Introduction to a new narrative for livestock and biodiversity

Livestock must be part of the solution to sustainably managing Earth's biodiversity

Livestock production occupies over a quarter of the globe's land surface area (Cravino et al, 2024), contributes 40% of all agricultural output and is critical for the food security, nutrition, culture and livelihoods of 1.3 billion of the planet's people (FAO, 2016a; Hall, 2019), predominantly in the Global South. Many of these people keep livestock in ways that tread lightly on other forms of biodiversity – or indeed enhance it. Livestock production systems are extremely diverse and can be a valuable asset in combating biodiversity loss and climate change when managed appropriately and responsibly.

In many regions, however, unsustainable livestock management practices and feed production have contributed – directly and indirectly – to all of the key drivers of biodiversity loss: changes in land and water use, direct exploitation of organisms, climate change, pollution and invasive species (IPBES, 2019). Livestock production appears to contribute about 11%–17% (Blaustein-Rejto & Gambino, 2023) of global greenhouse gas (GHG) emissions, and has contributed to the deforestation and conversion of natural areas for large-scale industrial cattle ranches, or to grow maize and soy for animal feed in intensive production systems.

Overconsumption of animal-based foods, predominantly in high-income countries, is a key driver of such unsustainable production and its deleterious environmental impacts. Eliminating deforestation and conversion of natural areas with strong legislation, market regulation and enforcement, whilst stimulating nature-positive agriculture and livestock systems – including redirecting harmful subsidies and shifting to healthier, more sustainable diets – will unlock opportunities to transform agriculture and livestock production and enable our food system to become a key contributor to a net-zero, nature-positive future (WWF, 2024).

It must be recognized that context matters: livestock systems cover a diverse range of context and situations and animals. While some might equate livestock with images of industrial large scale systems, the types of systems that we see across much of the Global South include mixed farming systems where crop-livestock integration is critical for soil health; semi-intensive systems, to which many farmers are now transitioning; and pastoral and extensive grazing systems, which are critical for restoring large areas of drylands (in Africa) and grasslands (in Latin America).

Livestock play fundamental roles across a vast range of ecosystems and communities – from helping maintain and restore diversity in plant and soil species to providing crucial sources of food, high-quality nutrients and income for stakeholders across the global livestock value chain. Sustainable livestock practices can improve soil health, increase carbon sequestration, promote ecosystem diversity, restore degraded lands, support wildlife conservation and enhance agricultural resilience. For example, pastoral systems are 50-90% more efficient than ranches under similar conditions due to their effective use of natural resources and minimal external inputs (de Jode, 2010).

However, many of the planet's livestock keepers live below the poverty line and are affected by climate change and biodiversity loss, in conjunction with land use change and non-conducive economic and tenure systems. For instance, pastoralists traditionally manage to adapt effectively to changing temporal and spatial distribution of pasture and water resources, through mobility and adjusting herd size and composition. This process is now under severe threat from the expansion of agricultural land, accelerated population growth and commercialisation of resources, which compromise and fragment pastoral areas and limit the availability of traditional grazing areas. Hence, a new narrative for livestock requires careful consideration of how to support such sustainable practices to be perpetuated.

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Key messages

Sustainable livestock management can restore ecosystems

As they move across landscapes grazing, breaking up soil, and dropping manure, sustainably-managed livestock helps to maintain and restore diverse grass and tree species and soil biodiversity (FAO, 2024), keep invasive species in check (Gennet et al, 2017), and prevent destructive wildfires by lightening the fuel load (PASTRES, n.d.a).

Livestock can also support other agricultural practices, such as growing crops, by improving soil health and reducing synthetic input use – if the animals are kept sustainably and manure is used to maintain or restore nutrient flows. Highland crop production in most parts of the world only exists thanks to draft oxen plowing lands; planted forages and well-managed pastures can restore degraded soils, incentivize production and decrease pressure on forests. Silvopastoral systems help to boost the productivity of livestock by providing crucial shade during hot periods, as well as supplying other food and livelihood products such as fruits, fuelwood and timber. Roots and tuber crops thrive in agro-silvopastoral systems where they can take advantage of the presence of nitrogen-fixing forage trees and animal dung's manure and microbial content. Biogas from manure is an excellent source of energy that helps reduce pressure on forests as fuelwood sources.

Rangelands make up 54% of the planet's land (Rangelands ATLAS, n.d.) and store a third of global terrestrial carbon stocks (Bai & Cotrufo, 2022). In many regions, rangelands cannot be used to produce other forms of food (Mottet et al, 2017), so livestock can provide an important source of food and income. If done right, livestock can play a particularly critical role in maintaining the ecological balance of these rangelands. Light- to moderate-intensity managed livestock grazing and pastoralism can positively impact rangeland vegetation compared to both grazing exclusion and intensive production (Cravino et al 2024). A high-density stock during a short period has less impact than a low-density stock during a long period because there is less trampling and grass selection (Hiernaux, 1998).

Global Biodiversity Framework (GBF) entry points: Goal A, B, Targets 1, 2, 3, 6, 7, 10, 11, 16

Wildlife and livestock can work together

Maintaining a sustainable wildlife-livestock balance preserves healthy ecosystems and stores carbon. Diversity in pastures and rangelands is key to supporting wildlife, including pollinators. If livestock production causes habitat loss, fragmentation, and degradation, it can be deleterious for wildlife: building the balance requires looking carefully at key factors such as stocking rates/wildlife grazing intensity and habitat heterogeneity, as well as human-wildlife conflict issues with predators and competition for grazing lands (Cravino et al, 2024).

Water management also needs to be considered: water scarcity from prolonged and frequent droughts is leading to competition between wildlife and livestock, so measures like developing drought-resistant forage species are key to mitigating this. Livestock systems can also have negative impacts on water bodies critical for other wildlife – such as eutrophication and antimicrobial resistance – that need to be addressed, such as by providing separate waterpoints for humans, livestock and wildlife; fencing and reforesting around waterways; and diversifying disease management systems.

When livestock production occurs on native grasslands or partially modified savannas, the impacts on wildlife are usually minor – whilst highly dependent on stocking rates, herd mobility and management (Cravino et al, 2024). Techniques like wildlife-friendly fencing can also help to facilitate productive co-existence (Segar & Keane, 2020). Pastoral transhumance has been shown to be particularly effective at connecting ecosystems by creating biocorridors (PASTRES, n.d.b).

Livestock systems come in many forms. In this silvopastoral system in Colombia's Cauca Department, planted forages boost productivity and incomes, protect and restore soils, and reduce greenhouse gas emissions through enhanced carbon sequestration. Photo Alliance Bioversity-CIAT/ Neil Palmer

Crucially, in the critical quest to preserve biodiversity, we cannot ignore the rights, needs and desires of the people who live in and around grasslands and savannahs. There is a complex history of serious violations to pastoralists' and livestock keepers' land rights through 'fortress conservation' approaches (PASTRES, n.d.c). Conservation and agricultural development sectors need instead to collaborate, and can serve each other – for instance, livestock development around protected areas can relieve pressure on those areas.

GBF entry points: Goal B, Targets 1, 3, 4, 11

Genetic diversity in livestock and forage species helps maintain ecosystem resilience, adaptation and biodiversity

Conserving livestock and forage genetic resources is essential for food security, ecosystem health and cultural heritage (Hall, 2019). International high-output breeds tend to be favoured in many farming systems (Hoffman, 2010), and some 17 percent of the world's farm animal breeds are at risk of extinction, while the risk status of many others is unknown due to lack of data (FAO, 2016b).

Pastoralists and other rural communities are known to preserve local livestock breeds (Köhler-Rollefson, 2001). These often harbour key traits that can promote adaptability in the face of challenges like climate change, such as heat tolerance and disease resistance (ILRI, AGNES and AU-IBAR, 2023), as well as playing key roles in local ecosystems and economies. Conservation of such genetic resources should take a community-based approach that keeps intellectual property in the hands of farmers ((Köhler-Rollefson, 2001).

Genomics can also help us to enhance the sustainability and productivity of livestock systems so that they can make the most of existing arable land and resources – both by developing new varieties and by reintroducing locally-extinct species where appropriate. For example, scientists in Africa have drawn on the gene banks of the International Livestock Research Institute (ILRI) to develop new drought- and pest-resistant varieties of Brachiaria grass with high nutritional value, which can flourish on marginal land and sequester three times more carbon than many other types of grass (Maas et al., 2015).

Keeping track of genetic diversity at national level is a critical piece of the puzzle. To this end, the Food and Agricultural Organization of the United Nations (FAO)'s Domestic Animal Diversity Information System (DAD-IS) provides countries with tools to monitor national breed populations and make informed decisions on the management of animal genetic resources – including ensuring that livestock genotypes match the ecological and socio-cultural context.

GBF entry points: Goal A, B, C, Target 4, 11, 13

Animal health is integral to ecosystem health and biodiversity

Sustainable management practices and good animal husbandry improve livestock health and contribute to broader conservation goals. An unhealthy or poorly cared-for animal is unproductive, which can have spillover impacts on biodiversity and climate change. For instance, livestock keepers – especially in grazing systems – may respond by increasing herd size to achieve their desired productivity levels. Overstocking increases pressure on grazing lands and water resources, accelerating biodiversity loss and degradation of ecosystems. And, livestock diseases can be directly or indirectly transmitted to wildlife, such as bovine tuberculosis in lions (Sylvester et al, 2017), and rabies in zebras and jackals (Mackey & Kribs, 2021).

A balance must be found between livestock health, the off-take or addition of natural resources, and the biodiversity and environmental impact of animals. If socio-culturally accepted, smaller herd sizes can enable farmers to invest more in their animals, improving productivity without overtaxing their resources or land. Proper feeding, watering, shelter, animal healthcare and manure management contribute to a circular farming system that supports both the environment and livelihoods.

There are numerous ways to support livestock health and reap broader biodiversity benefits. For instance, improving access to veterinary services – such as by supporting mobile clinics and trained community animal health workers to ensure regular health checks and treatment in remote areas – can help to prevent disease outbreaks. Biosecurity measures, compulsory and targeted vaccination programmes and improved disease monitoring can reduce livestock morbidity and mortality, preventing overstocking and enhancing productivity. Introducing locally adapted, climate-resilient forages and supplements strengthens livestock immune systems and improves overall health, while pasture rotation and other forms of paddock management help prevent diseases. Selective breeding for disease resistance and productivity, meanwhile, can enhance herd health and reduce reliance on veterinary drugs.

GBF entry points: Goal A, B, Targets 5, 6, 7, 8, 11, 17

Participation and inclusion are central to sustainable livestock management

There is no one-size-fits-all solution to sustainable livestock management. It must be designed to align with the evolving specificities of each site and its stakeholders – including women, youth and Indigenous peoples – and consider tenure issues and the need for secure land access rights. Done well, participatory natural resource management can also help to boost gender equity: a participatory rangeland management programme piloted by ILRI in East Africa significantly increased the number of women in leadership positions (ILRI, 2019).

Context-specific monitoring and targeted support are needed to achieve benefits for biodiversity and avoid negative impacts by assessing appropriate approaches and carrying capacities over time and space. In this vein, the Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF) is leading the co-development of a global monitoring framework for rangeland restoration to assess and monitor soil health, land degradation and vegetation diversity, in which local land restoration managers are involved in the collection, analysis and interpretation of data (Winowiecki & Vagen, 2024). FAO (2020) has also developed a list of guidelines for quantitative assessment of how livestock impacts biodiversity in a given area.

Herders in Kenya's semi-arid northeast guide their cattle home. With supportive policies and sustainable practices, pastoralism can support biodiversity, restore ecosystems, and build climate resilience—driving sustainable development across drylands. Photo ILRI/Kabir Dhanji

Importantly, while a sound resource management plan can reduce the incidence of conflicts, these can never be entirely avoided. Conflict prevention and resolution mechanisms, such as dialogue platforms, should be firmly integrated into any resource management system.

GBF entry points: Goals A, B, D, Targets 1, 15, 17, 19, 21, 22, 23

The pastoral livestock sector needs support to serve biodiversity conservation and the economies of dryland and savanna countries

Drylands and savannas are among the most vulnerable areas in the world, hit hard by climate change and biodiversity loss, instability, and high levels of poverty and food insecurity. They are therefore increasingly targeted as priority areas for ecosystem restoration and climate-resilient development.

Livestock is the most important productive activity in these areas. For example, it supports the livelihoods and resilience of over 100 million people across the Sahel and Horn of Africa (de Haan, 2016). Due to their mobility, the predominantly pastoral population in this area makes optimal use of the drylands by turning its scarce resources into valuable products including meat, milk and skins. Their production system not only contributes significantly to local and national economies, but also ensures food security and nutrition, employment and cultural values beyond borders.

Prolonged political and economic marginalisation of these areas has however impeded the sector from reaching its full potential. With the right policies and practices in place, pastoralism can be a sustainable production system that is highly adaptive to climate change and restore biodiversity and degraded ecosystems, which can ultimately drive sustainable development in drylands and savannahs.

GBF entry points: Goals A, B, D; Targets 1, 2, 3, 4, 8, 9, 10, 11, 14, 19, 20, 21, 22

Recommendations

1. We ask governments and national partners to recognize and incorporate farm animal biodiversity, silvo-pastoral systems and other approaches to support sustainable livestock management into National Biodiversity Strategies and Action Plans (NBSAPs) and align with Nationally Determined Contributions (NDCs).
2. We ask for capacity building, technology transfer and other forms of non-monetary benefit-sharing as an important part of a new international system for the sharing of benefits arising from the use of livestock Digital Sequence Information (DSI) for the benefit of research and development organizations, and Indigenous and pastoral livestock keepers in developing countries.
3. We ask for a multilateral DSI system with a mechanism for technology transfer and capacity building that operate on their own, independent from the availability of funds raised through monetary benefit-sharing mechanisms.
4. We ask governments and conservation agencies to embed effective policies at national and local levels, and across borders, that stimulate pastoral mobility and include pastoralists and their customary institutions in decision-making and natural resource management; and, we ask civil society and non-governmental organisations to help strengthen pastoral and agro-pastoralist organisations' capacities to effectively influence such policies.
5. We ask donors and research organisations to upscale proven sustainable livestock solutions which contribute to biodiversity conservation.
6. We ask the private sector to catalyse ecosystem restoration and climate resilience in several ways: through offering climate-smart products or biodiversity restoration services, providing access to technology and information services, creating green employment opportunities, connecting smallholders to the livestock value chains, and providing access to pastoralists and agro-pastoralists to sustainable markets and finance.

Following CBD COP16 and beyond, we will:

- **Build a coalition of partners** to influence Africa's position on livestock and biodiversity and contribute to national and global processes
- **Develop a two-year engagement plan** to support NBSAPs across countries and global fora in the run-up to the next CBD COP.

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This document is a preview to an upcoming report, which will explore this narrative and key messages in greater depth. We welcome your feedback and contributions as we prepare the full release. Scan the QR code to share your insights or email us directly.

Wendy Zavala Escobar, GIZ
wendy.zavala@giz.de

Mireille Ferrari, ILRI
m.ferrari@cgiar.org