

MANAGING GRASSLANDS FOR PLANET AND PROFITS: THE ESSENTIAL ROLE OF PASTORALISM

As a large scale, multi-country, multi-stakeholder restoration initiative, Regreening Africa offers a unique opportunity to generate actionable lessons on the cost-effectiveness and impact of local, national and global restoration efforts. As part of the Regreening Africa Insights Series, this brief shares key insights from the programme's development at scale of effective livestock management interventions, learning from the environmental value of nomadic pastoralism.

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KEY INSIGHTS



Grasslands and rangelands cover up to 28% of the planet's land area, host much of its remaining megafauna, and are one of the world's biggest carbon stores. Their mismanagement has serious adverse impacts on the climate and on their inhabitants.



Grassland mismanagement stems from an ignorance of grasslands ecology. For example, the common practice of set-stocking rapidly degrades rangeland soils, yet is still promoted by policies that encourage pastoralists to settle down on ranches.



The management systems pragmatically evolved over millennia by the inhabitants of grassland biomes are being shown by modern science to be the most effective:



nomadic pastoralism effectively mimics the soil-building, biodiversity-boosting processes that originally created the world's wildlife-filled grasslands.

The positive impacts of nomadic pastoralism can be reproduced at ranch scale by adapting management systems known as Adaptive Multi-Paddock grazing.



Effectively managed livestock is a precious ally in the fight against climate change and biodiversity loss, and has now been recognized as such by the UN General Assembly and FAO, amongst others.

Background

Animals are a key component of African farming systems at almost all scales and in almost all biomes. Grazing and nomadic pastoralism have been part of African agricultural management for millennia, and remain so today. They play a crucial role in the management of drylands: in the savannahs, shrublands and grasslands of the continent, where cropping is often impractical, nomadic pastoralism can generate highly nutritious foods while also maintaining and restoring landscapes and providing habitats for a remarkable range of wildlife. While the restoration of African agricultural landscapes is often considered entirely dependent on farmers' cropping methods, the contribution of livestock should not be underestimated.

Yet pastoralism is beset by growing difficulties. Rapid human population growth has led to an expansion of croplands and livestock numbers alike, stressing traditional management systems based on the trade of pastoralists' manure to boost farmers' soil fertility against agricultural stover used as fodder. Furthermore, pastoralism is increasingly viewed as problematic: many commentators focus on the poor conversion ratios of livestock and assess its negative impacts as vastly outweighing its benefits, while nomadic pastoralists are increasingly misconstrued across much of the continent as 'backward' and as prime source of the insecurity affecting many communities. As a result, policymakers often push livestock owners to settle permanently on ranches as the best solution to the "problem" of pastoralism.

This misunderstanding of the role of animals in agricultural landscapes not only leads to counter-productive policy-making but can also lead to suboptimal land management. Rectifying this is crucially important: the evidence is overwhelming that grazing and pastoralism can be essential tools to restore and regenerate degraded landscapes, boost biodiversity and even draw down significant quantities of atmospheric carbon. They are, in other words, climate-appropriate production systems that let livestock owners enjoy remarkable levels of resilience by deploying mobility strategies unavailable to cropland farmers.



Indeed, some analysts such as the American Drawdown group rank it as one of the top ten mitigation measures available, with a much greater potential than offshore wind or nuclear power.¹ The IPCC's land report, likewise, finds it one of the most important tools at our disposal.²

Breaking the tension between the positive assessment of pastoralism by researchers and its negative reputation amongst policymakers and the urban public, then, is as important to help us manage our planet for more carbon drawdown, more biodiversity and optimised water cycles as it is to boost the incomes and nutrition of African pastoralists and smallholders.

Regreening Africa works with smallholder farming families across many different biomes: from the semi-arid drylands of the west African Sahel to the intensive

cropping systems of the densely populated hills of Rwanda or the lowlands of western Kenya. Across these contexts, livestock and livestock management take many different forms. For example, in Ethiopia, Rwanda and western Kenya, Regreening Africa focused on helping farmers to select agroforestry tree species optimised for the browsing behaviour of honeybees, in addition to the fodder species favoured by goats and cattle. In Senegal, Niger and Mali, where the seasonal migration of nomadic pastoralists across farming landscapes plays a crucial role in the management of biomass and soil fertility, Regreening Africa's interventions were usually more social in nature, focused on co-developing seasonal grazing plans with farming and pastoral stakeholders, backed by political and administrative state support. This insight brief will provide snapshots of the lessons learned as these interventions were developed at scale.

Grasslands: a crucial, often mismanaged biome

Grasses, and the herbivorous vertebrates that consume them, successfully coevolved over the past 60 million years at least, spreading across the globe to cover around 55% of the land area of our planet today³. From the arctic tundra to the arid American west, from the vast expanse of Central Asia to the Sahara and from the majority of Iberia to almost the whole of Australia, shrublands, grasslands, dry woodlands and savannahs are the planet's dominant ecosystem.

Most of those grasslands are drylands, characterized by a low aridity index of less than 0.65 (where rainfall accounts for at most 65% of the land's potential evapotranspiration), and yet their soils remain highly productive. Grasses are unique in that they grow from their base and not from their tips, an adaptation to grazing that allows grasses to rapidly shift resources from their roots to extending their leaves after being grazed. This resource-shifting leads to the die-back of parts of the plant's rootstock, forming precious soil organic matter and creating humus-rich soil. Provided that the grazing events are not too frequent, the photosynthesis brought by this fresh leaf growth lets the grass plant regrow its rootstock, allowing it to fully recuperate, and for the cycle to be repeated after the next grazing. It is these regular pulses of fresh soil organic matter being deposited by dying roots deep in grassland soils that allows them to grow so rich over millennia of grazing. This process pumps so much carbon into the soil that some researchers now suspect that this mechanism is key to fully understand the ice ages.⁴

The crucial low frequency of the grazing is a service provided by carnivores, who bunch herbivores together into herds. This encourages herds to eat, manure and trample everything in their path and to move on in the search for fresh pasture. Freshly grazed and manured grasses are then left alone for long durations, usually a full season, giving them enough time to fully regenerate before the herds

return in their ceaseless seasonal migration and impact the sward again. Repeated over thousands of years, this constant cycle of die-back and root regrowth created the thick, rich soils which humanity is now dependent on.

But across most of the world, this natural grazing process has been interrupted. The richest, best watered grasslands have been turned into farms, where repeated ploughing often leads to an escape of that rich soil carbon into the atmosphere as a result of soil erosion. Much of the remaining grasslands have either been criss-crossed by roads, fencing and other human infrastructure that diminish large herbivore migrations, or they are most commonly used for set stocking – letting livestock graze at will within a parcel of land. The risk of set stocking is that grasses do not have the time to regenerate their roots between grazing events, eventually exhausting all their resources and dying off. Meanwhile, the manuring of the livestock benefits the thorny and bitter plants that livestock do not graze on, so that a thriving sward can rapidly become a profoundly degraded, thorny wasteland.

Livestock managers can follow one of two strategies to avoid this degradation:

- Implement **nomadic pastoralism**, an intricate and adaptive management system that mimics the behaviour of naturally migrating herds. It is still common across much of Africa and the Central Asian highlands, and is particularly good at maintaining or restoring biodiversity.
- Mimic the behaviour of bunched herds at very small scales by employing a strategy known as **Adaptive Multi-Paddock (AMP) grazing** or **Holistic Grazing Management (HGM)**, where land is divided as needed into dozens to hundreds of tiny mobile parcels that are impacted by livestock for short periods, before being allowed to rest and regenerate.⁵

SILVOPASTORALISM: WIDESPREAD, RESILIENT, AND A BOON FOR THE CLIMATE

In drylands, silvopastoralism – the grazing of livestock under or amongst trees – is the most common and extended group of agroforestry systems, displaying a rich variety of practices, management systems and outcomes (ILRI et al., 2021). But despite the many differences in the varieties of climates, trees, shrubs, grasses, wildlife and livestock to be found across the world's silvopastoral lands, it is the interactive dynamics between the components of silvopastoral systems (the trees, grasses and animals) that best characterise them. In all of them, the vegetal elements (grasses and herbs, shrubs, trees) are integrated into the same unit of production and land management to increase the period of fodder availability and improve productivity and adaptation. Silvopastoralism emerges as the approach that best uses the intricacies of dryland agroforestry, especially once the unique subtleties of local knowledge systems are included in the management. The importance of grazing with trees has now been recognised by the UN system, with the FAO publishing a magisterial compendium of those systems around the world.

Silvopastoral systems, in addition to the poor reputation of pastoralists and of meat's climate impact, have to contend with another challenge: the world's heedless rush to plant trees, as many and wherever possible, to offset its carbon greed. Pastoralists and other rangeland managers are being displaced by massive tree planting efforts. These have negative impacts – on livelihoods, on biodiversity, on many of the positive ecosystem benefits of mixed tree stands in savannahs and, paradoxically, in some cases, on carbon stocks and fluxes. Recognising the importance of silvopastoralism for the climate is crucially important. As such, the UN General Assembly has decreed that 2026 will be the International Year of Rangelands and Pastoralists, and the recognition of the importance of grazing with trees by the FAO's committee on Forestry⁵.



Assessing pastoralism across Africa



WEST AFRICA: NOMADIC PASTORALISM

Major research efforts on grazing in West Africa have highlighted the complementarity between cropping and pastoralism and the substantial impact of pastoralism on the wider economy. The livestock sector is immensely important across this region, accounting for up to 60% of the GDP of ECOWAS states, mostly as a result of traditional grazing management.

There is a huge diversity of pastoral strategies in the region. At one extreme, agropastoralists graze their livestock locally around anchor points granting widely recognised tenure rights, such as wells or fields; and at the other, herds are managed by nomadic pastoralist whose yearly migration takes them from the edges of the Sahara to the coastal regions in the south. Pastoralists migrate to the Saharan-Saharan zone in the wet season, despite the availability of year-round biomass further south. They are driven north by the higher palatability and much higher protein content of drylands grasses in a migration that mirrors that of herbivorous megafauna.

The balance of these different strategies rests on intricately negotiated tenure and rights agreements that govern access to stover, trees and water. These are typically designed to be reciprocal rights, to ensure access to resources such as water irrespective of the stochasticity of seasonal resource availability. Sadly, these effective systems, which have maintained good livelihoods and high biodiversity over centuries, are being rapidly degraded by:

- demographic change and the concomitant spread of farmland;
- increasingly fraught issues between traditional and legal tenure systems;
- rapidly spreading insecurity and violence;
- climate change; and
- political pressure to permanently settle nomads, despite research overwhelmingly backing its superiority in terms of productivity, livelihoods, biodiversity, soil health and even carbon.

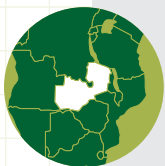
Nevertheless, the situation in West Africa is not wholly bleak. Good regulatory environments that encourage users to develop and seal social use agreements recognised by the authorities have been developed in Mauritania and Niger. Ghana has developed cattle committees on which farmers and herders are equally represented, mandated to evaluate the financial damage to a farmer whose fields have been invaded by cattle. There is strong evidence that herders are attracted to regions where such committees are operative.

Some of the biggest remaining challenges concern the transboundary nature of nomadic pastoralism; limited value addition to animal products; and a lack of phytosanitary controls that would allow these meat and milk products to be marketed abroad on the basis of their superior ecosystemic profile.

PASTORAL CORRIDORS IN SENEGAL

SHARED, the evidence-based stakeholder management protocol developed by CIFOR-ICRAF, was crucial in solving conflict between herders and farmers in Senegal. It was used by World Vision and the stakeholders they convened to develop and implement pastoral corridors—areas of grazing land snaking through farmland that let pastoralists move through in search of pasture. A national legal framework codified the protocols for the establishment and recognition of these corridors, and defined how they should be used. World Vision worked with local authorities, village chiefs and pastoralists to define and allocate pastoral corridors, and help them to invest in their physical delimitation in the form of boundary posts between the corridors and farmland.

This effective approach enabled successful farmer-managed natural regeneration (FMNR) of trees in Senegal, as livestock browsed the tender young shoots of regenerating trees. Incentives were cleverly aligned to ensure compliance by all parties: for example, agricultural women could make money from harvesting the protein-rich seedpods of regenerated tree species like *Faidherbia albida* and selling them to pastoralists. While some herdsman allowed their animals to invade farmland and others removed the boundary posts delineating farmland to let their animals graze on fields, Regreening Africa reacted by intensifying dialogue with all stakeholders, finding solutions and incentives to reduce the risk of non-compliance.



COMMUNAL GRAZING AT SCALE IN ZAMBIA

In Zambia, land degradation is most often driven by two mutually reinforcing management issues: (1) the narrowing of most smallholder farming systems into monocultures, usually maize, which require more petrochemical inputs, and (2) low levels of interpersonal trust, which force families to delegate one labour unit, usually a child or a youth, to graze their one or two cows close to the village all day long. The costs of inputs and the low yields of monocropping fail to turn a profit on the maize; the constant grazing of cows close to the village encourages the spread of cattle diseases and degrades pasture land; and the lack of grazing further afield leads to unchecked growth of grasses that are burned at vast scale early on in the dry season. The end result is rising poverty, worsening land degradation, disappearing biodiversity, and massive carbon emissions.

To tackle these issues, the Zambian organisation Grassroots Trust works at the level of chiefdoms averaging 40,000 people or 2000 square kilometres, to help communities re-envision economic systems so as to move away from these failings. Their strategy has two strands: first, help communities adopt an agroecology approach based on mixed cropping that integrates livestock and raises productivity significantly, generating profits for smallholders that are typically an order of magnitude higher than those achieved through petrochemical monocropping; and second, recreate historically practiced circular grazing systems by helping people develop the trust necessary to lend their cattle into a large communal herd.

This approach has been rolled out to 24 communities across six districts in two provinces since 2015. Each typically boasts 10 to 15 actively involved farming families and anywhere between 70 and 250 cattle. Livestock is usually penned on a crop field at night, manuring it. Herds are grazed using adaptive mob grazing techniques across larger areas that typically include highlands used in the wet season and lowlands used in the dry season, mimicking the seasonal grazing of wild animals.



TANZANIA: VILLAGE PLANNING TO RESOLVE LAND USE CONFLICTS

Three-quarters of Tanzania is comprised of mostly semi-arid rangelands, characterised by highly variable rainfall. These lands, historically teeming with megafauna, were traditionally and effectively managed by pastoralists and agropastoralists. That system survived colonialism but was profoundly impacted by the socialist government's villagisation scheme of the 1970s. This consolidated settlements into large villages and established a top-down administrative system run from the capital. The resulting boundaries, some visible and some administrative, limited pastoral mobility, decreased available grazing, and contributed to land degradation.

The majority of these rangelands are found in the Miombo-Mopane dryland forest biome, and so are traditionally used for silvopastoralism. Land degradation expressed itself in a reduction in tree cover through timber and fuelwood harvesting and the overgrazing of saplings. Efforts have been ongoing to encourage FMNR, but the required investment was costly (in foregone tree products and grazing, and in labour), and an economic analysis suggested that the returns were too low to justify that investment.

The country's land policy and legislation provides for a specific form of local management: villages are expected to develop and implement a land use plan defining key land use categories. But the planning development process is rarely fully inclusive. Nomadic pastoralists, not being village members, are often left out. Combined with the various administrative and physical boundaries, this can further reduce available grazing.

In order to overcome these challenges, a process of 'joint' village land use planning was encouraged



by the International Livestock Research Institute (ILRI), IFAD, the International Land Coalition (ILC), government and other stakeholders, in four clusters of villages in the Kiteto district of the Manyara region. The stakeholders agreed on a land-use plan that includes around 2,000 km² of protected grazing land, including so-called village forest reserves. Grazing interests were represented by newly established livestock keepers' associations and formalised by village council-delivered Certificates of Customary Rights of Occupancy (CCROs). The livestock keepers are now developing participatory rangeland management plans to guide local investments in rangelands restoration and improve rangeland productivity.

Access to water remains an issue, which the livestock keepers, as major beneficiaries of plentiful water, can help solve by harnessing adaptive multi-paddock grazing. By boosting soil cover and soil organic carbon, this form of grazing helps the land absorb rainwater and therefore replenish groundwater. This provides a significant reduction in the risk and impacts of floods and droughts.

ACROSS THE DRYLANDS: TRANSPARENCY ON IMPACTS

Across the Regreening Africa programme activities in Senegal, Niger, Mali, Ghana and Somalia, nomadic pastoralists make up most of the production of meat and milk and use migration routes to follow the rains, increasingly constrained by national boundaries, infrastructure, and the spread of croplands. Despite these constraints, cattle remain a potent status symbol, encouraging urban and other elites to invest in large herds. The reduction in available grasslands and the increase in livestock numbers has led to rising conflicts with farmers, whose fields herds often invade.

Part of Regreening Africa's success in its approach within these communities is a relentless focus on evidence-based stakeholder engagement, allowing stakeholders with vastly different experiences, interests, resources and power to interact and negotiate in good faith on the basis of a common understanding of all available evidence.

However, access to such evidence is not a given. Much of nomadic pastoralism takes place in vast, marginal landscapes, far from urban centers and logistical infrastructure, so that traditional tools of impact monitoring – structured surveys, soil sampling, transects, biodiversity sampling etc. – are difficult and expensive, and data on the impact of grazing on biodiversity and carbon is scant and outdated.

But advances in GPS technology, new and much cheaper ways of analysing samples (such as soil spectroscopy or shotgun DNA sequencing), machine learning and artificial

intelligence provides hitherto undreamed-of tools to cheaply and relatively accurately monitor the rangelands.

These tools depend on effective baselining, as supplied by CIFOR-ICRAF's Land Degradation Surveillance Framework (LDSF). Arguably the world's most accurate monitoring tools for those environments, LDSF draws on a library of hundreds of thousands of soil samples collected over the years from sentinel landscapes across sub-Saharan Africa, parts of Asia and Latin America, so as to analyse remote sensing imagery to a remarkable degree of precision, and provide relatively accurate information on 16 different variables including erosion prevalence, the proportion of annual versus perennial grasses, rooting depth and soil carbon.

This information, combined with a flood of data from many different databases, can be presented in extraordinarily detailed dashboards that are a boon to policy makers and those who evaluate land use systems at all levels. It is striking how rapidly the usefulness of these dashboards increases with access to data, with the most impressive examples combining LDSF data with that flowing from hydrological services, climate models, education, health and police reports, etc.



PART OF REGREENING AFRICA'S SUCCESS WITHIN THESE COMMUNITIES IS A RELENTLESS FOCUS ON EVIDENCE-BASED STAKEHOLDER ENGAGEMENT, ALLOWING STAKEHOLDERS WITH VASTLY DIFFERENT EXPERIENCES, INTERESTS, RESOURCES AND POWER TO INTERACT AND NEGOTIATE IN GOOD FAITH ON THE BASIS OF A COMMON UNDERSTANDING OF ALL AVAILABLE EVIDENCE.



RECOMMENDATIONS

The sheer importance of the world's grasslands for the broader health of our planet's climate and biodiversity has long been recognised, but the importance of its effective management by its traditional inhabitants, the world's nomadic pastoralists, is only beginning to be honoured.

This coincides with a better understanding of the massive impact of large-scale herbivore migrations on the health of grasslands (and on their ability to draw down large amounts carbon from the atmosphere), and the development of methodologies such as AMP and HGM that effectively reproduce these positive impacts through the management of livestock in the constrained areas of modern ranches.

To further encourage these positive developments at scale, policymakers are encouraged to consider the following steps:



Encourage the devolution of effective land governance systems to their users and other stakeholders, with the mandate to develop and enforce land-use rights that aim to rekindle ecosystem function (net primary productivity, soil health, water cycles, biodiversity, etc.) and benefit both settled farmers and nomadic pastoralists, to be endorsed and backed by state agencies, including the security services.



Deploy effective agroecology and rangeland management modules across agricultural colleges, universities and state extension services, including a strong focus on the management of the regeneration of shrubs and trees for higher productivity in both farming and pastoral settings.



Introduce agroecology in primary and secondary schools. Children are receptive to an understanding of natural processes and will as adults be able to effectively use that knowledge.



Work with partners to develop internationally recognised sanitation, veterinary and certification services accessible to pastoralists and ranchers.



Simplify the regulatory and tax environments governing the animal products value chain, in order to encourage the sector's access to international markets where it can capitalise on the unique benefits of pastoral livestock products.



Adopt effective monitoring systems to allow extension services and buyers to distinguish between the impacts of various kinds of rangeland management, and use those to help farmers and pastoralists access international carbon and biodiversity markets.



Ensure that the contribution of pastoralism to the broader economy and the health of rangelands is recognised by policymakers and the public through effective communications campaigns.



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ABOUT REGREENING AFRICA

Regreening Africa is an ambitious five-year project that seeks to reverse land degradation among 500,000 households, and across 1 million hectares in eight countries in Sub-Saharan Africa. By incorporating trees into croplands, communal lands and pastoral areas, regreening efforts make it possible to reclaim Africa's degraded landscapes.

As part of a larger global and regional effort to halt and reverse land degradation, the European Union-funded project, Regreening Africa, aims to improve smallholder livelihoods, food security and resilience to climate change in eight African countries. More specifically, it seeks to reverse land degradation over at least one million hectares and benefit 500,000 households, while also catalyzing an even larger scaling effort to restore tens of millions of hectares of degraded land across Africa.

With an initial phase over 2017-2022, this unique research in development is led by World Agroforestry (ICRAF) and implemented by consortium of international non-governmental. The consortium includes World Vision, Catholic Relief Services, Cooperative for Assistance and Relief Everywhere and Oxfam, as well as national NGO Sahel Eco. The eight countries that it is active in are Ethiopia, Kenya, Rwanda, Somalia, Ghana, Mali, Niger and Senegal, with a light touch in Burkina Faso.

Regreening Africa focuses on the incorporation of trees into many land-use types, including croplands, communal lands and pastoral areas, with complementary soil and water conservation and soil improvement practices. It leverages science and research to track the impact of implementation and enhance concurrent social inclusion and livelihood-enhancing efforts as well as creating a sustainable enabling policy environment for land restoration at national and sub-national levels.

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