



Protecting genetic resources: essential strategies for biodiversity



POLICY INSIGHTS

Genetic diversity is the variation of genes between and within species. Maintaining high genetic diversity enables species to adapt to climate and environmental changes. Protecting agricultural genetic resources is essential for plants and livestock to maintain this diversity, and to ensure resilience and sustainability in agriculture and forestry systems. EU funds, and in particular the Common Agricultural Policy (CAP), can play an important role in supporting this.

Genetic resources face increasing challenges related to climate change, land use, and consumption and production patterns; negligent exploitation of natural resources; substitution of local breeds and varieties; and poor management practices that lead to the degradation of biodiversity¹. Promoting strategic **research and innovation** on crops, livestock and forest species is essential to enhance their resilience and adaptation to climate change.

Gene loss and the erosion of gene diversity are pressing challenges on a global scale. The decrease of genetic resources seriously compromises the agriculture and forestry sectors, making them more vulnerable to climate change. It is estimated that **49% of mammalian livestock breeds and 39% of avian breeds in Europe and the Caucasus are threatened; a total of 357 mammalian and 119 avian breeds have already gone extinct**. This loss damages the resilience and sustainability of agricultural and forestry systems, requiring urgent coordinated conservation efforts.

Greater emphasis should be placed on the conservation and sustainable use of genetic resources as we move towards more sustainable and resilient agriculture and forestry systems. A critical dimension of this approach is its adherence to the **International Treaty on Plant Genetic Resources for Food and Agriculture**, which enshrines a worldwide system of benefit-sharing and access to

genetic resources. Strategies for protecting genetic resources find specific mention within all the leading international frameworks – for example, the **Sustainable Development Goals** (SDG 15) and the **Convention on Biological Diversity** (CBD) with the **Kunming-Montreal Global Biodiversity Framework** (GBF). Countries hold sovereign rights over their genetic resources, and the **Nagoya Protocol**, a supplementary agreement to the CBD, along with the **EU's Access and Benefit Sharing Regulation**, ensures fair sharing of benefits derived from these resources, particularly when used in research and development.



Other examples of more recent policy developments at the EU level include the **farm-to-fork strategy**, and **the new EU forest strategy for 2030**. Among its objectives, this policy aims to increase agrobiodiversity by offering more Plant Reproductive Material choices to farmers, facilitating conservation through simplified rules and specific derogations for seed networks and exchanges, and addressing both the conservation of diversity and the regulatory

¹ Lovrić, N., Fraccaroli, C., & Bozzano, M. (2023). A future EU overall strategy for agriculture and forest genetic resources management: Finding consensus through policymakers' participation. *Futures*, 151, 103179.





impacts on smaller producers, as per the [Arche Noah position paper](#).

Another policy milestone is the EU [biodiversity strategy for 2030](#), which is a comprehensive, ambitious and long-term plan to protect nature and reverse [the degradation of ecosystems](#). The strategy aims to put Europe's biodiversity on a path to recovery by 2030, and contains specific actions and commitments to that end, being the proposal for the EU's contribution to the upcoming international negotiations on the global post-2020 biodiversity framework. A core part of the [European Green Deal](#), it will also support the green recovery following the Covid-19 pandemic.

In 2021, EU-level stakeholder initiatives, including the [European Cooperative Programme for Plant Genetic Resources \(ECPGR\)](#), [European Regional Focal Point for Animal Genetic Resources \(ERFP\)](#), and [European Forest Genetic Resources Programme \(EUFORGEN\)](#), launched the [Genetic Resources Strategy for Europe](#), which complements several key EU policies under the [European Green Deal](#). This strategy, developed in the framework of the [GenRes Bridge](#) Horizon 2020 project, promotes the conservation and sustainable use of plant, animal, and forest genetic resources, aligning with efforts to boost Europe's bioeconomy and sustainability commitments.



Gene protection: conservation strategies and practice

The protection of agriculture and forest genetic resources follows two complementary approaches for [in-situ and ex-situ conservation](#). *In-situ* conservation includes maintaining the genetic diversity of ecosystems and natural environments within which crop varieties can adapt and evolve on their own. *Ex-situ* conservation involves keeping genetic materials outside their natural habitats, such as in a gene bank, botanical garden, or seed bank. It is necessary for the long-term storage and protection of genetic diversity and often involves cutting-edge technologies. Two examples of good genetic conservation practices include [EUGENA](#), which safeguards animal genetic resources, and [AEGIS](#), which integrates plant genetic resources across Europe. Another example is the [pan-European network of Genetic Conservation Units for forest tree species](#), which supports both *in-situ* and *ex-situ* conservation efforts.



Initiatives that involve farmers, foresters and rural communities as custodians of locally adapted varieties, breeds, and plant populations can secure genetic resources for the future, while also supporting rural economies. The use of traditional methods and the conservation and protection of traditional animal and plant species can generate new market opportunities for local products. Strategic alliances with rural development programmes in tourism, gastronomy, and in general can boost conservation schemes. Initiatives to promote local varieties can be most successful when they are based on collaborations with research institutions, non-commercial initiatives, and farming communities. Under Horizon Europe, [research and innovation activities](#) aim to stop the loss of genetic diversity and unlock the vast gene pool of plants and animals, making it accessible to breeders, farmers, foresters, and ultimately consumers. For example, three Horizon Europe projects - [Pro-wild](#), [FRUITDIV](#), and [COUSIN](#) - support efforts to enhance the conservation of crop wild relatives (CWR), the wild cousins of cultivated crops, through both *in-situ* and *ex-situ* methods, and to increase their utilisation in plant breeding and farming.





Red Cow breed

This Greek project focused on reviving the indigenous Red Kastoria-Kristallopigi cattle through pedigree certification. This approach enhanced meat quality and increased the resilience of the cattle, while also sustaining the economic viability of local breeding. A winner of the [Rural Inspiration Awards - RIA2022](#), the project quickly grew from 27 breeders and 1700 animals to 85 breeders and 5200 pedigree-certified animals, thereby boosting the competitiveness of Greek beef by prioritising quality.

Within the CAP, all Member States, except Latvia and Denmark, plan to support genetic resources in agriculture and forestry according to the [28 approved CAP Strategic Plans](#). This covers two categories: saving endangered breeds and plant types under threat of genetic erosion, and supporting efforts for the conservation, sustainable use, and development of genetic resources in agriculture and forestry. The vast majority of Member States support the preservation of endangered livestock breeds (with a wide range of farm animals supported across Member States) and agricultural plant varieties. However, there are also interventions aimed specifically at the forest sector through both *in-situ* and *ex-situ* conservation measures (e.g. gene banks), as well as other conservation-related initiatives. Member States are implementing a range of schemes to promote both agricultural and forest genetic resources under their environment-climate commitments ([Article 70 of the CSP Regulation](#)). Additionally, a few Member States use Article 32 by targeting notably endangered and/or local breeds through their coupled income support.

The EU CAP Network is supporting CAP stakeholders in the design of interventions addressing the conservation and sustainable use of genetic resources through its [thematic work](#) and the dissemination of inspiring [good practices](#).

Italian and Maltese LAGs cooperate for the preservation of the genetic resources of olive trees

This transnational initiative carried out an in-depth genetic study to establish the great genetic diversity of Maltese olive trees (46 different genotypes were identified). It also included conservation efforts to safeguard the Maltese olive germplasm, in view of future agronomic and climate-related challenges, as well as awareness-raising activities (seminars and publications) to promote olive tree conservation.

