Integrating Local and Indigenous Animal Genetic Resources for Food and Agriculture (LIAnGRFA) into global biodiversity governance

A technical policy brief for the Convention on Biological Diversity

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May 2025

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Executive summary

Why this document matters

The conservation and sustainable use of Local and Indigenous Animal Genetic Resources for Food and Agriculture (LIAnGRFA) are critical to biodiversity conservation, food security, climate resilience, and rural livelihoods. These livestock breeds – shaped over centuries through natural selection and traditional knowledge – possess unique traits such as disease resistance, heat tolerance, and efficient feed conversion, which makes them vital for sustainable agriculture and ecosystem health.

This paper examines existing policy gaps, inconsistencies in international governance frameworks, and financial barriers limiting the conservation and sustainable use of LIAnGRFA. It provides actionable policy recommendations to integrate LIAnGRFA into the Convention of Biological Diversity (CBD), National Biodiversity Strategies and Action Plans (NBSAPs), and financial mechanisms such as the Global Environment Facility (GEF) and Green Climate Fund (GCF).

These are some of the key policy gaps and implementation challenges related to LIAnGRFA:

1. The Kunming Montreal Global Biodiversity Framework (GBF) fails to explicitly include LIAnGRFA in its conservation targets, which limits global level protection and investment.
2. Most NBSAPs fail to include concrete conservation measures for LIAnGRFA due to the explicit mandates in the GBF.
3. The Nagoya Protocol on Access and Benefit-Sharing (ABS) does not provide a dedicated framework for LIAnGRFA, which leaves communities, breeders, and researchers without legal pathways to access and utilize indigenous livestock breeds.
4. The Cartagena Protocol on Biosafety does not consider the conservation of naturally adapted indigenous breeds, which are at risk from increasing industrialization in livestock breeding.
5. The Global Plan of Action for Animal Genetic Resources (FAO-CGRFA) lacks binding commitments under the CBD, leaving conservation efforts fragmented and voluntary.
6. Absence of a global legal framework for LIAnGRFA: Unlike plant genetic resources, which are governed by the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), there is no equivalent treaty for livestock breeds.
7. Financial barriers: Less than 5% of global biodiversity funding (through mechanisms like the GEF and GCF) is allocated to livestock biodiversity, restricting conservation efforts, genetic improvement programs, and resilience-building initiatives geared towards LIAnGRFA.
8. Poor data and research investment: There is no centralized global database for LIAnGRFA making it difficult to track population trends, genetic diversity, and conservation needs.

A policy roadmap for LIAnGRFA inclusion

Policy recommendations that should be considered for global discussion at the 17th meeting of the Conference of the Parties to the Convention on Biological Diversity (COP17) include:

1. **Explicit recognition of LIAnGRFA in the CBD and GBF**
   - Amend the GBF targets to explicitly reference LIAnGRFA as global conservation efforts.
   - Ensure NBSAPs include targeted conservation strategies for LIAnGRFA at the national level.
2. **Develop a multilateral framework for LIAnGRFA**
   - Establish a dedicated international agreement, similar to the Plant Treaty, to provide a legal framework for the conservation, sustainable use, and equitable benefit-sharing of LIAnGRFA.
3. **Increase dedicated funding for LIAnGRFA conservation**
   - Advocate for a minimum of 10% of GEF, GCF, and CBD funding to be allocated to LIAnGRFA conservation and breeding programs.
4. **Create a global LIAnGRFA information system**
   - Establish a centralized database to track breed diversity, population status, and conservation efforts.
   - Support scientific research and traditional knowledge systems to enhance the sustainable use of these breeds.

5. **Strengthen indigenous livestock keepers' rights**
   - Develop legal frameworks such as breed associations, geographical indications, and traditional knowledge safeguards to ensure fair benefits from conservation and commercialization.
6. **Enhance cross-sectoral coordination between global institutions**
   - Strengthen collaboration between CBD, the Food and Agriculture Organization of the United Nations (FAO), United Nations Framework Convention for Climate Change (UNFCCC) and the United Nations Convention to Combat Desertification (UNCCD) to integrate LIAnGRFA into national biodiversity, climate adaptation and land restoration strategies.
7. **Ensure LIAnGRFA inclusion in CBD negotiations**
   - Ensure LIAnGRFA is recognized in CBD COP discussions, biodiversity financing, and Nagoya Protocol revisions for benefit-sharing.

Conclusion - the urgency of action

Failure to explicitly recognize and protect LIAnGRFA in global biodiversity policies will lead to irreversible genetic loss, diminished climate resilience, and missed opportunities for sustainable development.

What is at stake?

- The livelihoods of millions of smallholder farmers and pastoralists who depend on indigenous livestock.
- Critical genetic diversity that holds solutions for climate change adaptation and disease resistance in future food systems.
- Ecosystem balance in rangelands and grazing landscapes that rely on indigenous livestock for soil fertility and biodiversity conservation.

As UNCBD COP17 and future negotiations shape the trajectory of global biodiversity conservation, policymakers must commit to fully integrating LIAnGRFA into global frameworks, financial mechanisms, and national biodiversity strategies. The inclusion of LIAnGRFA in international conservation efforts is critical to safeguard these invaluable genetic resources so they can continue to contribute to agricultural biodiversity, food security, and climate resilience in the face of global challenges.

Photo ILRI/Camille Hanotte.

1. Introduction

1.1. Background on LIAnGRFA and their role in biodiversity

1.1.1. Definition

Local and Indigenous Animal Genetic Resources for Food and Agriculture (LIAnGRFA) refer to livestock breeds and genetic variations that have developed naturally over centuries, shaped by local environmental conditions and human selection. These genetic resources include both conventional (cattle, sheep, goats, pigs, poultry, etc.) and non-conventional livestock species (camels, guinea fowl, grasscutters, guinea pigs, rabbits, insects, llamas, alpaca, yak, reindeers, banteng, water buffalo, eland, oryx, deer, etc.) as well as less commonly recognized genetic resources such as capybara, snails, frogs, reptiles, etc.

Unlike commercial livestock breeds — which are selectively bred for high productivity traits under intensive farming systems that rely on concentrated feeds, veterinary pharmaceuticals, and artificial reproductive technologies — indigenous livestock are adapted to specific local environments. Their ability to thrive in low-input systems, where feed, water, and health resources are often scarce, makes them crucial for sustainable livestock production.

Key adaptive traits of LIAnGRFA include:

- **Heat tolerance:** Studies confirm that indigenous cattle breeds in Africa, such as Ankole, Nguni, and Sheko, exhibit superior thermoregulation mechanisms, allowing them to withstand high temperatures and water scarcity — a crucial trait for climate adaptation strategies (Food and Agriculture Organisation of the United Nations [FAO] 2019).
- **Cold resilience:** Research on Mongolian yaks and Tibetan cattle demonstrates their ability to thrive in high-altitude and subzero conditions, sustaining pastoralist livelihoods in extreme climates (Ayalew et al. 2021)
- **Forage efficiency:** The Red Maasai sheep of East Africa can digest coarse, low-nutrient forages, making them better suited for rangeland systems where high-energy feeds are scarce (Baker et al. 2004)
- **Disease resistance:** N'Dama cattle in West Africa possess natural resistance to trypanosomiasis (sleeping sickness), reducing dependence on antibiotics and veterinary pharmaceuticals (International Livestock Research Institute [ILRI] 2023)
- **Livelihood security:** Indigenous livestock breeds support millions of smallholder farmers and pastoralists, providing meat, milk, wool, hides, and draught power essential for food security and rural economies.

1.1.2. The role of LIAnGRFA in biodiversity conservation and ecosystem restoration

LIAnGRFA play a crucial role in maintaining balanced ecosystems, contributing to soil health, and enhancing biodiversity. Their natural grazing behaviors, manure deposition, and ecological adaptability contribute significantly to sustainable land management and climate resilience. Unlike commercial breeds, which often rely on intensive inputs and controlled environments, indigenous livestock support low-input, environmentally regenerative practices that benefit ecosystems.

Key contributions of LIAnGRFA on ecosystem health:

- **Regenerating degraded landscapes:** Achieved through controlled grazing, which prevents desertification (Fernandez-Gimenez 2002).
- **Improving soil health:** Naturally fertilizing rangelands through manure deposition (Steinfeld et al. 2006).
- **Promoting sustainable grazing systems:** Maintaining biodiversity within rangelands and grasslands (Byrnes et al. 2018).
- **Enhancing water cycle efficiency:** Stabilizing soil structure and preventing erosion in grazing areas (Intergovernmental Panel on Climate Change [IPCC] 2019).
- **Soil fertility and carbon sequestration:** LIAnGRFA contribute to carbon storage by enriching soil organic matter, making them an essential tool for climate-smart agriculture (FAO 2021a)
- **Nutrient cycling:** Grazing livestock recycle nutrients within pastures and rangelands, facilitating plant biodiversity and sustaining healthy ecosystems (Drucker et al. 2020)
- **Pollination and seed dispersal:** Certain livestock species, such as indigenous goats and camels, aid in seed dispersal and pollination, promoting native plant regeneration (IPCC 2019).
- **Grazing management:** Well-managed grazing controls invasive species, prevents wildfires and supports healthy grassland ecosystems (FAO 2021b).

1.1.3. LIAnGRFA's contribution to climate resilience and food security

Livestock biodiversity is essential for climate adaptation, disease resistance, and sustainable food systems. Genetic diversity in indigenous breeds enhances resilience to climate change, ensuring stable food production even in extreme environments (FAO 2021c).

- **Climate adaptation:** Camels' genetics research highlights their unmatched ability to survive in extreme heat, making them a key resource for food security in arid regions (Kadim and Sahi 2018).

Photo ILRI/Stevie Mann.

- **Disease resistance:** Maintaining genetic diversity in livestock enhances disease resistance, reduces reliance on antibiotics and promotes low-input, biodiversity-friendly farming (Madalena 2012).
- **Sustainable food production:** Kenyan Agricultural and Livestock Research Organization (KALRO) improved *Kienyeji* (local) chicken and other indigenous poultry breeds outperform commercial hybrids in free-range conditions ensuring higher survivability rates for smallholder farmers (Nyaga 2017).

1.1.4. Cultural and economic significance of LIAnGRFA

Beyond their environmental and food security roles, LIAnGRFA are deeply intertwined with human culture, traditions, and economies. Preserving LIAnGRFA is essential for maintaining cultural diversity and bolstering economic resilience in rural communities.

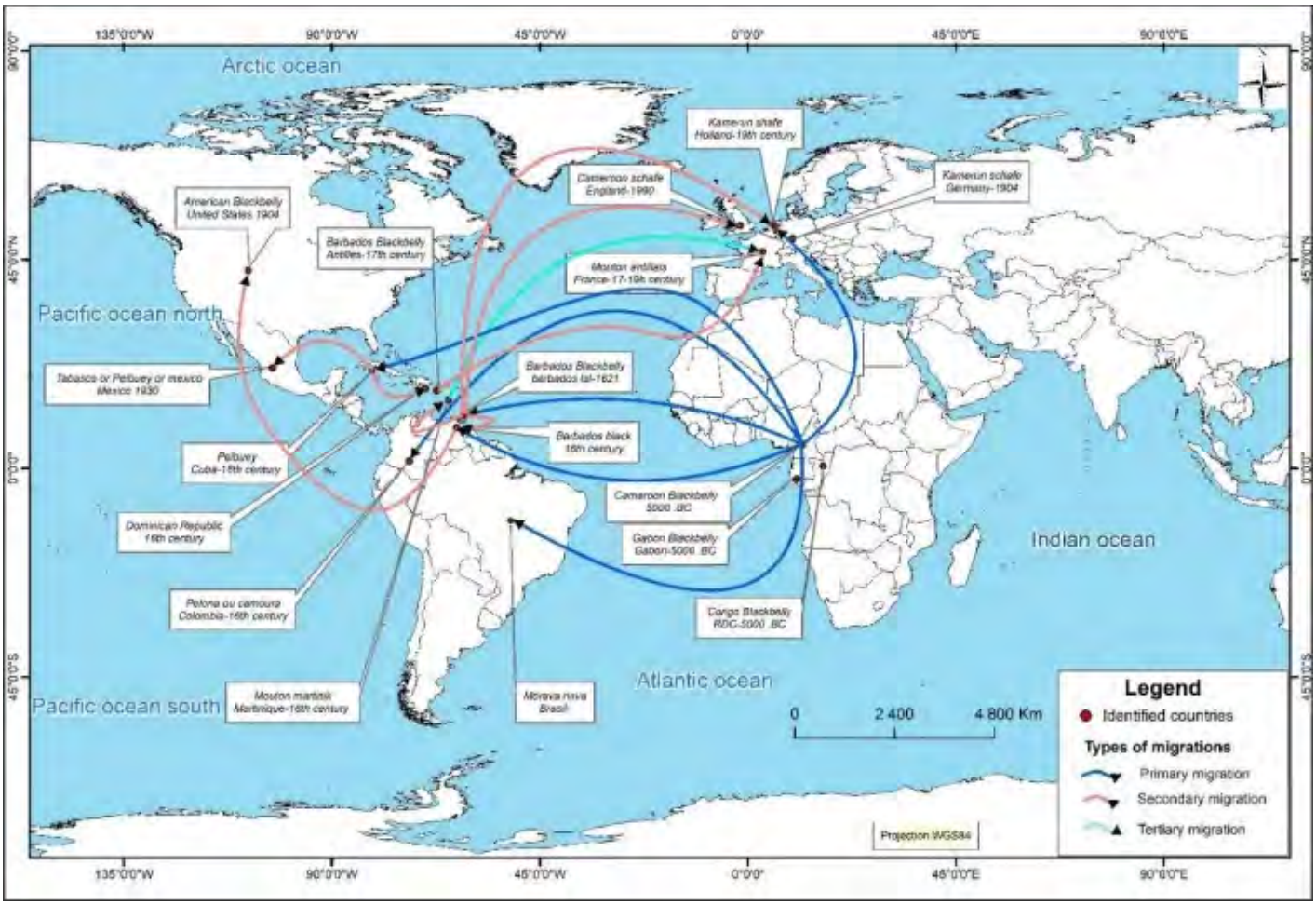
- **Social and cultural heritage:** They are deeply embedded in local traditions and rituals, serving as symbols of identity.
- **Livelihood security:** They sustain millions of smallholder farmers and pastoralists, providing a stable source of meat, milk, hides, and wool. In Zambia, Malawi, Zimbabwe and Ghana, guinea fowl farming has become popular as they are more resistant to poultry diseases, which makes them more productive for resource-poor households with minimum access to veterinary services (Karombo 2019; Abdallah and Oyebamiji 2024). In Nigeria, breeds like the White Fulani and Red Bororo cattle are crucial for the livelihoods of local communities, offering both nutritional and economic benefits (Kubkomawa 2017).
- **Economic resilience:** They require lower input costs than commercial breeds, making them economically viable for resource-poor farmers. For example, in Rajasthan, India, indigenous cattle breeds play a significant role in the livelihood security of farmers, especially in desert areas where crop failure is common due to drought conditions (Kumar 2019).

1.2. The critical role of global exchange in livestock breeding

The exchange of LIAnGRFA has significantly influenced livestock development worldwide. Although genetic exchanges have traditionally been perceived as predominantly North-to-South, emerging trends indicate increasing demand for climate-resilient traits from indigenous livestock in the Global South. Northern breeding programs are increasingly acquiring genetic material from tropical and locally adapted breeds, recognizing their value in global breeding initiatives.

An example of an indigenous breed with global influence is the Cameroon Blackbelly Sheep. Initially transported during the transatlantic trade era, this breed has played a foundational role in shaping international sheep populations, including the Barbados Blackbelly, American Blackbelly, Kamerun Schafe (Germany), and Martinik Sheep (Martinique). The breed is also recognized in Cuba, Mexico, and Colombia, with further populations identified in France, England, and the Netherlands. Despite regional adaptations, all Blackbelly sheep share distinct characteristics, including a brown coat with a black belly, high disease resistance (notably trypanotolerance), hardiness, and high reproductive rates. These traits make them highly valued for meat, leather, ecotourism, and, to a lesser extent, milk production.

Figure 1: Map of the Cameroon Blackbelly sheep dispersal in the world.



Source: https://www.isdgs-aoba.org/blackbelly-sheep-breeds-in-the-world.

Historically, livestock breeding has evolved through different phases:

- 19th Century: Urbanization and intensive agriculture led to breed stabilization through breed societies defining genetic purity (Gibson and Pullin 2005).
- Mid-to-late 20th Century: Genetic improvement programs, specialization and breeding cooperatives increased productivity but also contributed to breed displacement (Ayalew et al. 2003)
- Present day: The introduction of exotic genetic material is often viewed as a solution for low productivity, despite challenges related to climate adaptation and disease resistance.

Gibson and Pullin (2005) argue that the acceleration of genetic exchanges — through germplasm movement, cross-breeding, and within-breed selection — will shape the future of livestock breeding in developing regions. Ensuring access to a broad genetic base, supported by appropriate regulatory frameworks, will be fundamental in enabling these regions to develop livestock systems tailored to their specific needs, which mirrors successful approaches in other developing economies.

1.3. The threat to LIAnGRFA

Despite their significance, LIAnGRFA face severe threats due to environmental, economic, and policy-related pressures.

- **Habitat destruction:** Expanding industrial agriculture, urbanization, and land conservation are reducing the availability of traditional grazing land.
- **Crossbreeding and genetic dilution:** The introduction of high-yield breeds threatens the genetic integrity of indigenous livestock, leading to a loss of adaptive traits.
- **Climate change:** Raising temperatures, extreme droughts, and increase disease outbreaks place greater stress on indigenous livestock populations.
- **Policy and market marginalization:** Many national and international policies prioritize commercial livestock production over indigenous breeds, leading to underfunding of conservation efforts.

Case illustration: Impact of drought on East African livestock

The 2020-2023 droughts in East Africa resulted in the loss of nearly 10 million livestock, disproportionately affecting commercial breeds that lacked resilience to extreme heat and water scarcity. In contrast, indigenous breeds such as East African Zebu cattle and Red Maasai sheep survived in higher numbers, demonstrating the crucial role of LIAnGRFA in ensuring food security under climate stress (ILRI 2023).

Photo ILRI

2. Status of LIAnGRFA in the Convention on Biological Diversity (CBD) framework

2.1. How LIAnGRFA are currently addressed in the CBD

The CBD recognizes genetic resources as fundamental to biodiversity conservation and sustainable use, but LIAnGRFA have historically been underrepresented within this framework. The focus has largely been on plant biodiversity, with livestock genetic diversity often overlooked. Unlike crop genetic resources, which benefit from structured international agreements and multilateral benefit-sharing mechanisms, LIAnGRFA remains marginalized in global biodiversity governance.

- **The Kunming-Montreal Global Biodiversity Framework (GBF):** Target 4 of the GBF explicitly recognizes the importance of genetic diversity in ensuring food security and ecosystem resilience, offering a new entry point for LIAnGRFA within biodiversity strategies. The inclusion of livestock biodiversity under the GBF framework is essential for supporting resilient food systems, particularly in regions where indigenous livestock play a crucial role in climate adaptation and community livelihoods.
- **National Biodiversity Strategies and Action Plans (NBSAPs) and country implementation:** NBSAPs serve as the primary mechanism for translating the CBD framework into country-level action, but most fail to sufficiently incorporate LIAnGRFA, reflecting a broader trend of under-prioritization. Countries with strong indigenous livestock traditions — such as those in Africa, Asia, and Latin America — must integrate LIAnGRFA into their biodiversity and agricultural policies to align with the GBF's objectives. Strengthening the role of livestock genetic resources within NBSAPs can enhance both conservation efforts and food security strategies.
- **Access and Benefit-Sharing (ABS) mechanisms and the Nagoya Protocol:** The Nagoya Protocol provides a framework for ABS of genetic resources, yet its application to LIAnGRFA remains limited. While the protocol establishes legal pathways for equitable benefit-sharing, the absence of a standardized system for livestock genetic resources leaves significant gaps in implementation. Unlike crop genetic resources, which benefit from the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), LIAnGRFA lacks a similar multilateral system, resulting in fragmented access and governance structures.
- **Financial Mechanisms - The Global Environment Facility (GEF) and the Green Climate Fund (GCF):** Allocation patterns heavily favor plant genetic resources, with only a fraction of biodiversity funding directed toward LIAnGRFA conservation. Bridging this funding gap is critical for ensuring the long-term sustainability of indigenous livestock breeds, particularly in regions where they serve as key assets for food security and climate resilience.

2.2. Key limitations in LIAnGRFA conservation

The effective integration of LIAnGRFA into global biodiversity frameworks is hindered by several technical and research challenges. Addressing these limitations is essential for evidence-based policymaking, equitable benefit-sharing, and long-term conservation.

- **Limited recognition and policy fragmentation:** LIAnGRFA are not explicitly recognized in many CBD policies, leading to marginalization in biodiversity and agricultural conservation efforts.
- **Lack of coordinated governance:** The absence of a dedicated international treaty for LIAnGRFA leads to policy fragmentation and weak conservation incentives. Different organizations — including the CBD, FAO, CGIAR, UNFCCC and UNCCD — operate in silos, leading to duplication of efforts, lack of synergy, and inconsistencies in data collection and suboptimal conservation outcomes. At COP16 in Cali, Parties explicitly called for enhanced operational synergies among the three Rio Conventions, recognizing that fragmented governance undermines the effectiveness of biodiversity, climate and land restoration goals. Strengthening inter-convention collaboration and establishing a cohesive governance mechanism would help harmonize policy approaches, improve data sharing, reduce duplication, and incentivize investment in sustainable management of LIAnGRFA.
- **Lack of comprehensive data on LIAnGRFA:** There is no standardized data collection and monitoring mechanism at the global level, preventing informed decision-making and hindering targeted conservation strategies. The lack of comprehensive population and genetic data exacerbates the risk of genetic erosion and biodiversity loss.
- **Insufficient funding:** Global biodiversity financing mechanisms prioritize plant conservation over livestock genetic diversity, resulting in resource disparities.
- **Weak ABS implementation:** The Nagoya Protocol does not adequately address ABS mechanisms specific to livestock genetic resources, which perpetuates inequalities in genetic resource utilization and limits community-driven conservation initiatives.

2.3. Other international agreements relevant to LIAnGRFA

2.3.1. FAO's global plan of action for animal genetic resources

Introduced in 2007, this plan serves as a comprehensive guide for countries to develop and implement policies that ensure the sustainable use, development and conservation of animal genetic resources, including LIAnGRFA. Key components include:

- **Characterization, inventory, and monitoring:** Establishing comprehensive systems to assess and monitor animal genetic resources, facilitating informed decision-making for conservation and utilization.
- **Sustainable use and development:** Promoting breeding and management practices that enhance productivity while maintaining genetic diversity, ensuring adaptability to changing environmental conditions.
- **Conservation:** Implementing both in-situ (on farm) and ex-situ (gene banks) conservation strategies to preserve genetic diversity for future generations.
- **Policies, institutions, and capacity building:** Strengthening institutional frameworks and building capacities to support effective management of animal genetic resources.

2.3.2. International Treaty of Plant Genetic Resources for Food and Agriculture (ITPGRFA)

The ITPGRFA, adopted in 2001, is a comprehensive international agreement that facilitates the conservation and sustainable use of plant genetic resources. This treaty has facilitated global exchange mechanisms, financial support, and standardized policies for plant biodiversity. Key features include:

- **Multilateral system of access and benefit-sharing:** The treaty establishes a standardized system for accessing plant genetic materials and sharing benefits derived from their use.
- **Benefit-sharing fund:** It includes a financial mechanism to support conservation and sustainable use projects, particularly in developing countries.

While both crop and livestock biodiversity fall under the CBD's broad objectives, key differences exist in how they are managed within global policy frameworks.

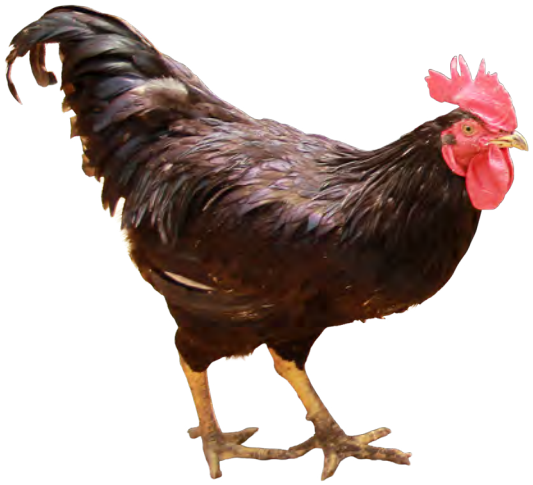
Table 1: How global policy frameworks address crop and livestock biodiversity.

Policy aspect	Crop genetic diversity	Livestock genetic diversity
Dedicated Global Treaty	ITPGRFA provides a comprehensive framework for conservation, access, and benefit sharing of plant genetic resources.	No equivalent treaty exists for LIAnGRFA. A dedicated animal genetic resources treaty is needed to establish global governance.
Access and Benefit-Sharing	The Nagoya Protocol and ITPGRFA's multilateral system provide clear guidelines on the exchange and benefit-sharing of crop genetic resources.	LIAnGRFA are not fully covered under Nagoya Protocol ABS frameworks. A livestock-specific ABS mechanism is needed.
Conservation Strategies	Strong in-situ and ex situ conservation programs for crop biodiversity, including seed banks and protected areas for wild relatives.	Limited in-situ and ex-situ conservation support for LIAnGRFA. Need national and regional livestock gene banks and breed conservation funding.
Financial Resources	Funding mechanisms exist through GEF, GCF, and the Global Biodiversity Fund for crop conservation.	LIAnGRFA receive significantly less financial support. A dedicated conservation fund is needed within major biodiversity finance mechanisms.
Global Action Plan	The Global Plan of Action for Plant Genetic Resources guides global efforts for crop conservation and sustainable use.	The Global Plan of Action for Animal Genetic Resources exists but lacks strong integration into CBD policies.
Research and Data Coordination	Global information systems track crop diversity (e.g., FAO's WIEWS, ITPGRFA data systems).	No centralized LIAnGRFA information system exists. Need a global database for tracking breed diversity and conservation status.

Photo ILRI/Stevie Mann.

While direct replication of the ITPGRFA model may not be feasible for livestock due to biological and management differences, it provides valuable insights for designing a similar governance structure for LIAnGRFA. Key differences between plant and animal genetic resources include:

- **Dynamic breeding:** Unlike plants, livestock require continuous breeding and adaptation, making conservation efforts more complex.
- **Mobility and adaptation:** Indigenous livestock breeds co-evolve with local environments and require transboundary conservation approaches.
- **Limited ex-situ conservation options:** While crops can be stored in seed banks, livestock conservation depends on breeding programs and living gene banks.
- **Diverse custodian groups:** LIAnGRFA are often maintained by pastoralist communities, smallholder farmers, and indigenous groups requiring livelihood-sensitive conservation approaches.



2.4. Recognition of LIAnGRFA at COP16 and key outcomes

The 16th meeting of the Conference of the Parties to the Convention on Biological Diversity (COP16) held in Cali, Colombia, marked a significant milestone in global biodiversity governance by formally recognizing the crucial role of LIAnGRFA. Key outcomes included:

- **Integration of LIAnGRFA in digital sequence information discussions:** COP16 addressed the complexities surrounding the use of digital sequence information of genetic resources, emphasizing the need for equitable benefit-sharing mechanisms.
- **Establishment of the Cali fund**: A dedicated funding mechanism projected to allocate $100 million annually for the conservation of LIAnGRFA.
    - Direct financial support for traditional livestock breeds: Supporting conservation efforts for climate-resilient species like the East African Zebu and Red Maasai sheep.
    - Recognition of Indigenous Peoples and Local Communities (IPLC): Acknowledging IPLCs as primary stewards of LIAnGRFA, the fund ensures support for community-led conservation programs.

These developments signify a progressive shift toward inclusive biodiversity policies that recognize and support the vital contributions of LIAnGRFA to global food security and ecosystem resilience.

3. Policy solutions and action plan for LIAnGRFA

This section outlines actionable policy recommendations for strengthening the inclusion of LIAnGRFA within global biodiversity governance. To provide a comprehensive approach, these recommendations are categorized into two distinct levels: macro-level and micro-level. The recommendations are framed within short-term (0-3 years), medium-term (3-7 years), and long-term (7+ years) actions.

3.1. Macro-level policy recommendations

Macro-level recommendations focus on high-impact policy reforms, international agreements, institutional coordination, and financial commitments necessary to integrate LIAnGRFA into global biodiversity, agriculture, and climate policies.

3.1.1. Short-term actions (0-3 Years)

The objective is to ensure the immediate recognition of LIAnGRFA in global policy frameworks and secure initial commitments.

- Explicit recognition in CBD, UNFCCC, and UNCCD negotiations
  - Ensure that LIAnGRFA is formally included in CBD COP deliberations.
  - Engage CBD national delegates and subsidiary bodies to recognize LIAnGRFA within biodiversity and climate discussions.
  - Advocate for LIAnGRFA recognition in international agreements such as the Global Stock take under the Paris Agreement and the FAO's Global Plan of Action for Animal Genetic Resources.
- Integration into Global Biodiversity Frameworks
  - Revise the GBF targets to explicitly reference indigenous livestock breeds. Incorporating LIAnGRFA aligns with Goal A[1], which focuses on maintaining and enhancing the integrity and resilience of ecosystems.
  - Mainstream LIAnGRFA into NBSAPs.
- Initiate dedicated funding for LIAnGRFA Conservation
  - At least 10% of biodiversity funding should be allocated to LIAnGRFA.
  - Mobilize donor governments and private sector partnerships for targeted LIAnGRFA projects.

3.1.2. Medium-term actions (3-7 years)

The objective is to establish foundational global frameworks, regulatory mechanisms, and institutional coordination.

- Develop an international agreement for LIAnGRFA
  - Initiate an intergovernmental process (potentially under FAO) to draft a voluntary code of conduct for LIAnGRFA, similar to the ITPGRFA.
  - Develop a Material Transfer Agreement to regulate the responsible exchange of genetic resources.
- Enhance Access and Benefit-Sharing (ABS) for LIAnGRFA
  - Revise Nagoya Protocol ABS mechanisms to include livestock-specific frameworks.
  - Streamline ABS procedures by establishing a multilateral system that avoids complex processes and high transaction costs, enabling facilitated access to genetic materials for local livestock breeders and scientists without financial barriers (Beato and Veneroso 2023).
  - Promote fair benefit-sharing through the Cali Fund model, allocating direct financial support to IPLCs engaged in indigenous livestock conservation (Koehler-Rollefson and Meyer 2015)
- Recognize and protect local and indigenous livestock famers' rights
  - Implement mechanisms to ensure equity for livestock keepers and smallholders, addressing imbalances caused by globalization and commercialization.
  - Develop a sui generis system for LIAnGRFA, including breed associations, trademarks and geographical indicators, and traditional knowledge safeguards.
  - Ensure that indigenous livestock breeders benefit from conservation and commercialization efforts.
- Build local capacity and knowledge
  - Strengthen local expertise in livestock genetics, breeding techniques and conservation methods through community-driven training programs.
  - Promote collaborations between governments, international organizations (e.g., FAO, ILRI, and CGIAR) research institutions, and local communities to co-develop resilient livestock systems.
  - Support indigenous and pastoralist knowledge-sharing networks, integrating traditional breeding practices into modern conservation strategies.
- Establish a global LIAnGRFA information system
  - Develop a centralized, transparent data platform compiling and disseminating information on the origin, distribution, diversity and utilization and conservation status of LIAnGRFA.
  - Leverage existing information systems (such as those under ITPGRFA) to enhance monitoring, breeding improvement and conservation programs.
- Promote policy integration and institutional coordination
  - Improve coordination between CBD, FAO, UNFCCC, and other relevant institutions to develop coherent policies recognizing indigenous livestock as part of biodiversity and climate resilience efforts.

1 2050 Goals.

- Ensure LIAnGRFA integration into GBF monitoring indicators, ensuring explicit inclusion of indigenous livestock breeds in global biodiversity conservation targets.

3.1.3. Long-term actions (7+ Years)

Secure the permanent integration of LIAnGRFA into biodiversity, food security, and climate policies globally.

- Operationalize a global treaty for LIAnGRFA conservation
  - Transition to a legally binding treaty for LIAnGRFA under FAO or CBD.
  - Institutionalize global conservation funding, ensuring permanent support for indigenous breeds.
- Ensure sustainable financing
  - Secure permanent allocation of biodiversity finance for LIAnGRFA within major funding mechanisms such as GEF, GCF, and the Global Biodiversity Fund.
  - Expand the Cali Fund to include long-term financing for IPLC-led conservation efforts, ensuring direct compensation for local communities managing genetic diversity.
  - Promote Public-Private Partnerships for market-driven conservation initiatives, linking livelihoods, conservation and sustainable agribusiness models.
- Ensure ABS compliance
  - Promote compliance with national and international regulations on ABS through monitoring mechanisms, advisory support, and legal assistance – especially for developing countries and economies in transition.

3.2. Micro-level policy recommendations

Micro-level recommendations involve specific, detailed revisions and additions to existing policy instruments, particularly targeting articles within the CBD and relevant targets in the Kunming-Montreal GBF. These targeted interventions ensure that LIAnGRFA receive explicit recognition, legal protection, financial support, and structured governance within biodiversity conservation frameworks.

3.2.1. Revisions to the CBD

Article 8 (in-situ conservation): Recognize pastoralist systems as biodiversity landscapes. Official recognition within the CBD framework will ensure their protection, promote sustainable grazing practices, and incentivize biodiversity-friendly livestock management (e.g., biodiversity credits, conservation payments).

Article 9 (ex-situ conservation): Establish national and regional LIAnGRFA gene banks. Require CBD Parties to develop national breed conversation strategies, ensuring the long-term cryopreservation and genomic mapping of LIAnGRFA to prevent genetic erosion. Promote public-private partnerships to fund community-driven ex-situ conservation programs, ensuring equitable benefit-sharing for custodians of indigenous breeds.

Article 10 (sustainable use): Support traditional livestock management systems. Policies should support and integrate these systems into national biodiversity plans to enhance sustainable livestock management. Ensure that market-driven livestock policies do not promote genetic homogenization, which threatens locally adapted breeds.

Article 15 (access to genetic resources and benefit-sharing mechanisms): Develop a livestock-specific ABS framework. A dedicated livestock ABS framework would regulate gene flows resulting from cross-border livestock movement; ensure fair and equitable benefit-sharing from the commercialization of indigenous livestock breeds; and promote simplified ABS processes for local livestock breeders and researchers to access and share genetic materials without excessive bureaucratic barriers.

Article 16 (access to and the transfer of technology): Enable LIAnGRFA-specific breeding innovations. Encourage technology transfer that supports in-situ breeding strategies, which ensures indigenous knowledge systems are protected from biopiracy. Ensure free and fair access to breeding technologies, veterinary care, and climate-smart livestock innovations for indigenous livestock keepers.

Article 20 (financial mechanisms): Allocate dedicated LIAnGRFA conservation funding. Mandate a dedicated funding stream within CBD financial mechanisms (e.g., GEF, GCF, and the Biodiversity Fund) to support LIAnGRFA conservation, research, and breeding programs. Expand the Cali Fund to include long-term financial commitments to IPLC-led livestock conservation efforts.

3.2.2. Revisions to the Kunming-Montreal Global Biodiversity Framework

Target 4 (genetic diversity): Explicit inclusion of LIAnGRFA. This will ensure they receive specific conservation measures and financial support, preventing further genetic erosion. The revision aligns with CBD's objectives on genetic resources and food security. Proposed revision (suggested addition is in bold italic):

"Ensure urgent management actions to halt human-induced extinction of known threatened species and for the recovery of conservation of species, in particular those which are declining, and the maintenance of genetic diversity within populations of wild and domesticated species, including their wild relatives and ***indigenous and locally adapted livestock breeds,*** to maintain their adaptive potential and the resilience of populations and ecosystems."

Target 10 (sustainable agriculture): Recognize pastoralism and extensive livestock systems. The current text does not explicitly reference pastoralist systems or LIAnGRFA, despite their crucial role in sustainable agricultural landscapes. Indigenous livestock breeds contribute to ecosystem balance, nutrient cycling, and climate resilience, making their explicit inclusion essential. The revision aligns with global efforts to integrate traditional livestock systems into climate-smart agriculture strategies. Proposed revision (suggested addition is in bold italic):

"Ensure that areas under agriculture, aquaculture, fisheries, and forestry, ***including pastoralist systems and extensive livestock production landscapes,*** are managed sustainably, in particular through the sustainable use of biodiversity, contributing to the resilience and long-term efficiency and productivity of these systems, and to food security, while enhancing biodiversity and improving the condition of ecosystems and reducing negative impacts. ***Recognize the role of indigenous livestock breeds in maintaining ecosystems, biodiversity and food systems resilience."***

Target 13 (fair and equitable benefit-sharing): Strengthen ABS for LIAnGRFA. Establish a multilateral ABS system that avoids complex legal and transactional costs for local breeders; ensures users of LIAnGRFA genetic materials share benefits with the regions of origin and recognizes global interdependence in livestock genetic resource exchange.

Target 18 (traditional knowledge): Protect indigenous livestock farmers' rights. Develop a sui generis protection system for LIAnGRFA, including breed associations, trademarks and geographical indicators, and traditional knowledge safeguards. Ensure that pastoralist and smallholder livestock keepers receive formal recognition and economic benefits from the commercialization of indigenous breeds.

Target 19 (funding for biodiversity): Increase LIAnGRFA financial allocations. Allocate at least 10% of biodiversity funding from GEF, GCF, and other international mechanisms to LIAnGRFA conservation and climate adaptation projects. Establish permanent financial mechanisms within NBSAPS to support community-led conservation initiatives.

3.2.3. Strengthening policy integration and compliance mechanisms

Enhancing coordination between key institutions (CBD, FAO, and UNFCCC) will ensure livestock biodiversity conservation is integrated into global climate adaptation strategies and LIAnGRFA policies align with broader food security and sustainable agriculture goals.

Strengthen compliance with national and international ABS regulations through monitoring and evaluation frameworks; advisory and technical assistance for developing countries; and legal support for IPLCs and pastoralist communities to safeguard genetic resources.

Photo ILRI/Apollo Habtamu.

4. Conclusion

Global livestock biodiversity is a cornerstone of human well-being, a healthy planet, and economic prosperity for all. Its conservation and sustainable use are essential for building resilient food systems, supporting climate adaptation, and achieving the SDGs. By fully integrating the biodiversity of local and indigenous animal genetic resources for food and agriculture into the Global Biodiversity Framework, we can catalyze and enable transformative action to halt and reverse biodiversity loss, ensuring a sustainable future for people and the planet. The conservation of these livestock genetic resources, particularly in rangelands, is a key component of this effort, contributing to the resilience of agricultural systems, the preservation of cultural heritage, and the sustainable management of ecosystems. Through coordinated global action, we can safeguard LIAnGRFA biodiversity and its contributions to a sustainable and equitable world. This document provides a vision for change: by explicitly recognizing LIAnGRFA in CBD negotiations, integrating them into GBF and NBSAPs, strengthening ABS frameworks, and mobilizing dedicated financial resources, we can unlock their full potential for sustainable development.

4.1. The urgency of action

Failure to act now will result in irreversible genetic loss, undermining the resilience of future food systems and exacerbating vulnerabilities for millions of smallholder farmers and pastoralists worldwide. Indigenous livestock, such as the N'Dama cattle of West Africa, which have natural resistance to trypanosomiasis, or the Red Maasai sheep of East Africa, known for their ability to digest coarse, low-nutrient forages, are critical to sustainable agriculture and climate adaptation. The increasing pressure from habitat destruction, genetic dilution through crossbreeding, and climate change further threatens these irreplaceable breeds.

A failure to integrate LIAnGRFA into biodiversity governance is not just a technical oversight but an issue of equity and justice. Pastoralists and indigenous communities, who have maintained these breeds for generations, face increasing marginalization and lack of access to benefit-sharing mechanisms. Recognizing their role as stewards of biodiversity is essential for ensuring not only environmental sustainability but also socio-economic equity.

Photo ILRI/StevieMann.

4.2. Next steps

To operationalize the recommendations outlined in this document, urgent action is needed at multiple levels:

a) International policy platforms (CBD, GBF, FAO, UNFCCC, and UNCCD)

- Adopt formal amendments to the CBD and the GBF to explicitly recognize LIAnGRFA.
- Establish a dedicated livestock-specific ABS framework under the Nagoya Protocol to protect traditional livestock keepers' rights and ensure equitable benefit-sharing.
- Commit to increasing biodiversity funding for LIAnGRFA conservation — at least 10% of GEF and GCF financing for indigenous livestock conservation and breeding programs.
- Strengthen collaboration between CBD, FAO, and UNFCCC to ensure LIAnGRFA policies are embedded within climate adaptation and biodiversity action plans.

b) National governments

- Integrate LIAnGRFA into NBSAPs, ensuring that conservation efforts and funding mechanisms are explicitly allocated at the country level.
- Establish and fund national livestock genetic repositories and gene banks to safeguard indigenous livestock genetic diversity.
- Develop legal and institutional frameworks that recognize and protect the rights of pastoralists and indigenous livestock breeders, ensuring they benefit from genetic resource commercialization and conservation initiatives.

c) Funders and financial institutions (GEF, GCF, development banks, and philanthropic donors)

- Establish a dedicated funding window for LIAnGRFA conservation, ensuring long-term financial commitments for breed conservation, genetic resource management, and indigenous livestock research.
- Develop blended finance models combining public funding, private sector investments, and community-based financial mechanisms to ensure sustainable financing for LIAnGRFA
- Expand eligibility criteria in existing biodiversity and climate funding programs to include LIAnGRFA conservation initiatives and indigenous livestock breeding programs.
- Support community-led conservation initiatives ensuring direct access to financial resources for indigenous and pastoral communities involved in LIAnGRFA conservation.
- Monitor and evaluate the impact of biodiversity investments, ensuring funding for LIAnGRFA contributes to measurable conservation outcomes and benefits local communities.

d) Research institutions and conservation networks

- Establish a global LIAnGRFA information system, modeled after the ITPGRFA, to track breed status, genetic diversity, and conservation efforts.
- Support traditional knowledge integration into breeding and conservation strategies, ensuring that indigenous and pastoralist communities play a central role in policy formulating and implementation.
- Develop fair benefit-sharing mechanisms, including direct financial support through models such as the Cali Fund, to incentivize and sustain community-led conservation initiatives.

By taking decisive action now, we can protect global livestock diversity, strengthen climate resilience, and secure food and livelihoods for future generations.

Photo ILRI/Stevie Mann.

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Acknowledgments: This technical policy brief is a collaborative effort between the International Livestock Research Institute (ILRI) and the Center for Tropical Livestock Genetics and Health (CTLGH).

The document has been formally shared with the Secretariat of the Convention on Biological Diversity (CBD) to inform ongoing discussions. It is intended to support Member States, negotiators, and development partners in aligning LIAnGRFA with the Kunming-Montreal Global Biodiversity Framework (GBF), National Biodiversity Strategies and Action Plans (NBSAPs), and biodiversity financing mechanisms.

This brief is part of a broader set of contributions aimed at ensuring that local, indigenous, and non-conventional livestock biodiversity is recognized, valued, and equitably supported within international, regional, and national biodiversity, climate, and land/desertification frameworks.

We welcome feedback and contributions. Please direct these to Christian Tiambo, lead scientist on CBD, ILRI – C.Tiambo@cgiar.org