



POLICY BRIEF

Land Use and Biodiversity Conservation: Exploring the Africa's biodiversity- agriculture nexus



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Recommendations

- Adopt systemic responses to address the biodiversity-agriculture nexus in ways that actively support and contribute to restoring ecosystem health and biodiversity.
- Facilitate cross sectoral collaboration and evidence-based decision-making, taking into account a systems approach.
- Train men, women and youth farmers in agricultural practices that are based on agroecological principles and nature based approaches, to enhance food security and nutrition while increasing ecosystem function.
- Strengthen the systemic monitoring of indicators of environmental change including above and below ground biodiversity, land health and water quality and quantity. Monitoring can be done through local crowdsourcing of citizen science combined with technical means.



Introduction

land is protected, yet issues related to biodiversity extend beyond parks and reserves – there is an equal need to consider biodiversity in urban and peri-urban land, as well as in land used for cultivation and pastoralism. This is all the more important in the context of Africa’s expanding human population and accelerating economic development.

The Africa Union’s continental development framework, Agenda 2063, underscores the central role that agriculture plays in Africa’s development ambitions. Yet, unsustainable agricultural practices drive biodiversity loss across the continent. These farming and pastoral practices have contributed to widespread land degradation, the fragmentation of habitats, deforestation and desertification. While Agenda 2063 promotes ongoing agricultural development, it also calls for the continent’s natural capital, its ecosystems and biodiversity, to be protected and restored. Are these mutually exclusive objectives?

This policy brief explores the nexus between agriculture and biodiversity within the broader context of land use change in Africa. It highlights key challenges for the continent as it seeks to ensure food and nutrition security and develop agro-industries, while at the same time protecting and restoring the region’s natural capital, including its biodiversity. The brief argues for closer collaboration between environmental and agriculture stakeholders in support of sustainable solutions to Africa’s challenges related to development, food security and nutrition, and biodiversity.



Biodiversity and Development in Africa

Africa’s forests, drylands, grasslands, wetlands and marine environments host an immensely rich diversity of plants and animals. The continent accounts for about a quarter of all animal and plant species; it is home to the world’s second largest rainforest and eight of the world’s 34 diversity hotspots.

This biodiversity is central to African livelihoods and economies. Urbanization is accelerating, yet over half the continent’s population still lives in rural areas, where they depend directly on ecosystem-based resources (World Bank 2022a). Urban and peri-urban populations supplement their incomes, energy, medicine and other essentials from these same ecosystem-based resources. It has been estimated that about 70 per cent of people living in sub-Saharan Africa depend on forests and woodlands for their livelihoods (UNEP 2016). More than 12 million Africans are employed in the fisheries and aquaculture sector. Biodiversity is also intimately tied to Africa’s multibillion-dollar tourism industry (IFC 2021).

Biodiversity across the globe is under threat. A recent study estimated that the total mass of all wild mammals is 22 million tonnes, only about 5 per cent of the total weight of all humans, estimated at 390 million tonnes, and a tiny fraction of the total weight of all domestic animals (630 million tonnes) (Milo et al. 2023). The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has reported that around 1 million animal and plant species are now threatened with extinction, and in 2019 then IPBES Chair, Sir Robert Watson, warned that “The health of ecosystems on which we and all other species depend is deteriorating more rapidly than ever. We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life worldwide” (UNEP 2019).



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These same trends are evident in Africa. The International Union for the Conservation of Nature (IUCN) has estimated that over 6,400 animals and 3,100 plants in Africa are at risk of extinction (UNEP-WCMC 2016). Africa’s large mammal populations have declined by almost 60 per cent in just 40 years. While data is less readily available for other animal groups, studies have shown that bird, insect and fish populations are also declining. Overall, populations of monitored species in Africa are estimated to have declined by 66 per cent since 1970 (WWF 2022).

While Africa has a significant share of its land area under conservation compared to other global regions (19 per cent for terrestrial systems and 17 per cent for marine systems), this is still significantly below the 30 per cent goal agreed through the United Nations Convention on Biological Diversity’s Global Biodiversity Framework (UNEP-WCMC 2022). A further challenge is that many parks face significant governance deficits, with limited resources to support effective management and prevent poaching and other forms of natural resource depletion.

Yet biodiversity is not an issue to be understood solely in terms of the acreage and effectiveness of protected areas. Much of the world’s biodiversity exists outside of protected areas, in some cases within large wilderness areas, but also within agricultural land, urban and peri-urban land and areas of mixed land use. Such land may fall under a variety of management and ownership regimes, including public land, private land and communally owned land.

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The Agriculture-Biodiversity Nexus

Biodiversity faces many threats in Africa, including climate change, illegal wildlife trade, pollution and the unsustainable harvesting of natural resources; but the greatest threat to Africa's biodiversity is agriculture. At the same time, agriculture is highly dependent on biodiversity. The FAO has called attention to the critical role that biodiversity plays in safeguarding global food security, increasing land health, underpinning healthy and nutritious diets, improving rural livelihoods, and enhancing the resilience of people and communities. In 2019, the FAO released a landmark report on "biodiversity for food and agriculture", a concept it defines as "the subset of biodiversity that contributes in one way or another to agriculture and food production. It includes the domesticated plants and animals raised in crop, livestock, forest and aquaculture systems, harvested forest and aquatic species, the wild relatives of domesticated species, other wild species harvested for food and other products, and what is known as 'associated biodiversity', the vast range of organisms that live in and around food and agricultural production systems, sustaining them and contributing to their output" (FAO 2019). The report finds that biodiversity for food and agriculture is declining and calls for the urgent strengthening of frameworks that support the sustainable use and conservation of biodiversity for food and agriculture. Such efforts should also include below-ground biodiversity, an often-neglected aspect of biodiversity for food and agriculture that nevertheless plays a vital role in soil health and productivity (UNEP 2002).

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(FAO, 2019)

An example of the "associated biodiversity" highlighted by the FAO (2021) is the relationship between agriculture and trees, including forests and trees outside forests. Such trees contribute to agriculture production in a number of ways, including by protecting soil and water, maintaining soil fertility, helping regulate climate, and providing habitat for wild pollinators and the predators of agricultural pests. These trees also constitute a rich store of biodiversity of potential use in agriculture. There is growing interest in the role of non-traditional food crops in agriculture, with significant work underway to identify and develop such "lost crops" in support of enhanced food security and nutrition, as well as agriculture-based livelihoods (Mudau et al. 2022; National Research Council 1996).

The linkages between biodiversity and agriculture also extend to nutrition and health. Indeed, the World Health Organization (2020) has emphasised that "biodiversity at every level (genetic, species and ecosystem level) is a foundational pillar for food security, nutrition, and dietary quality".

The agriculture sector is integral to Africa's economy and supports the livelihoods and food nutrition and security of millions. About 43 per cent of Africa's total employment is in the agriculture sector. There are about 33 million smallholder farms on the continent, with these farmers contributing about 70 per cent of Africa's food supply. There are also a growing number of large commercial farms on the continent, with international investors playing an increasing role in the continent's agricultural sector. Over the past 20 years, about 35 million hectares of land in Africa have been sold to foreign investors (Toulemonde 2021). While some of this land is used for forestry, a significant share has been used for agricultural production, including soya, oil palm and other crops.



Mechanisms Driving Biodiversity Loss

One of the key mechanisms through which agriculture drives biodiversity loss is the conversion of highly biodiverse landscapes to agricultural production. The share of Africa's land that is dedicated to agriculture has been expanding and now exceeds 42 per cent (World Bank 2022b). Analysis of satellite data has revealed that Africa is a global hotspot for farmland expansion. Concerningly, almost 80 per cent of these new croplands have been carved out of natural landscapes rather than pasture or abandoned farmland (Potapov et al. 2021). The IPBES (2018) has warned that the unregulated conversion of forest, rangelands and other natural areas, such as wetlands, driven in large part by the pressures of food production, has significant implications for Africa's biodiversity and consequentially for the region's long-term sustainable development. Such land conversion results in habitat loss and fragmentation, degradation of water catchments, and soil erosion.

Agriculture can also undermine biodiversity through the impact of pesticides and other harmful products, which can harm above and below-ground biodiversity on the farmland itself, but also has more wide-ranging impacts where these products find their way into the broader environment. In Eastern Africa, pesticide use to address plagues of locusts and quelea birds has been linked to the death of beneficial insects, birds and other wildlife (Kairu 2023). In West Africa, pesticide imports increased by about 19 per cent annually throughout the 1990s, yet its use is poorly regulated, its impacts on beneficial wildlife and on humans is poorly

understood by end users, and there is limited monitoring of environmental residues and pesticide contamination (Jepson et al. 2014). South Africa is the continent's largest user of pesticides and has been identified as being among the 30 countries most susceptible to high pesticide pollution risk (Degrendele et al. 2022).

The bushmeat trade in Africa is extensive. For example, it has been estimated that up to 6 million tonnes of bushmeat is extracted each year from the Congo Basin. In countries like Ghana and Cote d'Ivoire, the annual value of the bushmeat trade exceeds \$100 million. While not all farmers harvest or consume bushmeat, in many cases the trade forms part of diversified livelihood strategies for rural communities and can be an important off-farm source of income and nutrition (Schulte-Herbrüggen 2013).

Human-wildlife conflict occurs in many regions of Africa, with settlement expansion associated with land conversion both in and around protected areas. Many African countries have documented human encroachment into national reserves, while certain regions, such as the Okavango Delta, still contain significant populations of free-ranging wildlife, such as elephants and leopards, that can cause crop and livestock losses (Nicole 2019). Such human-wildlife conflict can lead to animals, including endangered species, being killed to protect crops and livestock, though significant efforts are underway to find solutions that benefit both farmers and wildlife (UNEP 2023).

Shifting Paradigms for Enhancing Biodiversity in Agriculture

There is growing recognition that agricultural practices, and food systems more broadly, must be transformed in order to reduce negative impacts on ecosystems, and indeed, to contribute to restoring damaged land and ecosystems. This shift must also take place in the context of growing populations and ambitions to support agricultural livelihoods, expand agricultural production, reduce reliance on food imports and contribute to increased food nutrition and security.

The UN Food Systems Summit, convened in 2021, underscored this message, calling for an enhanced focus on feeding growing populations in ways that contribute to people's nutrition, health and well-being, restore and protect nature, are climate neutral, adapted to local circumstances, and provide decent jobs and inclusive economies. The Kunming-Montreal Global Biodiversity Framework, established under the Convention on Biological Diversity and couched as an effort to bring about a transformation in societies' relationship with biodiversity by 2030, directly addresses the relationship between biodiversity and food systems. The Framework calls on stakeholders to "Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably, in particular through the sustainable use of biodiversity, including through a substantial increase of the application of biodiversity friendly practices, such as sustainable intensification, agroecological and other innovative approaches contributing to the resilience and long-term efficiency and productivity of these production systems and to food security, conserving and restoring biodiversity and maintaining nature's contributions to people, including ecosystem functions and services" (CBD 2022).

The idea of sustainable intensification lies at the core of the challenge for Africa and other regions. The imperatives of ensuring food security and responding to shifting consumption patterns driven by urbanisation and economic development, as well as realising the ambitions of the continent to develop the agricultural sector to better support livelihoods and promote trade and industrialisation, requires that agricultural production continues to increase. Productivity gains in agricultural production can generate direct and meaningful benefits for Africa's millions of smallholder farmers. Enhanced production also supports the development of agro-industries. Yet it is clear that if such intensification of production is associated with increased monocultures and poorly managed use of pesticides and other harmful practices, the impacts on biodiversity and human health can be severe. Agricultural intensification is often presented as a means to reduce land conversion and thereby benefit biodiversity – the logic being that intensification allows farmers to produce more product and more types of products on available land and thereby reduces incentives to expand land production and use "slash-and-burn" or other harmful practices. However, there is a well-documented "rebound effect" of agricultural intensification, whereby intensification increases agricultural profitability and thus becomes a driver of further land conversion. The relationship between agricultural intensification and future conservation costs has been raised, including clear indications that intensification "may result in conservation in some contexts, but will also increase future agricultural land rents as productivity increases, creating new incentives for agricultural expansion and deforestation" (Phelps et al. 2013).

A further concern related to intensification is the increasing use of fertilizers, particularly synthetic



fertilizers. Across the globe, including in Africa, the use of fertilizers has been associated with environmental issues, including runoff into marine and freshwater systems that leads to eutrophication, deoxygenation and resultant aquatic "dead zones". At the same time, the increasing use of synthetic fertilizers has been key to the ability to feed the world's growing population, while African agriculture continues to be marked by low fertilizer use and low crop yields. While the intensification of fertilizer use, including synthetic fertilizers, remains contentious, many African stakeholders, including the African Development Bank, are seeking ways to boost the production and use of fertilizers in support of enhanced agricultural productivity. It is recognized, however, that this does lead to a heightened risk of harmful agricultural runoff, which must be countered with improved land and water management, education campaigns to support appropriate use of fertilizers and agricultural practices that minimize runoff, and other forms of support (Shah 2022).

In light of trends outlined above, there have been growing calls for a shift towards sustainable intensification of agriculture. Rockström et al. (2017) underscore that this entails more than just increasing agricultural output while minimizing the ecological footprint, or "more food with fewer resources". Instead, it is argued that a more fundamental shift in approach is required, one that is built around ecological processes that utilize natural functionalities that ecosystems offer. The aim, the authors argue, is to "design multi-functional agro-ecosystems that are both sustained by nature and sustainable in their nature". Achieving progress towards such systemic transformations requires effective collaboration between environmental and agricultural stakeholders, as well as researchers, governance actors and farmers themselves. There is a need to unpack the assumptions underlying different approaches to sustainable intensification of agriculture, pay attention to equality and political processes, explore local change interactions and improve the connection of agriculture with nutrition and health outcomes (Brown et al. 2023).

While the challenges of the agriculture-biodiversity nexus are complex and pressing, it is clear that they can only be addressed through a systems approach that recognizes the embedded nature of agriculture in support of building resilience within broader human and natural environments.

Certain stakeholders have been advocating for an approach to African agriculture around the integrated concept of “high-yielding, resilient, and adaptive practices”. This concept speaks to the need to increase yields in order to improve food security and agricultural livelihoods, enhance resilience to climatic and other shocks, and adapt to shifting weather patterns and other disruptive forces impacting the agricultural sector (Kenewendo et al. 2022). While the challenges of the agriculture-biodiversity nexus are complex and pressing, it is clear that they can only be addressed through a systems approach that recognizes the embedded nature of agriculture in support of building resilience within broader human and natural environments. Protected areas will need to be expanded and better managed, but in this area too natural systems cannot be isolated from surrounding communities, many of whom are highly reliant on agricultural livelihoods. It will be necessary to significantly scale farming practices that not only minimize harmful biodiversity impacts, but actively contribute to regenerating soil health and biodiversity.



Conclusion

Agriculture is the leading threat to biodiversity in Africa, yet there is much that can be done to ensure that the sector’s negative biodiversity impacts are not only reduced, but that agriculture can actively contribute to the protection and restoration of biodiversity. Sustainable intensification based on agroecological principles and nature based approaches will be required to ensure that Africa is able to promote food security and nutrition, develop agro-industries to enhance economic opportunities in the sector, and build the resilience of agriculture-based livelihoods, without undermining the natural capital on which the sector relies. Achieving these outcomes will require more effective collaboration between environmental and agricultural stakeholders, as well as researchers, governance actors, development practitioners and the farmers themselves.

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