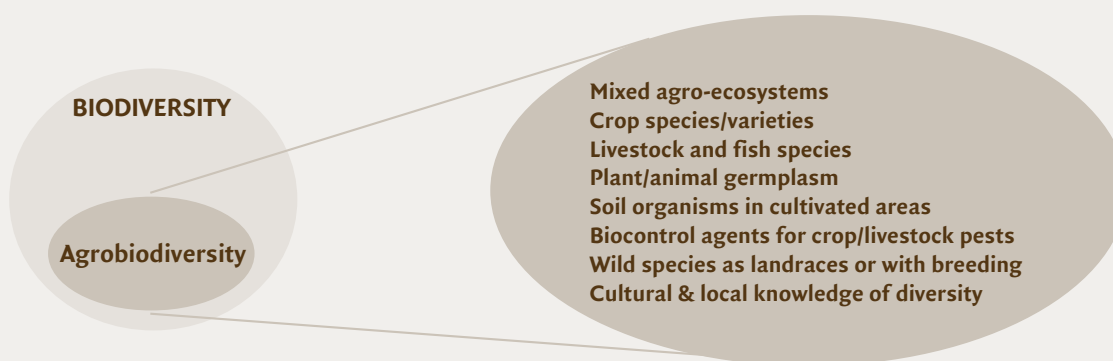


WHAT IS AGROBIODIVERSITY?

Agrobiodiversity is the result of natural selection processes and the careful selection and inventive developments of farmers, herders and fishers over millennia. Agrobiodiversity is a vital sub-set of biodiversity. Many people's food and livelihood security depend on the sustained management of various biological resources that are important for food and agriculture. Agricultural biodiversity, also known as agrobiodiversity or the genetic resources for food and agriculture, includes:

- 🌾 Harvested crop varieties, livestock breeds, fish species and non domesticated (wild) resources within field, forest, rangeland including tree products, wild animals hunted for food and in aquatic ecosystems (e.g. wild fish);
- 🌾 Non-harvested species in production ecosystems that support food provision, including soil micro-biota, pollinators and other insects such as bees, butterflies, earthworms, greenflies; and
- 🌾 Non-harvested species in the wider environment that support food production ecosystems (agricultural, pastoral, forest and aquatic ecosystems).

[Box 1] AGROBIODIVERSITY IS CENTRAL TO OVERALL BIODIVERSITY



Agrobiodiversity is the result of the interaction between the environment, genetic resources and management systems and practices used by culturally diverse peoples, and therefore land and water resources are used for production in different ways. Thus, agrobiodiversity encompasses the variety and variability of animals, plants and micro-organisms that are necessary for sustaining key functions of the agro-ecosystem, including its structure and processes for, and in support of, food production and food security (FAO, 1999a). Local knowledge and culture can therefore be considered as integral parts of agrobiodiversity, because it is the human activity of agriculture that shapes and conserves this biodiversity.



[Box 2] A DEFINITION OF AGROBIODIVERSITY

The variety and variability of animals, plants and micro-organisms that are used directly or indirectly for food and agriculture, including crops, livestock, forestry and fisheries. It comprises the diversity of genetic resources (varieties, breeds) and species used for food, fodder, fibre, fuel and pharmaceuticals. It also includes the diversity of non-harvested species that support production (soil micro-organisms, predators, pollinators), and those in the wider environment that support agro-ecosystems (agricultural, pastoral, forest and aquatic) as well as the diversity of the agro-ecosystems.

Source: FAO, 1999a

Many farmers, especially those in environments where high-yield crop and livestock varieties do not prosper, rely on a wide range of crop and livestock types. This helps them maintain their livelihood in the face of pathogen infestation, uncertain rainfall and fluctuation in the price of cash crops, socio-political disruption and the unpredictable availability of agro-chemicals. So-called minor or underutilized crops, more accurately, companion crops, are frequently found next to the main staple or cash crops. They often grow side by side and their importance is often misjudged. In many cases, from a livelihoods perspective, they are not minor or underutilized as they can play a disproportionately important role in food production systems at the local level. Plants that will grow in infertile or eroded soils, and livestock that will eat degraded vegetation, are often crucial to household nutritional strategies. In addition, rural communities, and the urban markets with which they trade, make great use of these companion crop species.

[Box 3] COLLECTION OF WILD PLANTS FOR HOUSEHOLD CONSUMPTION

In Burkina Faso, and throughout the West African Sahel, rural women carefully collect the fruit, leaves and roots of native plants such as the baobab tree (*Adansonia digitata*), red sorrel leaves (*Hibiscus sabbarifa*), kapok leaves (*Ceiba pentandra*) and tigernut tubers (*Cyperus esculentus* L.) for use in the families' diet. These supplement the agricultural grains (millet, sorghum) that provide only one part of the nutritional spectrum and may fail in any given year. More than 800 species of edible wild plants have been catalogued across the Sahel.

Source: IK Notes No. 23, 2000.

There are several distinctive features of agrobiodiversity, compared to other components of biodiversity:

- ⑥ Agrobiodiversity is actively managed by male and female farmers;
- ⑥ many components of agrobiodiversity would not survive without this human interference; local knowledge and culture are integral parts of agrobiodiversity management;
- ⑥ many economically important agricultural systems are based on 'alien' crop or livestock species introduced from elsewhere (for example, horticultural production systems or Friesian cows in Africa). This creates a high degree of interdependence between countries for the genetic resources on which our food systems are based;
- ⑥ as regards crop diversity, diversity within species is at least as important as diversity between species;
- ⑥ because of the degree of human management, conservation of agrobiodiversity in production systems is inherently linked to sustainable use – preservation through establishing protected areas is less relevant; and
- ⑥ in industrial-type agricultural systems, much crop diversity is now held *ex situ* in gene banks or breeders' materials rather than on-farm.



An overview of the key roles of agrobiodiversity is provided in the following Box. Not all the roles listed will be relevant in any given situation. Nonetheless, this list may serve as a checklist to prioritize those that are crucial in a project/work situation.

[Box 4] THE ROLE OF AGROBIODIVERSITY

Experience and research have shown that agrobiodiversity can:

- ✳ Increase productivity, food security, and economic returns
- ✳ Reduce the pressure of agriculture on fragile areas, forests and endangered species
- ✳ Make farming systems more stable, robust, and sustainable
- ✳ Contribute to sound pest and disease management
- ✳ Conserve soil and increase natural soil fertility and health
- ✳ Contribute to sustainable intensification
- ✳ Diversify products and income opportunities
- ✳ Reduce or spread risks to individuals and nations
- ✳ Help maximize effective use of resources and the environment
- ✳ Reduce dependency on external inputs
- ✳ Improve human nutrition and provide sources of medicines and vitamins, and
- ✳ Conserve ecosystem structure and stability of species diversity.

(Adapted from Thrupp, 1997)

WHAT IS HAPPENING TO AGROBIODIVERSITY?

Locally varied food production systems are under threat, including local knowledge and the culture and skills of women and men farmers. With this decline, agrobiodiversity is disappearing; the scale of the loss is extensive. With the disappearance of harvested species, varieties and breeds, a wide range of unharvested species also disappear.

[Box 5] 100 YEARS OF AGRICULTURAL CHANGE:

SOME TRENDS AND FIGURES RELATED TO AGROBIODIVERSITY

- ✳ Since the 1900s, some 75 percent of plant genetic diversity has been lost as farmers worldwide have left their multiple local varieties and landraces for genetically uniform, high-yielding varieties.
- ✳ 30 percent of livestock breeds are at risk of extinction; six breeds are lost each month.
- ✳ Today, 75 percent of the world's food is generated from only 12 plants and five animal species.
- ✳ Of the 4 percent of the 250 000 to 300 000 known edible plant species, only 150 to 200 are used by humans. Only three – rice, maize and wheat – contribute nearly 60 percent of calories and proteins obtained by humans from plants.
- ✳ Animals provide some 30 percent of human requirements for food and agriculture and 12 percent of the world's population live almost entirely on products from ruminants.

Source: FAO, 1999b

More than 90 percent of crop varieties have disappeared from farmers' fields; half of the breeds of many domestic animals have been lost. In fisheries, all the world's 17 main fishing grounds are now being fished at or above their sustainable limits, with many fish populations effectively becoming extinct. Loss of forest cover, coastal wetlands, other 'wild' uncultivated areas, and the destruction of the aquatic environment exacerbate the genetic erosion of agrobiodiversity.

Fallow fields and wildlands can support large numbers of species useful to farmers. In addition to supplying calories and protein, wild foods supply vitamins and other essential micro-nutrients. In general, poor households rely on access to wild foods more than the wealthier (see Table 1). However, in some areas, pressure on the land is so great that wild food supplies have been exhausted.

The term 'wild-food', though commonly used, is misleading because it implies the absence of human influence and management. Over time, people have indirectly shaped many plants. Some have been domesticated in home gardens and in the fields together with farmers' cultivated food and cash crops. The term 'wild-food', therefore, is used to describe all plant resources that are harvested or collected for human consumption outside agricultural areas in forests, savannah and other bush land areas. Wild-foods are incorporated into the normal livelihood strategies of many rural people, pastoralists, shifting cultivators, continuous croppers or hunter-gatherers. Wild-food is usually considered as a dietary supplement to farmers' daily food consumption, generally based on their crop harvest, domestic livestock products and food purchases on local markets. For instance, fruits and berries, from a wide range of wild growing plants, are typically referred to as 'wild-food'. Moreover, wild fruits and berries add crucial vitamins to the normally vitamin deficient Ethiopian cereal diet, particularly for children.

<div>[Table 1]</div> <div>Proportion of food from wild products for poor, medium and relatively wealthy households</div>				
Survey site	Date	Very Poor %	Middle %	Better off %
⊗ Wollo – Dega, Ethiopia	1999	0–10	0–10	0–5
⊗ Jaibor, Sudan	1997	15	5	2–5
⊗ Chitipa, Malawi	1997	0–10	0–10	0–5
⊗ Ndoywo, Zimbabwe	1997	0–5	0	0

Source: Biodiversity in development (IUCN/DFID, No date)

There are many reasons for this decline in agrobiodiversity. Throughout the twentieth century the decline has accelerated, along with increased demands from a growing population and greater competition for natural resources. The principal underlying causes include:



The rapid expansion of industrial and Green Revolution agriculture. This includes intensive livestock production, industrial fisheries and aquaculture. Some production systems use genetically modified varieties and breeds. Moreover, relatively few crop varieties are cultivated in monocultures and a limited number of domestic animal breeds, or fish, are reared or few aquatic species cultivated.





Globalization of the food system and marketing. The extension of industrial patenting, and other intellectual property systems, to living organisms has led to the widespread cultivation and rearing of fewer varieties and breeds. This results in a more uniform, less diverse, but more competitive global market. As a consequence there have been:

- ⑥ changes in farmers' and consumers' perceptions, preferences and living conditions;
- ⑥ marginalization of small-scale, diverse food production systems that conserve farmers' varieties of crops and breeds of domestic animals;
- ⑥ reduced integration of livestock in arable production, which reduces the diversity of uses for which livestock are needed; and,
- ⑥ reduced use of 'nurture' fisheries techniques that conserve and develop aquatic biodiversity.



The main cause of the genetic erosion of crops – as reported by almost all countries – is **the replacement of local varieties by improved or exotic varieties and species**. Frequently, genetic erosion occurs as old varieties in farmers' fields are replaced by newer. Genes and gene complexes, found in the many farmers' varieties, are not contained in the modern. Often, the number of varieties is reduced when commercial varieties are introduced into traditional farming systems. While FAO (1996) states that some indicators of genetic erosion have been developed, few systematic studies of the genetic erosion of crop genetic diversity have been made. Furthermore, in the FAO Country Reports (1996) nearly all countries confirm genetic erosion is taking place and that it is a serious problem.

Key points

- Agrobiodiversity is a vital subset of biodiversity, which is developed and actively managed by farmers, herders and fishers.
- Many components of agrobiodiversity would not survive without this human interference; local knowledge and culture are integral parts of agrobiodiversity management.
- Many economically important agricultural systems are based on 'alien' crop or livestock species introduced from elsewhere (for example, horticultural production systems or Friesian cows in Africa). This creates a high degree of interdependence between countries for the genetic resources on which our food systems are based.
- As regards crop diversity, diversity within species is at least as important as diversity between species.
- Locally diverse food production systems are under threat and, with them, the accompanying local knowledge, culture and skills of the food producers.
- The loss of forest cover, coastal wetlands, 'wild' uncultivated areas and the destruction of the aquatic environment exacerbate the genetic erosion of agrobiodiversity.
- The main cause of genetic erosion in crops, as reported by almost all countries, is the replacement of local varieties by improved or exotic varieties and species.



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Web sites

FAO Web site for Agrobiodiversity: www.fao.org/biodiversity/index.asp?lang=en

FAO Web site for Gender, Agrobiodiversity and Local Knowledge: www.fao.org/sd/links



Additional background papers

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