Policy Brief

Finding a way forward for Nature-based Solutions in Africa's grassy ecosystems

> Nature-based Solutions can support adaptation and mitigation and reduce trade-offs for Africa's grassy ecosystems. However, one-size fits all approaches are to be avoided.

Introduction

Due to its vast landmass and unique ecosystems, Africa has the potential to contribute significantly to land-based mitigation and adaptation interventions, offering an estimated 21% of global potential for increased carbon storage on land.

Unfortunately, in the rush to use natural assets to fight climate change by sequestering carbon, large-scale interventions have been proposed in Africa's non-forested grassy ecosystems (Figure 1). These aim to increase aboveground carbon by increasing woody biomass through actions like tree planting, fire abatement or promoting cool, early season fires. If these interventions are imposed in Africa's open ecosystems, significant costs to biodiversity, water availability and livelihoods will occur for negligible amounts of carbon sequestration.

Nature-based approaches for these systems require careful consideration of benefits and costs to livelihood opportunities, biodiversity conservation, water and agriculture. This policy brief summarises the evidence base, and outlines potential synergies and trade-offs between climate actions in grassy ecosystems (on the one hand) and sustainable development, including biodiversity conservation and livelihoods (on the other).

FIGURE 1 A series of photographs showing the diversity and array of African non-forested systems

Nature-based approaches

The term Nature-based Solutions (NbS) is used widely as a unifying concept where actions, often rooted in or arising from nature, aim to simultaneously 1 protect, conserve, restore, sustainably use and manage natural or modified ecosystems, 2 contribute to mitigating and/or adapting to climate change, and 3 ensure human well-being. However, in spite of its wide use and aim to work as a unifying concept, the use of the term "NbS" is still strongly contested because;

- There is likelihood of misunderstanding that NbS can provide a global solution to climate change. Using the term "nature", being expressed as a "solution" to climate change, is inappropriate and detracts attention from the need for urgent reduction of greenhouse gas emissions.
- Framing of some climate actions as "natural" and others as "unnatural" limits the range of effective options available to policy makers.
- Pledges for NbS often translate into targets for afforestation, often with monocultures and non-native species.
- There are multiple formal definitions of NbS, with different definitions being adhered to in different policy documents, and with different definitions being proposed by the United Nations Environment Assembly, the European Union and the International Union of the Conservation of Nature.

In acknowledgement of these concerns, we refer to nature-based approaches, and seek approaches that will reduce or minimise trade-offs.

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What can be done in Land-based climate actions for African grassy ecosystems?

1 Protect intact ecosystems and develop the necessary financing and policy mechanisms to support this

Protecting natural ecosystems offers mitigation, adaptation and other socio-ecological co-benefits. However, unlike with forests, there is no financing mechanism for avoided conversion of grassy ecosystems. Failure to develop appropriate incentives will result in large costs to biodiversity and livelihoods.

- Africa's grassy ecosystems provide a rich source of ecosystem services and livelihood benefits, such as clean water, healthy soils and income from activities such as pastoralism and nature-based tourism.
- In Africa, 76% of newly cultivated land (since 2000) is on previously untransformed land, and a significant area of Africa's woodlands, savannas and grasslands have already been transformed by cultivation, plantation forestry, urban development and mining. This conversion is irreversible.
- Africa's grassy ecosystems store a substantial amount of carbon. Protecting Africa's grassy ecosystems maintains a high store of carbon, particularly in soils and belowground biomass. If managed correctly, these ecosystems can capture as much carbon as tropical forests, particularly in the soil and underground plant biomass. Preventing the loss of stored carbon in intact ecosystems is twice as effective carbon-wise than restoring lost or degraded systems. Converting these lands (through cultivation or afforestation) will result in a loss of biodiversity, ecosystem services and climate change adaptive capacity (Figure 2). Their loss will have notable impacts on water use, especially in semi-arid regions. There will be significant loss of forage for grazing wild and domestic animals, with serious impacts on livelihoods and the economy.
- Widespread proposals to plant trees in African grassy ecosystems represent a significant land-conversion pressure. Africa has been targeted as providing major opportunities for tree planting, and the AFR100, an implementation of the Bonn Challenge, plans to plant at least one million square kilometres of trees in Africa, with a significant area of non-forested ecosystems in Africa being earmarked as suitable for tree planting. This will yield only negligible carbon sequestration gains, but will have multiple social, economic and environmental risks, including to the historical, traditional and indigenous livelihoods of local people, disruption of ecological systems and the services they provide, especially through the introduction of non-native trees, and destruction of rich biodiversity over much of the targeted area in Africa. Furthermore, the long-term mitigation potential (especially of aboveground carbon) of such land conversions is unknown, given natural processes like fire and drought in these landscapes.

> "The rush to sequester carbon is encouraging large-scale planting of trees in Africa"

> "Protecting Africa's grassy ecosystems maintains a high store of carbon"

Activity	Carbon	Water	Biodiversity	Livelihoods
Ploughing	▼	▼▲	▼	▲
Afforestation	?	▼	▼	?

FIGURE 2 The rush to sequester carbon is encouraging large-scale planting of trees in Africa. However, conversion of grassy ecosystems in Africa through ploughing and tree planting will result in significant impacts on biodiversity and livelihoods.

2 Manage (and restore) non-forested African ecosystems

Many proposals around non-forested ecosystems are centered around increasing woody biomass to capture carbon aboveground through tree planting, reducing/avoiding burning, promoting early dry season fires or promoting woody encroachment. These proposals trade-off against biodiversity, ecosystem function and livelihoods, often resulting in lower-than-expected carbon gains. Such interventions should be viewed with caution before being implemented in non-forested African ecosystems. There are many other more appropriate intervention options which have stronger co-benefits for biodiversity and adaptation.

Large areas of Africa's grassy ecosystems are intact (they have not been converted to other land uses) but they are degraded. Degradation results in reduced ecosystem function and it is caused by the alteration of ecosystem processes, structure and composition. Critical drivers of degradation in Africa's grassy ecosystems are woody encroachment, overgrazing and alien plant invasion.

Woody encroachment – the increase in tree and shrub cover and a decrease of grassy cover across non-forested ecosystems – is very common in Africa. It is caused by changes in fire and herbivory in grassy ecosystems. Altered fire regimes and a colonial legacy of fire suppression have resulted in fewer and smaller early season fires across the landscape. Wildlife biomass representing diverse guilds of grazers, browsers and mixed feeders has also declined and has often been replaced by grazing livestock (cattle and sheep). These land management changes, coupled with climate change and carbon dioxide fertilization, have caused woody encroachment.

Woody encroachment is a notable threat to the existence of grassy ecosystems. The tree cover shades out light-loving plants. More trees in dry ecosystems increase plant water use and decrease stream flow. Ecosystem services are lost, especially services linked to grass production like grazing and water infiltration. Moreover, ecosystem carbon storage does not necessarily increase. Studies show that soil carbon (the major and most stable stock of carbon globally) can either increase or decrease with encroachment, depending on rainfall, soil type, and type of tree.

Sustained heavy livestock grazing is widespread. Some areas are experiencing overgrazing. One cause is that climate change, resource and land access constraints have shifted the pastoral tradition of managing grazing herds with seasonal mobility to more sedentary, high intensity grazing. This has caused a reduction of plant cover and an increase in erosion, particularly in semi-arid and arid regions.

Early results show that changes to cattle grazing management (e.g., rotational grazing or holistic grazing) that shift away from prolonged high intensity (largely sedentary grazing) approaches can offer carbon and biodiversity benefits, although widespread evidence is limited and the scale at which these changes in grazing regimes would need to occur to result in meaningful carbon storage, has yet to be determined.

Alien plant invasion, particularly in water catchments, is widespread and can significantly reduce stream flow and ground water. Removal of alien vegetation is beneficial to eco-system function and water availability.

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2 Manage (and restore) non-forested African ecosystems

Key interventions to enhance management and restoration of non-forested landscapes

- Improving the management of degraded grassy ecosystem areas can enhance ecosystem functionality, enhancing adaptation, mitigation and ecosystem services. Evidence shows that management interventions that reintroduce disturbances can contribute to ecosystem recovery; for example, reintroducing a diverse fire regime can increase biodiversity, and grazing with livestock can contribute to creating habitats that support large, wild herbivores.
- Other active interventions like managing erosion, reseeding grasses, application of intense fires, or cutting and clearing of woody encroachment (invasive and native) can make a significant contribution to restoring biodiversity and ecosystem services whilst potentially increasing belowground carbon. (Figure 2)
- An important challenge in Africa is to distinguish correctly between degraded/deforested forests and grassy ecosystems that contain substantial woody cover (e.g., miombo woodlands). In areas where wood fuel harvesting and charcoal production have reduced tree cover, appropriate nature-based approaches are very different from those used in degraded forests. In grassy ecosystems, natural regeneration of woody cover is rapid and biodiversity can peak after 15-30 years, with carbon stocks recovering within decades. Valuing and managing these so-called "degraded" systems to provide wood and grazing resources can reduce reliance on fossil fuels, increase biodiversity and also provide resources to communities. Reseeding and replanting trees is not usually required and can be damaging.

> "An important challenge in Africa is to distinguish correctly between degraded/deforested forests and grassy ecosystems that contain substantial woody cover"

Activity	Carbon	Water	Biodiversity	Livelihoods
Fire suppression	?	?	▼	▼
Early season burning	?	?	▼	?
Promoting woody encroachment	?	▼	▼	▼
Grazing management (either holistic or rotational grazing)	▲	?	▲	?
Restoring disturbance (fire/herbivory)	▼ ▲	▲	▲	▲
Active restoration (reseeding, woody plant removal, irrigation)	▲	?	▲	▲

FIGURE 3 Efforts to sequester carbon by increasing above-ground biomass, can result in both synergies and trade-offs. Instead, interventions that counteract or address existing causes of environmental degradation would be more appropriate. Counter-intuitively, contrary to popular belief these could often involve removal of woody biomass and use of fire and herbivory as management tools.

Key Messages

1. Africa is highly vulnerable to climate change, despite being the region with the lowest carbon emissions (less than 4% of global emissions). Africa's position on climate action on land is to prioritise adaptation in response to climate change while supporting mitigation efforts, particularly if they provide opportunities for achieving the sustainable development goals and support livelihoods.

2. The vast majority of African landscapes are not forested. Many of the common mitigation policies are derived from forested ecosystems and are often inappropriate for grassy ecosystems. This calls for context-specific (e.g., biome-specific) nature-based approaches in Africa, particularly those targeting natural eco-systems. Within the African context, it is important to address the historical misclassification of the grassy biomes and provide the resources to identify the difference between degraded forest and woody grassy ecosystems correctly. In areas where wood fuel harvesting and charcoal production have reduced tree cover, appropriate nature-based interventions are very different from those used in degraded forests.

3. Financial mechanisms for promoting these more contextual interventions need to be found to ensure that African ecosystems are not transformed merely to meet the carbon sequestration needs of those financing such interventions.

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Charting the way forward

Current evidence for biome-appropriate Nature-based approaches for Africa is sparse. There is a need to grow a database of African-centred, evidence-based guidance on biome- and sector-appropriate land-based actions with the aim to collate evidence on effectiveness of mitigation, adaptation and any socio-economic benefits and trade-offs. Funding efforts need to promote the collection of baseline and intervention data to help gather the evidence to support the best interventions.

Land-based interventions need to be implemented with support of experts and local communities, as there is a strong potential for trade-offs between climate actions, biodiversity and livelihoods. To avoid potentially irreversible harm to the rich cultural and biological diversity of the African continent, effective communication to decision-makers and stakeholders as well as financing institutions on the potential pitfalls of current approaches must be done in haste.

Funding mechanisms for avoided land conversion would enable grassland conservation efforts as well as assist with carbon mitigation.

Glossary

Adaptation In human systems, the process of adjustment to actual or expected climate and its effects, to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects.

Afforestation Conversion to forest of land that historically has not contained forests.

Carbon dioxide (CO_2) fertilisation The increase of plant photosynthesis and water-use efficiency in response to increased atmospheric carbon dioxide (CO2) concentration. Whether this increased photosynthesis translates into increased plant growth and carbon storage on land depends on the interacting effects of temperature, moisture and nutrient availability.

Co-benefits A positive effect that a policy or measure aimed at one objective has on another objective, thereby increasing the total benefit to society or the environment.

Ecosystem-based adaptation (EBA) The use of ecosystem management activities to increase the resilience and reduce the vulnerability of people and ecosystems to climate change.

Mitigation (of climate change) A human intervention to reduce emissions or enhance the sinks of greenhouse gases.

Reforestation Conversion to forest of land that has previously contained forests.

Trade-offs A competition between different objectives within a decision situation, where pursuing one objective will diminish achievement of one or more other objectives. A trade-off exists when a policy or measure aimed at one objective (e.g., reducing GHG emissions) reduces outcomes for other objectives (e.g., biodiversity conservation, energy security) due to adverse side effects, thereby potentially reducing the net benefit to society or the environment.

Woody encroachment The increase in tree and shrub cover across non-forested ecosystems.

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Laura Pereira Cover Image: Mara River, Mara Triangle, Kenya; Migration image, Mara Triangle, Kenya; Boma meeting (SORALO/ILRI Climate Smart Livestock programme workshop), South Rift Valley, Kenya
Sally Archibald Figure 1: Drakensberg, South Africa (left); Bicuar National Park, Angola (centre), Kitulangalo Forest Reserve, Tanzania (right); Brown cow,Kitulangalo Forest Reserve, Tanzania; Controlled burn (Working on Fire), Kruger National Park, South Africa