

## Fundamentals of Agrobiodiversity

# Promoting local innovation in managing agricultural biodiversity

Increasingly, development projects promote the role of farmers – smallholders, herders and other local resource users – in *conserving* natural and agricultural biodiversity. However, they often overlook local efforts to make *new uses* of and enrich biological resources. Farmers' past contributions to domesticating, selecting and breeding plants and animals are acknowledged, but rarely what they are doing today. Men and women farmers continue to explore new ways to use biodiversity to spread risks, enhance food security and improve livelihoods. Especially poorer farmers innovate in biodiversity management in efforts to increase their options for coping with change and to exploit micro-environments in their agro-ecosystems.

Local innovation is the process by which local people, on their own initiative, develop new and better ways of doing things. Out of this process emerge local innovations, which may be technical or socio-institutional (such as making new rules for resource use) and are tailored to the needs of the local farm families and communities. These site-appropriate ideas deserve support. Recognising them encourages farmers and scientists to cooperate in research to improve agriculture and natural resource management. Local innovations offer entry points for identifying questions of mutual interest to explore together. Taking local innovation seriously reinforces farmers' self-confidence to manage and improve the resources on which they depend.

This approach to research and development reflects the very principles of good biodiversity management: appreciating local specificity, valuing and ensuring the continued existence of multiple types of assets (be these genes or creative ideas), keeping possibilities open for adaptation and, thus, assuring resilience and sustainability.

## Local innovation in domesticating plants

In many countries, one encounters local people who keep "botanical gardens". These are often local healers seeking easier access to the plants they need. Similarly, "forest farmers" manipulate mixtures of natural and cultivated species. For example, Amerindians in Amazonia sow or transplant crop species in forest openings and selectively cut and enrich the forest with desired species of timber, fruit and medicinal



Mrs Lal Kumari Thapa with award received from LI-BIRD for her innovativeness in domesticating medicinal plants.

Photo: Shashish Maharjan

plants. They innovate continuously in the face of changes in environmental and social conditions and in relative value of different species.

### Example:

#### Domesticating plants in homegardens in Nepal

Jaya Bahadur Thapa and his wife Lal Kumari Thapa live in Chaur, a village in Kaski District in western Nepal. Both are traditional healers. They used to collect the medicinal plants from the forest but then began to grow them near their home to save time and ensure supply. After studying the habitat and growth habits of the wild plants, they collected seed and tried out different sowing and management practices. They have domesticated about 145 medicinal plants in their homegarden and nearby land.

The couple belongs to the Pratigya Cooperative in Chaur which, already in 1997, started working with LI-BIRD, the Nepal Agricultural Research Council and Bioversity International on *in-situ* conservation of agricultural biodiversity. The Cooperative asked the couple to help identify medicinal plants and record local knowledge about them for a Community Biodiversity Registration Programme. The Thapas helped record 165 medicinal species in homegardens, farmland and the village forest, and frequently inform other farmers and visitors about the plants. They take part in the annual local Biodiversity and Agriculture Fair, where they spread awareness about the value of local medicinal plants. Their



Mr Jaya Bahadur Thapa (2<sup>nd</sup> from right) briefing visitors about his collection of medicinal plants. Photo: Pratap Shrestha

home is now a Knowledge Resource Centre for people, including schoolchildren, to learn about domesticating and using these plants.

Several farmers in Chaur now grow medicinal plants and sell them to the Thapas. People from beyond the village come to seek *ayurvedic* treatment from the couple. Also traders in medicinal plants are among their clients. To honour Lal Kumari for her contribution to domesticating and popularising threatened plant species, LI-BIRD gave her the “Innovative Women Farmers’ Award for Conservation of Biodiversity” in 2007.

## Local innovation in breeding

Over centuries, farmers have developed countless crop varieties and animal breeds to suit specific agroclimatic conditions and culinary purposes. To this day, farmers – especially those in marginal areas – continue to do so.

### Example: Developing site-appropriate barley varieties in Ethiopia

In semiarid Tigray in northern Ethiopia, smallholders have in recent years developed locally adapted varieties of barley to suit current conditions and needs. Using single-plant and mass selection, farmers developed new naked and hulled barley varieties that are superior to cultivars recommended by formal plant breeders. These varieties are better able to tolerate stresses such as disease pressure, waterlogging and drought. They are ideal for the high-risk and low-input farming systems in northern Ethiopia. They are in high demand for local food products, such as snacks of roasted barley (*kollo*), that Tigray women are commercialising on their own initiative.

The local innovation process involves both men and women. Couples decide jointly on how many varieties to grow, seed selection and plot allocation. Seed storage is women’s work. Women’s important role in managing seed is reflected in local sayings such as: “*No wife, no seed, no life*”.

Researchers from Mekelle University strengthened local innovation in plant breeding by engaging in participatory research with farmers and development agents. In seven districts of Tigray, farmers conduct trials that include the farmer-developed varieties. This research was the topic of a village workshop with farmer breeders, development agents, scientists and local policymakers, who discussed challenges related to seed production and variety release. The research made scientists appreciate how farmers continue to transform domesticated plants. Farmers’ knowledge of genetic resources and their ongoing plant selection and breeding activities create a good germplasm base that, combined with scientists’ knowledge, could lead to development of cultivars with wide potential for use in semiarid areas.

## Local innovation in collective action

Individual farmers who show outstanding innovativeness in managing biodiversity generally acknowledge that their achievements grow out of past and present knowledge in the community. Most local innovation emerges from a collective process over generations and is not owned by any individual. Many rural communities have, on their own, created and continue to adjust local institutions to protect species useful for their survival. In some cases, governments have appreciated this local institutional innovation and provide support so that the initiatives can prosper.

### Example:

#### Alternative uses and markets for Andean roots

As an alternative to growing coca, new crops like bananas, coffee, pineapple and citrus were promoted in Coroico Municipality. In the process, the genetic diversity of native roots decreased. For example, the *Arracacha*, also known as Peruvian carrot, and *Achira*, a potato-like tuber, became less important in the diet. To prevent complete loss of the traditional roots, women in San Juan de la Miel got together to promote them. For their initiative, the municipality granted them funds and land. They documented their botanical knowledge of the roots, set up varietal gardens and organised diversity fairs, where they also offered foods made from the roots. Especially tourists showed interest in these foods – and brought the women to a new business idea. To be able to take advantage of the commercial potential of the traditional roots, the women and the municipality sought experts who

could help them develop and market new products. They took up contact with PROINPA, a local foundation working on genetic resources, food sovereignty and marketing.

Through the collaboration with PROINPA, the women learned more about the nutritional value and processing potential of the roots. The high digestibility of the starch (suitable for infants, the old and the sick) and their elastic and glutinous properties make the roots ideal for flakes, flour and purées. These new products led to new marketing challenges. The women's groups needed new procedures to produce with high quality, keep to industrial standards, agree on profit distribution and establish business links. Market regulations in Coroico and La Paz needed to be changed to ensure access by rural families. PROINPA accompanied the women through these changes, helping them "learn by doing". The women gained higher income from selling more varied and better-quality products, and gained higher standing in their community and families. As one woman said: "*The money we earned made our husbands consider us as an important pillar of the family*".

## Policy implications

Scientists, development agents and local administrators should become more aware of local men's and women's creativity in managing genetic resources. They should look beyond traditional knowledge and recognise the dynamics of local experimentation and innovation. Local governments are well placed to promote these initiatives and to fit them into local development strategies. Only through widespread decentralised research and development activities can adequate attention be given to crop varieties and animal breeds that are locally important to meet cultural needs and to suit site-specific agroecological conditions.

An enabling policy environment is crucial to strengthen endogenous innovation and stimulate participatory research and development. This is in line with the International Treaty on Plant Genetic Resources for Food and Agriculture, which supports farmers' rights to use, exchange and sell farm-saved seed; to take part in relevant decision-making; and to be rewarded for this invaluable contribution to the global genetic pool (see also the issue papers "*The International Treaty on Plant Genetic Resources for Food and Agriculture – status of implementation*" as well as "*Farmer's Rights and agrobiodiversity*").

Farmers not only save seed but also develop improved varieties for local conditions. The Treaty indeed calls for participatory plant breeding. This requires adjustment of breeding strategies and regulations for variety release. Still, however,



Farmers characterising barley varieties.

Photo: Fetien Abay

farmer-relevant traits and locally preferred varieties may not be certified because farmer-developed varieties are not recognised in national seed-legislation systems. This recognition would increase the benefits of plant breeding for resource-poor farmers.

In addition, farmers should have the right to decide about the research agenda related to agriculture and natural resource management. This would help institutionalise a farmer-led participatory approach to developing genetic diversity.

Likewise, the Convention on Biological Diversity provides for protection of indigenous peoples' knowledge, innovations and practices; and also protection of the ecosystems needed to support local innovation in domesticating plant and animal genetic resources. These provisions – like those of the International Treaty – must be incorporated into national policies and actually implemented, including support to local innovation in conservation and sustainable use of biodiversity.

## Practical implications for development cooperation

Development projects related to agricultural biodiversity should deliberately seek local innovators in managing biodiversity. Finding them is not a problem, as other local farmers usually know who they are. The strengths and weaknesses of local innovations should be discussed with local farmers – men and women – to reach agreement on how to support the most promising innovations.

Local biodiversity innovators should be included as resource persons in project activities, e.g. by inviting them to workshops or organising visits by other farmers. Encouraging formation of small common-interest groups around local innovators is a good entry point for participatory research and development.



Other farmers visiting farmer breeder's experiment.

Photo: Fetiën Abay

Incentives – in terms of both recognition and socio-economic benefits – can encourage farmers to innovate in biodiversity management and to share their knowledge. The possibilities are many: public awards, recognising local innovators as resource persons, helping farmers protect their rights to use genetic resources, and officially recognising the varieties and

breeds developed by farmers. Often, these knowledge holders do not want individual intellectual property rights but rather public appreciation for their contributions.

It is especially important that young people learn to value local biodiversity knowledge and initiatives. Some plants almost extinct in the wild can be found only in local botanists' backyards. Schoolchildren, young farmers and extension workers should "go to school" there, so that the local botanists' knowledge about and enthusiasm for biodiversity can become infectious. Such activities can be linked to school science pro-grammes and environment clubs.

Multistakeholder partnerships can enhance local innovation for sustainable use of biodiversity. They are essential for realising the full potential of local genetic material. Farmers involved in such partnerships can integrate scientific knowledge and new genetic material into their resource-use systems. These innovative men and women develop skills in public speaking and can then play a stronger role in community development. The interaction of support organisations with local biodiversity experts builds these people's capacities to engage in dialogue also with other stakeholders and to influence the research and development agenda.

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## Some organisations that deal with local innovation in managing biodiversity are:

- LI-BIRD (Local Initiatives for Biodiversity, Research and Development); [www.libird.org](http://www.libird.org)
- PROINPA (Promoción y Investigación de Productos Andinos); [www.proinpa.org](http://www.proinpa.org)
- Prolinnova (Promoting Local Innovation in ecologically oriented agriculture and natural resource management); [www.prolinnova.net](http://www.prolinnova.net); here one can find more detailed information on this topic, including the longer working paper with annotated bibliography.

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