These projects cover various themes, such as climate-change adaptation, agricultural development, and sustainable land management. The US has been countering China's influence by establishing new investments, partnerships, and policy initiatives. The US cooperates with allies such as the EU, Canada, Japan, and Australia to create secure and diversified supply chains for critical minerals, reducing reliance on China. US companies are the dominant buyers of carbon credits in Africa.

5.5 Concretising policy alternatives

5.5.1 From hi-tech industrial farming to agroe-cological farming models

We call for **a radical shift from hi-tech and high-input intensive industrial agriculture towards alternative agro-ecological models that are compatible with local conditions and that protect ecological balance and resilience**. Our study shows that the model of industrial agriculture continues to dominate, albeit with minor adjustments. Powerful international and national actors, such as the AfDB, World Bank, foreign countries, and African states continue to support and sponsor high-capital and high-input agricultural food systems to feed Africa and the world (Watkins, 2025). Studies show that "organic systems are more profitable than conventional systems, even when external costs of production are not counted. While organic systems had an overall (10% to 15%) greater labour demand, this was considered

to be less of a constraint in regions where labour is cheaper or where there is a surplus of labour" (Valenzuela, 2016; for profitability, see Crowder and Reganold, 2015).

The main drivers of agro-ecological farming should be smallholder farmers, because they supply most food globally. There are various benefits associated with agro-ecological farming models. These include biologically diverse systems; less cultivated land; increased profitability; comparable yields; diversified diets; increased water-use efficiency; improved soil quality; increased biodiversity and ecosystem levels; and a decrease of "pesticide residues in the body". In addition, the food is comparably healthier (Valenzuela, 2016). On the other hand, bad health, environmental impacts, biodiversity loss, and emissions exacerbating the climate crisis are associated with the intensification of agricultural production (López, 2012). In addition, industrial agriculture is not sustainable. It is, therefore, important for the AfDB and other policy stakeholders to consider ecological models of farming.

5.5.2 Reduce the demand for cropland

Instead of expanding cropland, there is a need to produce more food to feed Africa on the same land, particularly if we are to keep the global temperature rise below 1.5°C. Evidence from our report shows that agricultural expansion remains problematic as it results in deforestation, with impacts on climate change. The strategy is to meet Africa's needs for food while reducing the demand for land for agricultural uses. In short, this strategy means producing more food on the same amount of land (Searchinger et al., 2024). This is a more sustainable plan than Adesina's proposition to acquire at least 25.7 million hectares of land for hi-tech and high-input industrial agriculture to feed Africa, which would affect 11,117,000 smallholder farmers (AFSA, 2024). After all, the land is simply not available.

Producing more food on the same land will mean increasing crop and grazing yields; shifting diets to plant-based foods; stopping using crops for bioenergy production; financing efforts to reduce food loss and waste, as globally, "around 13.2% of food produced is lost between harvest and retail, while an estimated 19% of total global food production is wasted in households, in the food service and in retail" (United Nations DESA, 2024); improving soil management using organic matter; improving aquaculture productivity sustainably; planting the same land more frequently while practicing multiple cropping; and intercropping and companion planting to increase yields, yield stability, and soil fertility (United Nations DESA 2024; Searchinger, et al. 2024).

In addition, it is important for power holders to note that improving household food security for the poor involves more than just increasing crop production metrics and improving market efficiency. At the heart of a food-security approach should be redistributive politics that enable access to nutritious food to the poor and marginalised (Sen, 1982). After all, the we are already producing enough to feed the world, but the majority of people are getting hungrier.

The above efforts will result in the reduction of land-use changes characterised by massive conversion of forest land, grassland, and grazing land to crop production as demonstrated earlier. Reducing the demand for agricultural land should always be accompanied by efforts to restore and protect forests for biodiversity, conservation, and other ecosystem benefits (Dooley et al., 2022). As Dooley et al. (2022) have argued, "conserving all carbon-dense primary ecosystems – and in particular all remaining primary forest-boreal, temperate, and tropical – is critical to climate-mitigation efforts, as they store far more carbon compared with harvested forests or plantation". This will help to achieve net reforestation.

5.5.3 Avoid carbon markets

We advocate for the avoidance of carbon markets that rely on land-based policy measures promoting land-use changes such as tree planting and afforestation. A more effective alternative is the direct reduction of emissions from fossil fuels. Carbon markets cannot compensate for the failure to reduce emissions from fossil fuels, particularly by superpowers such as the US and China. The scale of land needed to implement and sustain carbon markets is not available in Africa. After all, land-based climate-mitigation strategies increase competition over land and land uses; affect indigenous people's land rights. diverse livelihoods, and food security; and can lead to biodiversity loss and land conflicts (IPCC, 2022).

A more sustainable intervention is the ecological restoration of degraded forests and protecting the loss and degradation of existing primary forests and other ecosystems. This is a more important strategy than climate-mitigation strategies that rely on carbon markets and availability of large tracts of land. If carbon markets are used, it is imperative for African leaders to negotiate for fair financial deals from the sale of carbon credits and to improve transparency and accountability.

5.5.4 Population growth and control

Population growth and control strategies should be included in long-term computation of on-site land information linked to prevailing land-use and land-cover changes in the context of climate change. According to Searchinger et al. (2024) "if all world regions reached **replacement-level fertility** by 2050 (that is., 2.1 children born per woman), the population would only grow to 9.3 billion by midcentury" and this will reduce the demand for agricultural land to feed the population by 180 million hectares.

Strategies may involve supporting adjustment in individual reproductive behaviour, which is centred on the values of individual choice, religion, and culture (Ezzeh and Feyissa, 2019).

Governments can increase access to sexual reproductive healthcare and education for the girl child to encourage voluntary reductions in giving birth (Searchinger et al., 2024). Efforts may also be made to encourage adjustments in fertility behaviour through various incentives and disincentives, as has been carried out in some countries (for example, Malawi, Kenya, and Zambia), although some governments have faced ethical dilemmas (for example, China and India). Interventions to lower adolescent pregnancy include reducing child marriages, which are prevalent in a number of Africa countries; increasing access to contraceptives among married adolescents; and establishing policies that promote reduction in unintended pregnancies.

A rising population implies a large expansion in **urbanisation**. This will require interventions to increase urban density, but in an equitable way, with enough social services and property rights, particularly for those living in informal areas.

5.5.5 Meet the timber demand without changing land uses

An alternative is to produce more wood on existing timber lands rather than open new frontiers. It is possible to meet the wood demand without changing land uses. Strategies can include reusing and recycling wood to reduce the need to harvest more trees; reducing the demand for wood; replacing the use of fuelwood with clean solar stoves to

reduce wood and charcoal use; harvesting wood from plantations rather than from natural forests, although there are some associated risks, such as lower long-term carbon storage, lower biodiversity, and altered water cycles; and restoring and protecting forests (Chimulu et al., 2015; Searchinger et al., 2024). Given the land scarcity, policies should not spur an increase in the demand for wood.

5.5.6 Reduce demand for critical minerals and protect land rights

In the context of the renewed rush for critical minerals, governments must provide **more explicit legal and social recognition and respect for customary land rights holders – both women and men – and their rights to use, access, control, own, and transfer land and other natural resources**. This requires changing the mindset and amending land and mining laws and policies to shift the balance of power and authority over land to women and men, families, and members of the community living on customary land from traditional leaders, mining companies, and the state.

To further protect communities, their land, and land uses, there is a need for policymakers to domesticate the principle of free prior informed consent (FPIC) as a way to protect vulnerable communities from the global rush for mining. FPIC is an international principle that gives people the right to say "yes" or "no" to developmental projects, therefore, upholding the universal right to self-determination (FAO, 2014, p.12). FPIC at a policy implementation level entails that the rights-holders – men and women – must make decisions free from undue influence, coercion, bribery, or fear.

"Prior" means that consent must be sought before the project starts and that there should be sufficient time to make a decision before the beginning of the investment project. The rights-bearers must be informed before making a decision. That means having accurate, understandable, accessible, and complete information about the investment on an ongoing basis. Finally, "consent" refers to the collective decision made by the rights-holders (including women, youths, and people living with disabilities), which can be a "yes", a "no", or a "conditional yes" and can be revisited during the different stages of the investment project (FAO, 2014, p.13). It is important to note the extent to which national-level legislation reflects this principle, starting with South Africa.

Alongside strengthening land rights, there is a need to reduce the rising demand for green-transition minerals through resource-efficiency measures. For example, new battery innovations have reduced the demand for cobalt by a projected 50% (BloombergNEF, 2022). In addition, electronic-waste recycling will reduce the demand for some minerals like copper and control the environmental ruin and social stresses associated with mining (Davey, 2023). The "phones, tablets, laptops, and other gadgets we discard contain valuable metals and minerals, collectively worth $62.5 billion each year" (Wood, 2024).

There is also a need to focus on other technologies and alternative forms of energy, such as renewable energy from the sun and wind, for cheaper production of a similar amount of energy. This not only conserves natural resources, but also reduces the need for mining and the associated environmental degradation. Efforts must be put in place to reduce the impact of mining on the environment, livelihoods, and farming to ensure food security for local families. Current land and mining laws promote the conversion of traditional land into mining areas. Most of the land-use changes are not authorised by the indigenous people and local communities.

The report calls for a decisive policy shift away from hi-tech, high-input industrial agriculture towards locally adapted, agro-ecological farming models that prioritise ecological resilience, smallholder livelihoods, and climate sustainability. Evidence shows that industrial agriculture, while heavily promoted by influential institutions such as the AfDB and World Bank, often leads to environmental degradation, biodiversity loss, and unsustainable land use. In contrast, agro-ecological systems offer diverse ecological and socioeconomic benefits, including healthier diets, improved soil and water management, and comparable or higher profitability, particularly in labour-rich rural economies.

To meet Africa's growing food needs while protecting ecosystems, the report advocates reducing demand for new cropland by boosting productivity on existing farmland, improving soil health, shifting to more plant-based diets, cutting food loss and waste, and protecting primary forests and other carbon-dense ecosystems.

Complementary measures are proposed to address interlinked land, resource, and climate challenges. These include meeting timber demand through increased productivity on existing timber lands, sustainable wood recycling, and the substitution of fuelwood with clean energy alternatives; avoiding land-intensive carbon-market schemes in favour of direct fossil-fuel-emission reductions; integrating population growth considerations into long-term land-use planning; and reducing reliance on critical minerals through resource efficiency, innovation, and robust e-waste recycling.

Central to all recommendations is the protection of customary land rights, particularly for women and marginalised communities, through the adoption of principles such as FPIC. This pro-poor, rights-based approach positions sustainable land and resource governance as essential to achieving food sovereignty, climate resilience, and equitable development across Africa.

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