

# Incentives for agrobiodiversity conservation

At a time when a growing world population needs to be fed on limited resources in a changing climate, the conservation and sustainable use of agricultural biological diversity gains utmost importance. Agrobiodiversity plays a crucial role in food security and nutrition, as well as in the provision of environmental services and livelihoods. It is critical to the sustainability, resilience and adaptability of agricultural production systems. To promote awareness and share knowledge on conservation and the sustainable use of agrobiodiversity, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), has published this series of agrobiodiversity factsheets.

The present factsheet deals with measures to motivate and compensate farmers and herders for the conservation and sustainable management of agrobiodiversity. Issues covered include: the question of who the providers of and beneficiaries from agrobiodiversity conservation are; the public good characteristic of agrobiodiversity due to the manifold services it provides; the question of how to value these services; the need for provision of incentives and payments for agrobiodiversity conservation services; as well the question of how could such incentives be sustainably financed.

## Who conserves agrobiodiversity, and who benefits?

Agrobiodiversity is a key public good that delivers necessary services for human wellbeing. While the benefits of agricultural biodiversity are increasingly recognized, their total economic value is not fully accounted for – neither by individuals nor by society. Benefits comprise private benefits to the farmer and herder in terms of food, fodder, fibre, and other products, as well as public benefits to wider society, such as those related to agro-ecosystem resilience and the maintenance of evolutionary processes and future options. Agrobiodiversity

## What is agrobiodiversity?

Agricultural biodiversity includes all components of biological diversity of relevance to food and agriculture, and all components of biological diversity that constitute the agricultural ecosystems: the variety and variability of animals, plants and micro-organisms, at the genetic, species and ecosystem levels, which are necessary to sustain key functions of the agro-ecosystem. Agrobiodiversity is the outcome of the interactions among genetic resources, the environment and the management systems and practices used by farmers and herders. It has developed over millennia, as a result of both natural selection and human interventions.

provides a mixture of private and public benefits. Markets only capture a part of these benefits, thus underestimating their true worth.

The majority of the genetic diversity used worldwide in agriculture is in the hands of numerous small farmers and herders who, with their breeding activities, keep adapting local crops and livestock to the local conditions. They decide which crops and crop varieties they will grow and which species and breeds of animal they will rear. In recent decades, industrialisation, global competition, climate change and structural changes in agriculture have led to a displacement of traditional crop plants and livestock by commercially more viable high-yielding varieties and breeds. However, a high level of agrobiodiversity often still exists in poorer rural communities in marginal areas in developing countries, where people depend on plants and animals that still produce a more reliable yield even under unfavourable climatic conditions.

Much of the on-farm conservation of agrobiodiversity is being done by poor farmers, men and women, around the world, at their personal cost and based on their local creativity and energies. While the costs of conservation are covered at farm level, the benefits can extend far beyond. An example for such





## Guardians of diversity

Smallholder farmers, especially those on marginal lands, are often much more interested in minimizing risk than in maximizing productivity. They need to feed themselves and their families. Maintaining a variety of different crops can reduce the risk of complete loss in the event of harvest failure. A particular species, variety or breed may also be socially and culturally valuable, used as part of a traditional cuisine or ceremony such as a wedding. Often, women play a key role in the conservation of agrobiodiversity. Farmers are also exploring new ways of using biodiversity in a sustainable way with a view to spreading risks, enhancing food security and improving their livelihoods. Poorer farmers in particular are innovating in biodiversity management in order to increase their options to cope with variable environmental conditions and to exploit micro-environments ('niches') in their agro-ecosystems. For more information, see the GIZ factsheet (in the present text, GIZ factsheets, hyperlinked, are marked with ►).

► [GIZ, 2015: \*Understanding agrobiodiversity\*](#)

## Ecosystem services provided by agrobiodiversity

- **Provisioning services:** products obtained from ecosystems such as food, fibre, fuel, draught power, manure, genetic resources, biochemicals, cosmetics, pharmaceuticals, and clean water
- **Regulating services:** benefits obtained from the regulation of ecosystem processes such as pollination, erosion prevention and maintenance of soil fertility, carbon storage and sequestration, water regulation and purification, air quality regulation, microbial decomposition of wastes or pollutants, natural pest and disease control, as well as resilience to shocks and climate variability
- **Cultural services:** non-material benefits people obtain from ecosystems such as recreational and aesthetic values, cultural heritage, educational values, inspiration, spiritual and religious values, as well as the maintenance and further development of local knowledge and innovations
- **Supporting services:** services necessary for the production of all other ecosystem services such as habitat provision, photosynthesis, water and nutrient cycling.

benefits are ecosystem services – resources and processes that are supplied by ecosystems to the benefit of humans and all forms of life (see box this page); they are the result of concrete activities by farmers. Those who do the conservation work and contribute to functioning ecosystems, do not get sufficiently compensated for the benefits they create.

## How to value agrobiodiversity?

Many of the services provided through the conservation and sustainable use of agrobiodiversity are at present not economically valued. How to value (and whom to let pay for) regulating ecosystem services of agrobiodiversity, such as pollination and erosion regulation, or cultural ecosystem services, such as recreational and aesthetic values, and inspiration? And how to assure that agrobiodiversity is conserved when there are insufficient direct immediate benefits for farmers? Despite their many and significant links, ecosystems as well as agricultural and food systems are typically evaluated in isolation from one another. However, ecosystems are the ecological home in which crop and livestock systems thrive and produce food for humans, and, in turn, agricultural practices, food production, distribution and consumption impose several unquantified effects on ecosystem health. So far there is no comprehensive economic evaluation of the 'eco-agri-food systems' complex. The economic value of agrobiodiversity ecosystem services needs to be investigated and evaluated, to cover fields such as pollination, soil fertility and plant protection. A helpful analogy would be the TEEB ('The Economics of Ecosystems and Biodiversity') approach; see [GIZ, 2012](#), and

► [GIZ, 2012: \*The economics of ecosystems and biodiversity \(TEEB\)\*](#)

A 'TEEB for Agriculture and Food' study presently reviews the inter-dependencies between agriculture and food systems and natural ecosystems, in order to assess the social, environmental, economic and health-related benefits and costs of these systems, so that governments and businesses can use the information and recommendations to improve decision-making ([TEEB, 2014](#); [TEEB 2015](#)). However, besides economically valuing the ecosystem services provided by agrobiodiversity, the costs of policy inaction (in terms of not conserving agrobiodiversity) also need to be considered. Money that we spend today on agrobiodiversity conservation might well save money which we otherwise had to spend in future.



## Incentives for diversity

Unlike for 'wild' biodiversity, agrobiodiversity conservation requires continued active human intervention. If the old varieties and breeds are to be prevented from disappearing, incentives are needed which make them more attractive to farmers. Value chain approaches making use of agrobiodiversity alone are insufficient for agrobiodiversity conservation. They only cover a few plant varieties or livestock breeds which have a potential for (niche) marketing. Many threatened agrobiodiversity resources have a low or no market value; and even where successfully conserved they may displace other threatened genetic resources. This happened with quinoa under the current quinoa boom: high market prices for a few (mostly white) quinoa varieties favoured by export markets led to a reduction of quinoa diversity in the Andean highlands (see [GIZ, 2013](#)).

Recognition of the value of farmers' work in maintaining agricultural biodiversity and the provision of positive incentives that adequately compensate them for doing so is urgently needed. The Convention on Biological Diversity (CBD) gives high attention to incentives for biodiversity; it runs a programme of work on incentive measures (see [CBD, 2011](#)). The FAO covers this aspect with its programme 'Incentives for Ecosystem Services in Agriculture' ([IES](#)). One of the 20 targets of the Strategic Plan for Biodiversity 2011 – 2020 is on incentives (Aichi Target No. 3). It demands that by 2020, incentives harmful to biodiversity are eliminated, phased out or reformed, and that positive incentives for the conservation and sustainable use of biodiversity are developed and applied.

Incentives for agrobiodiversity conservation can be positive – promoting activities encouraging conservation – or negative – promoting activities harmful to conservation, such as low prices for local varieties, subsidies for modern varieties, or one-sided promotion of monocultures and high-input agriculture. There are direct and indirect incentives. Direct incentives motivate or discourage the farmers directly in monetary form (e.g. direct payment, loan, landrace or local breed subsidy, or increased market price) or in kind (e.g. awards/recognition for 'custodianship', training, extension advice, school materials and school meal programmes, infrastructure, seed access

and seed fairs, or land use rights). Indirect incentives lead to changes in an actor's agro-ecological and socio-economic environment, which in turn has an impact on the sustainable use and conservation of agrobiodiversity.

► [GIZ, 2006: \*Incentive Measures for the Conservation of Agrobiodiversity\*](#)

In the European Union, incentives for the continuous on-farm use of agrobiodiversity have become an integral part of EU support for regional and rural development in recent years. The measures aimed at achieving the objectives of the ITPGRFA and the CBD pass through the EU Common Agricultural Policy and become part of the Rural Development Plans. At global level, the Benefit Sharing Fund ([BSF](#)) of the ITPGRFA serves as incentive for agrobiodiversity conservation. It aims at directly assisting farmers in developing countries in the management of crop genetic resources for sustainable food security and improved livelihoods. Under the third project cycle of the fund approved in March 2015, over USD 10 million were allocated in 22 projects around the world.

### Agro-ecotourism stimulating agrobiodiversity conservation

Agro-ecotourism is a form of tourism that combines ecotourism and agrotourism, focussing on nature conservation, agriculture and culture. It can contribute to the *in situ* conservation of typical regional diversity of crop varieties and livestock breeds. The more unusual the variety or breed, the more suitable it is for promotional purposes. By providing income and employment, agro-ecotourism can serve as an incentive for the conservation of agrobiodiversity and traditional cultural practices (including food culture), stimulate community pride and awareness of heritage, nature and agrobiodiversity, and revive the appreciation of traditional crops and local farm animals. Examples for German development cooperation in support of tourism as an incentive for conservation and sustainable use of agrobiodiversity are the projects 'Conservation of Agrobiodiversity in Rural Albania' ([CABRA](#)) and 'Competitiveness of the Private Sector in Rural Areas' in Kosovo ([COSiRA](#)).

► [GIZ, 2007: \*Maintaining and promoting agricultural diversity through tourism\*](#)





## Payments for agrobiodiversity conservation services

If we want to secure socially desirable levels of conservation for the greater public good and protect the crops and breeds that are at the most risk of extinction, a kind of ‘payment for ecosystem services’ (PES) should be applied for agrobiodiversity conservation. PES has been successfully applied in paying for environmental services achieved through conservation of wild biodiversity, but also for activities related to agrobiodiversity conservation, such as soil and water conservation measures, windbreaks, riverbank protection, the creation of pastures for bees, the less intensive use of arable land or pastures, and the maintenance of cultural features in the landscape.

Effective payment schemes for agrobiodiversity conservation have to consider what payments should be made for, which species/varieties/breeds to conserve (the so-called ‘Noah’s Ark Problem’), minimizing costs of agrobiodiversity conservation while maximizing benefits, and reducing transaction costs. Other questions include who should be paid, how much should be paid, and how should payments be made. For exploring such aspects, Bioversity International is running a programme on payments for agrobiodiversity conservation services (PACS). PACS is an agriculture-related PES scheme designed to tackle the public good characteristics of agrobiodiversity. Payments are monetary, in-kind, or other types of rewards that effectively increase the private benefits for farmers in utilizing certain crop varieties or livestock breeds on-farm.

Safe minimum standards need to be defined for the conservation activities under the scheme. For a livestock breed these are: more than 1000 breeding females or 20 breeding males (FAO criteria for ‘not at risk’). However, such numbers do not exist for plant genetic resources – here, conservation activities should consider how much land to be cultivated, by how many farmers, their geographical distribution, the amount of seeds available in local systems, existing seed distribution networks, the degree of local knowledge maintained, socio-cultural traditions and market integration. Farmers as service providers are to be selected according to the expected outcome in terms of ecological effectiveness (reaching the conservation goal), economic efficiency (least-cost conservation), and social equity (pro-poor outcomes, fairness). For minimizing conservation costs, competitive tender approaches proved successful (see box this page).

PACS schemes appear to have potential as an environmentally effective and cost-efficient mechanism through which to provide conservation incentives. Interventions should be targeted to areas of high agrobiodiversity and high poverty in order to maximize impact. Prioritization of particular plant and animal genetic resources will ensure that the most diversity can be conserved for a given budget. Limited conservation budgets can achieve maximum impact by identifying least-cost providers. Payments or rewards may be made in different ways (see [Drucker, 2011](#), and [Narloch et al., 2011](#)).

In order not to undermine existing conservation efforts, informal local institutions for the self-governance of natural resources have to be considered. The incentive scheme should involve a socially accepted allocation of rewards in order to support and strengthen collective action in natural resource management and agrobiodiversity conservation.

► [GLZ, 2011: Payment for Environmental Services \(PES\) to conserve agricultural biodiversity](#)

## Conservation tenders

Under the PACS programme, Bioversity International tested a competitive tender scheme using auction-based mechanisms for conservation of nine threatened quinoa varieties in Bolivia and Peru. Farmer organisations were invited to participate in a single round, sealed-bid reverse auction, offering their services to plant different quinoa varieties for conservation reasons, comparing the cost-effectiveness of the offers for selection.

Experiences showed that payments may be not only in cash to individuals, but also in-kind at community level (e.g. school renovation). Relative to fixed price programs, the transaction costs of running conservation tenders can be relatively high, since the conservation agency has to coordinate the whole selection process with all –possibly dispersed – land users. Cost reduction can be achieved by dealing with groups of land users or motivating self-compliance through the contract terms stipulating that no payments are made unless the whole contract is delivered in its entirety. This also creates a strong incentive for participating farmers to ensure that all group members deliver ([Bioversity International, 2013](#)).



## Financing the conservation of agricultural diversity

The Little Biodiversity Finance Book ([GCP, 2012](#)) provides an overview of how biodiversity finance is generated at present by public funds (international, national) as well as by market and private sources and how it might look in future. Most international and national financing instruments are tailored to conserve biodiversity in general and not agrobiodiversity in particular. However, many of the international finance instruments supporting biodiversity can also be used for agrobiodiversity, such as the Global Environmental Facility (GEF) and the Green Climate Fund (GCF; see box below).

### Global Environmental Facility (GEF)

National governments and civil society organisations can obtain funds from the Global Environmental Facility (GEF) to cover additional costs associated with transforming a project with national benefits into one with global environmental benefits. There are several GEF Operational Programs under which agrobiodiversity measures can be co-funded. Operational Program 13 was especially launched to conserve and ensure the sustainable use of agricultural genetic resources.

### Green Climate Fund (GCF)

The Green Climate Fund (GCF) was established in 2010 under the UN Framework Convention on Climate Change (UNFCCC) to serve as the central global investment vehicle for climate finance. It started operations in mid-2014. It was established to help developing countries reduce greenhouse gas emissions and adapt to climate change. Funds can be applied for agrobiodiversity conservation schemes as long as the climate relevance of funded activities is described – co-benefits to biodiversity conservation, sustainable agriculture, etc. are considered an advantage for GCF funding.

Various countries – both industrialised and developing – provide national funds for the conservation of genetic resources; others have set up special national eco-funds, which are financed from national and international sources and are used in particular for smaller-scale measures, e.g. the National Gene Fund in India ([PPVRA, 2011](#)). Generally, these funds focus on natural biodiversity, but many of them also offer the possibility of promoting agrobiodiversity conservation.

Also, development projects offer potential for implementing activities to conserve threatened crop varieties and livestock breeds and related indigenous knowledge. For instance, value chains for products from plants and domestic animals that are currently rarely used can be promoted.

Comprehensive financing instruments which target international, national and regional levels are needed to conserve agrobiodiversity for our future. For sustainably financing interventions to conserve agrobiodiversity, a combination of market, public and private sources of finance should be identified, incorporating a mixture of incentive instruments – value chain development combined with payment schemes built on governmental funds and private sector funding. See also [Biodiversity International \(2013\)](#) and

► [GIZ, 2008: Financing the conservation of agricultural diversity](#)

## Outlook

The costs of maintaining agricultural biological diversity for local, national and global benefit is currently borne by the smallholder farmer and herders. Given the existence of 'public good' values, positive incentives are required to ensure socially desirable levels of agrobiodiversity conservation and use. Agrobiodiversity-related payments for ecosystem services – in cash and in kind, to individuals as well as communities – can provide such incentives in a cost-efficient and pro-poor way. Support has to be cleverly planned, involving a mix of different incentive mechanisms, adjusted to the specific context.

Governments, non-governmental organisations, multilateral agencies, private companies, academic institutions, and independent experts need to cooperate to promote conservation finance solutions through exchanging information and expertise and developing studies and tools.





Friederike Kraemer  
naren@giz.de

## Important links

- Bioversity International, Payments for Agrobiodiversity Conservation Services (PACS): [www.bioversityinternational.org/pacs/](http://www.bioversityinternational.org/pacs/)
- Convention on Biological Diversity (CBD), Programme of work on incentive measures: [www.cbd.int/incentives/background.shtml](http://www.cbd.int/incentives/background.shtml)
- FAO Programme Incentives for Ecosystem Services in Agriculture (IES): [www.fao.org/nr/aboutnr/incentives-for-ecosystem-services/en](http://www.fao.org/nr/aboutnr/incentives-for-ecosystem-services/en)
- Sector Project Sustainable Agriculture (NAREN): [www.giz.de/sustainable-agriculture](http://www.giz.de/sustainable-agriculture)
- Sector Project ValuES: [www.aboutvalues.net](http://www.aboutvalues.net)

## Further information

- Bioversity International, 2013: No free lunches: PES and the funding of agricultural biodiversity conservation – Insights from a competitive tender for quinoa-related conservation services in Bolivia and Peru. [www.fao.org/fileadmin/user\\_upload/pes-project/docs/FAO\\_RPE-PES\\_Bioversity\\_BoliviaPeru.pdf](http://www.fao.org/fileadmin/user_upload/pes-project/docs/FAO_RPE-PES_Bioversity_BoliviaPeru.pdf)

- CBD, 2011: Incentive measures for the conservation and sustainable use of biological diversity – Case studies and lessons learned. [www.cbd.int/doc/publications/cbd-ts-56-en.pdf](http://www.cbd.int/doc/publications/cbd-ts-56-en.pdf)
- FAO, 2011: Payment for ecosystem services and food security. [www.fao.org/docrep/014/i2100e/i2100e00.htm](http://www.fao.org/docrep/014/i2100e/i2100e00.htm)
- GCP, 2012: The Little Biodiversity Finance Book – A guide to proactive investment in natural capital. Global Canopy Programme. [globalcanopy.org/materials/little-biodiversity-finance-book](http://globalcanopy.org/materials/little-biodiversity-finance-book)
- GIZ, 2011: Bezahlung von Ökosystemleistungen für den Erhalt der landwirtschaftlichen genetischen Vielfalt – Konzepte, Erfahrungen und Relevanz für die Entwicklungszusammenarbeit. [www.giz.de/fachexpertise/downloads/giz2011-de-agrobiodiv-bezahlung-von-oekosystemleistungen.pdf](http://www.giz.de/fachexpertise/downloads/giz2011-de-agrobiodiv-bezahlung-von-oekosystemleistungen.pdf)
- IPBES, 2016: Pollinators, Pollination and Food Production. Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (in preparation).

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Registered offices  
Bonn and Eschborn, Germany

Sector Project Sustainable Agriculture (NAREN)  
Friedrich-Ebert-Allee 36+40 Dag-Hammarskjöld-Weg 1-5  
53113 Bonn 65760 Eschborn, Germany  
T +49 (0) 228 44 60-0 T +49 (0) 6196 79 - 2359  
F +49 (0) 228 44 60-0 F +49 (0) 6196 79 - 1115  
naren@giz.de  
[www.giz.de/sustainable-agriculture](http://www.giz.de/sustainable-agriculture)

Author Dr Christine Martins

Design Ira Olaleye

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Addresses of the BMZ offices	BMZ Bonn Dahlmannstraße 4 53113 Bonn, Germany T +49 (0)228 99 535 - 0 F +49 (0)228 99 535 - 3500  poststelle@bmz.bund.de <a href="http://www.bmz.de">www.bmz.de</a>	BMZ Berlin Stresemannstraße 94 10963 Berlin, Germany T +49 (0)30 18 535 - 0 F +49 (0)30 18 535 - 2501
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