



FACTSHEET

Maintenance of genetic diversity

In a nutshell

Genetic diversity (the variety of genes between and within species populations) distinguishes different breeds or races from each other, providing the basis for locally well-adapted cultivars and a gene pool for developing commercial crops, livestock, as well as commercial products (e.g. pharmaceuticals, cosmetics and flavourings).

1. Role for human well-being

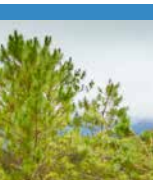
Agricultural producers and local people benefit (in terms of subsistence and commercial use) from the diversity of crops and wild plants and animals adapted to local conditions. The term "[agrobiodiversity](#)" is used to refer to the genetic diversity important for food and agriculture. In the Philippines, (see [SEARICE-report p. 38 ff.](#)) an initiative to conserve local varieties of rice aided the development of rice strains that are better adapted to local conditions - giving greater yield, a high quality seed supply, and decreasing dependence on plant breeders at a much lower cost than that of commercial plant breeding.

In addition, genetic diversity plays a role in preserving options for the future: we cannot know which plants or animals will be especially important for humans in the future, such as which species may contain a substance useful for making a specific medicine.

2. Typical threats

The main reasons for the loss of genetic diversity are the loss of forest cover, coastal wetlands and other 'wild' uncultivated areas with high biodiversity and the destruction of the aquatic environment. The [FAO](#) reports that the state of agrobiodiversity is alarming: since the beginning of the 20th century, the world has lost 90% of agrobiodiversity for 20 of its major staple food crops. Genetic resources in agriculture have mainly been lost through the loss of traditional cultivars of crop species (due in part to the adoption of industrial farming practices and varieties) and through species extinction, see [Greenfacts](#). Further issues in agriculture are the promotion of commercial (genetically modified) seed varieties and the exclusion of genetic variations via patent procedures. Additionally, patents taken out by life science companies can prevent local people from benefiting financially from the commercial use of plants or animals for medicine and at its worst exclude them formally even from subsistence use. The introduction of invasive species into ecosystems is another growing threat. In many cases – especially in most developing countries – climate change will have a negative impact on wild and cultivated genetic diversity. This implies a need for new crop varieties that can withstand the regional or local effects of climate change in order to ensure food security.





3. Example indicators

- The dependence of households on local adapted crop species is an indicator of their value.
- Genetic diversity of crop products. For example, in Germany the indicator [genetic diversity](#) is used to show the endangerment of genetic resources for food and agriculture, initially using selected indigenous breeds as examples.
- [Ex-situ crop collection](#) indicates the dynamics of the bio- and geographical diversity contained within ex-situ collections over time.
- The indicator [genetic diversity of terrestrial domesticated animals](#) shows the rate of genetic or breed diversity of farmed or domesticated animals, which in turn offers vital options for adapting livestock production to future challenges.
- [Trends in invasive alien species](#) measures plants, animals and micro-organisms outside their natural geographic range and thus the threat to genetic diversity.

Global available sources for national data:

- The [Global Biodiversity Information Facility](#) is the biggest biodiversity database on the internet.
- See the [Crop Wild Relatives Global Atlas](#) and [Vincent et al. \(2013\)](#) for a prioritised crop wild relative inventory to help underpin global food security.

4. Example methods

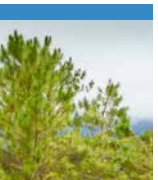
For **assessing the value** of this ecosystem service:

- [Damage costs and avoided costs](#) as well as [Reparation costs](#) – here a loss is not irreversible
- [Contingent valuation](#)
- [Choice experiments](#)
- See the report [Valuing Participatory Plant Breeding for a review of tools and methods](#) based on case studies.
- [Surveys or questionnaires](#) focusing on the crop species used in order to understand humans' dependence on them.

For **assessing the condition** of this ecosystem service:

- [Mean species abundance](#) is an indicator of naturalness or biodiversity intactness. It is defined as the mean abundance of original species relative to their abundance in undisturbed ecosystems.
- Using participatory research methods such as [questionnaires](#), conducting [interviews](#) with key informants, [focus group discussions](#) etc., a wide range of relevant information can be collected. Such as the identification of used crop landraces based on morphological characteristics; traditional knowledge, beliefs and biocultural heritage associated with all aspects of crop cultivation and identify the custodians. See for example:
 - [Documentation of yam diversity and associated traditional knowledge systems in Yap state, Federated States of Micronesia \(FSM\)](#)
 - [Participatory Methods to assess traditional breeding systems.](#)





5. Managing this service

Typical instrument for managing this services include:

Protection of habitats

- The protection of natural or semi-natural habitats is key to the large-scale preservation of genetic diversity. In [Choiseul, Solomon Islands](#), analysing ecosystem services and environmental pressures helped to optimise the location of protected areas and protected area networks.

For further background information and examples, see the ValuES factsheet [Habitats for species](#).

In-situ conservation of endangered species

- Snow leopards are an endangered 'flagship species' in the Himalayan region and are play a key role in maintaining the mountain ecosystem. [A village-run insurance programme](#) for valuable large livestock such as yaks, cattle and horses has been set up and funded. The programme is focused on better herding practices and making more wild prey available, compensating for the total costs of animals lost by means of insurance programmes, and finally an awareness raising programme.
- A nest protection and a by-catch and release programme in [Watamu Beach, Kenya](#), have been enabling local communities to preserve and monitor endangered turtles and their nests.

Conservation of crop diversity and traditional cultivars of crop species

- The [Crop Trust](#) supports a range of activities designed to ensure that collections of crops are better understood, more easily available, more safely conserved, and more securely funded. The Trust supports the conservation of crop diversity in gene banks worldwide and, by way of a back-up for these valuable seed collections – the sub-national [Svalbard Global Seed Vault](#).
- The [International Institute of Tropical Agriculture](#) offers guidance on, among other things, [Strategies for Sustainable Maize Seed Production in West and Central Africa](#).
- For case studies from China, e.g. on how to ensure the sustainability of wild relatives of crops or traditional land use practices, see: [Mountain Gods and Wild Rice - Agrobiodiversity as a Basis for Human Existence](#).
- The [Global Horticulture Initiative](#) offers capacity building and advocacy related to this service.
- [By establishing payments for agrobiodiversity conservation services](#) rural communities can be rewarded for maintaining traditional crop varieties rather than using (more profitable) commercial ones.

[Bioversity International](#) provides scientific evidence of the role that on-farm biodiversity, wild agricultural biodiversity and forest biodiversity can play in a more nutritious, resilient, productive and adaptable food and agricultural system.

On behalf of:



of the Federal Republic of Germany



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