Mapping agricultural biodiversity initiatives
Agricultural biodiversity truly is a global public good. The variety and variability of plants, animals and micro-organisms, developed and managed by farmers over generations, forms the basis of our food system and the cornerstone of food and nutrition security, climate change adaptation and sustainable rural livelihoods. A growing body of evidence indicates that the single-minded focus on production that fuelled the drive for large scale monocultures has produced a food system that isn’t future proof. The ongoing homogenisation of crops, livestock and farming systems renders the industrial agri-food system prone to changes in both the natural as well as the socio-economic environment. There is growing recognition that agricultural biodiversity and the associated knowledge and practice of smallholder farmers, are essential for resilient food systems. Yet for the first time in human history, the last century has seen a dramatic decrease in agricultural biodiversity.

This continuing erosion of the global gene pool is a complex problem with no single solution. Global agreements and national laws provide the legal and policy framework that can either hamper or enhance agricultural biodiversity. Formal sector government interventions and research projects can likewise have a major impact, for better or for worse. But solutions are most powerful
when they are locally rooted and community driven. For thousands of years farmers have harnessed the potential of agricultural biodiversity to adapt to local environments and socio-economic requirements. There are hundreds of local and informal sector initiatives that build on this intimate relationship between the environment, genetic diversity and farmer knowledge, with farmers, communities and civil society organisations in the driving seat.

These initiatives are not just dots on a map. They form an ever growing heterogeneous mosaic of approaches to conserve, develop and sustainably use agricultural biodiversity. Trying to divide them into neat categories is impossible, and most initiatives are embedded in a broader strategy. However, five main and interlinked entry points for action can be distinguished: development, conservation, markets, knowledge, and advocacy. They include initiatives for in- and ex-situ conservation, participatory breeding, marketing and exchange, training and knowledge sharing, lobby and advocacy. Most are implemented in the world’s centers of origin of agricultural biodiversity in the global South, but their impact is global. The crop and livestock initiatives presented here do not provide a comprehensive overview. Rather they capture the narrative of ways to promote and enhance agricultural biodiversity, demonstrate the global scale of local initiatives and acknowledge the farmers, communities and civil society organisations in the frontline to nurture and defend it.
Development
Development

Managing and developing agricultural biodiversity through participatory selection and breeding

Agricultural biodiversity is the foundation of agriculture. The thousands of different crop varieties and livestock breeds are the result of the careful management, selection and development by farmers and their husbands over a period of 10,000 years. This development of agricultural biodiversity is a continuous process towards specific characteristics to suit local environments or socio-economic requirements. Through their in-depth knowledge and understanding of breeds, varieties, selection and local conditions, farmers, and women in particular, have developed the animal and plant genetic resources that make up the DNA of our food system.

Compared to this, specialized breeding by formal institutions is a very recent development. The past century has seen a strong push towards specialised production systems, increased uniformity and “improved” species, varieties and breeds. But the high-yielding varieties produced by commercial seed companies require high external inputs, don’t perform well in an unpredictable climate, are not easily accessible to small-scale farmers and don’t satisfy criteria linked to local medicinal, cooking, exchange, social and cultural uses. Similarly, formal sector livestock breeding has a singular focus on increasing productivity, with little regard for the resilience of breeds to environmental stress and disease and cultural and traditional values of livestock keepers and pastoralists.

Limited access, high cost and the failure of modern breeds and varieties to satisfy farmers’ requirements, means that most small-scale farmers and livestock keepers rely primarily on local and informal systems to obtain seed and cross livestock. Since farmers know best what their requirements are, strengthening
their capacity to develop their own varieties and breeds through community or participatory breeding programmes is a powerful tool. Participatory plant breeding (PPB) combines the knowledge and skills of farmers and professional plant breeders. The term is used to describe a range of approaches, from participatory variety selection to participatory breeding and crop improvement, that involve different stakeholders such as researchers, breeders and farmers, in plant breeding. In farmer-led PPB, the focus is on supporting and strengthening farmers’ own systems of breeding and crop improvement, including through the re-introduction of lost varieties. Various NGOs have made farmer-led PPB part of their strategy to conserve agricultural biodiversity and support community development. These include the Foundation for the Promotion and Study of Andean Products (PROINPA) in Bolivia, the Local Initiative for Biodiversity, Research and Development (LI-BIRD) in Nepal, and the South East Asia Regional Initiative for Community Empowerment (SEARICE). PPB is often embedded as an element in a broader strategy that includes other approaches like farmer field schools, community seed banks and seed fairs. It has great potential to support in-situ conservation, development and improvement of traditional crops and landraces, whilst contributing to the empowerment and self-reliance of farmers.
Participatory plant breeding in Nepal

Nepal’s agricultural biodiversity is enormous, including many unique varieties of rice and maize, the staple cereal crops of the rural population. The cultural diversity expressed in the use of these varieties is just as rich, with different varieties used for home consumption, festivals, selling at the market, to serve to guests, and even for medicinal use. But farming can be challenging due to the mountain geography, poor soils and unpredictable weather. Building on this rich biological and cultural diversity, the Local Initiatives for Biodiversity, Research and Development (Li-BIRD) pioneered participatory plant breeding in Nepal to support in-situ conservation and improve rural livelihoods. To this end, Li-BIRD has built partnerships with international agencies, researchers, NGOs and farming communities. Most research is carried out on the farm instead of in a research station and researchers work alongside farmers to select and develop varieties that meet their needs. Li-BIRD works with farmers and researchers to breed rice cultivars preferred by farmers, increase maize productivity by improving the performance of local landraces, and breed high-micronutrient, stable-yield potato varieties. Key to success has been the formation of Farmer Research Committees. These committees, with women making up a large part of the membership, take the lead in project activities, visit government research stations to learn about varietal development, share knowledge with other farmers and build linkages with other local groups such as seed producer groups and marketing committees. The strong involvement of women is an important element, as they play a key role in seed selection, dissemination of preferred varieties, and quality assessment.
Conservation
Conservation

Maintaining plant and animal genetic resources in gene and seed banks and in farmers’ fields

It is estimated that 75% of the world’s crop diversity, around 11% of mammalian livestock breeds and 2% of avian livestock breeds have gone extinct. Only 30 cultivated plant species provide 90 per cent of all the human food derived from plants, and 12 plant and five animal species together provide 70 per cent of the human diet. This narrow focus on a few crops and livestock species is putting agricultural biodiversity at risk. To preserve genetic diversity, formal government programmes are collecting and storing germplasm in gene and seed banks around the world. National gene and seed banks serve an important purpose in preserving the global gene pool, but as soon as germplasm is frozen and seeds are dried, the process of evolution stops.

Community seed and gene banks started to emerge around 30 years ago to provide farmers with access to adequate supplies of good quality, locally adapted seeds and maintain seed security at district and community levels. Contrary to most national gene banks, they are more than simple repositories. Regular exchanges of seed are the foundation of a community seed bank, ensuring the continued evolution of the genetic resource base. NGOs played a key role in the establishment of community seed banks, strengthening local seed systems and maintaining farmer varieties for the direct benefit of a community.

Organisations such as USC Canada, SEARICE in South-East Asia, and CTDT and EOSA in Eastern Africa pioneered the approach, with others now following their example across the world. In contrast to the formal commercial seed sector, which is based on the privatisation of genetic resources, the community seed bank system depends on collective action, reciprocity and knowledge
In Ejere in Central Ethiopia, a pest outbreak caused farmers to lose their wheat crop in the mid 1970s. In response, the Ethiopian government distributed a high-yielding variety of durum wheat, replacing the diverse varieties of purple and yellow durum wheat that farmers had grown for centuries. By the time the promise of increased production came at a price. By the time the high cost of fertilisers and pesticides, degrading soils and poor taste became apparent, the old varieties were lost. Thanks to an initiative of Ethio-Organic Seed Action (EOSA), the traditional varieties were re-introduced 20 years later and farmers were able to re-claim their agricultural heritage. Today, Ejere farmers again grow a wide range of traditional varieties and after each harvest they store samples of their seed in a community seed bank. This way they conserve agricultural diversity and spread their risks.
Evolutionary plant breeding in Iran

The idea of evolutionary plant breeding (EPB) stems from the 1920s. But due to the push for uniformity by seed companies and the agrochemical industry, it took until 2008 to implement the technique in a formal project. The programme was spearheaded by the Centre for Sustainable Development (CENESTA) in Iran. Initially, five farmers in Kermanshah and Semnan provinces were provided with mixtures of 1600 types of barley, including both landraces as well as modern cultivars from different countries. In the field, new varieties are constantly evolving as the different types cross naturally. Through a combination of natural and farmer selection (by themselves or with scientists), the evolution of the population mixture is guided to best meet environmental and socio-economic requirements. This way, evolutionary populations provide adapted varieties and serve as a source of genetic material for creating new mixtures. The pilot programme was an immense success. The mixed populations produced higher yields and performed better in adverse conditions than their local or improved counterparts and were more resistant to weeds, diseases and pests. As a result of farmer-to-farmer exchanges and the work of CENESTA and others, the evolutionary barley populations now cover several hundred hectares and are planted in 17 provinces by 150 farmers. A similar programme for bread wheat has since been established by the Dryland Agricultural Research Institute (DARSI) in Iran and evolutionary mixtures of a variety of crops are grown in several other countries.
Markets
Markets

Sale and exchange of seed, diverse food crops and livestock products in informal and formal markets

Although most smallscale farmers and livestock keepers produce primarily for subsistence, many sell or exchange part of their harvest or produce in local informal markets or through formal value chains. Local markets are important for conserving agricultural biodiversity through the sale and exchange of native food crops and livestock products. Farmers that produce for local markets often favour a diversity of crops, varieties and breeds that satisfy local preferences linked to medicinal, cooking, exchange, social and cultural uses, whereas commercial varieties grown for national and international markets only meet production and financial criteria. In Andean communities in the Lares Valley, local barter markets play a crucial role in the conservation of agricultural biodiversity. Farmers have become specialists and traders, growing enough of a certain crop to exchange excess with other Andean communities who grow different crops. The diversity of crops and varieties exchanged in barter markets is much higher than the diversity traded in the cash economy, where they have to meet strict requirements related to size, shape and diseases. In this way, barter markets directly contribute to agricultural biodiversity conservation at the household and agro-ecosystem level. Initiatives that celebrate and promote local food diversity range from food festivals, to heirloom fairs and diversity days increasingly also in the North.

Overall, around 80–90 % of seed used by smallholder farmers in developing countries is sourced from informal farmers’ seed systems. This includes self-saved seed, farmer-to-farmer exchanges and local market purchase, with the formal sector playing only a minor role. In much of the world, local markets and fairs are an important source of seed, especially during stress periods or for specialised products. Farmer-to-farmer seed exchange is promoted through seed fairs, seed swaps and village seed networks.


To increase participation of smallholder farmers in formal value chains, most attempts have focused on increasing production by replacing local varieties and breeds with introduced high-yielding ones. In some cases, a value chain approach has played a positive role in the conservation of agricultural biodiversity, by developing niche markets for traditional varieties and breeds and their products. Many traditional varieties and breeds have unique qualities and characteristics, ranging from nutritional and medicinal value to better quality and taste. Finding a match between the features of a particular product and the demands of a specific market could help conserve agricultural biodiversity and improve livelihoods. Certification or labelling schemes can help distinguish the niche product from the mass market. Several initiatives have successfully created markets for their products through innovative marketing, branding and product design, and by improving organisation, production, processing and distribution. However, a stand-alone niche product market development strategy is unlikely to provide a silver bullet for agricultural biodiversity conservation and could even prove counterproductive if it leads to specialisation in a few profitable varieties or breeds and the displacement of others.
A niche market for Kyrgyz goat cashmere

Some of the finest cashmere in the world comes from a local breed of goats in southern Kyrgyzstan. The jaidari goats however, are in danger of extinction, as livestock keepers cross the traditional breed with introduced Pridon and Angora goats to increase fiber production. These crossbreeds produce more wool, but of much lower quality. To conserve the jaidari breed and improve the livelihoods of the pastoralist communities, the Aga Khan Foundation’s Mountain Societies Development Support Programme (MSDSP) with the Odessa Centre Ltd. and the Kyrgyz Cashmere Producers’ Association initiated a cashmere marketing programme. The initiative provided training to farmers and smallscale local traders on goat identification, combing, sorting fiber, village bulk marketing, international standards and demands. A breeding programme was established to create a high-quality jaidari breeding flock and livestock keepers formed marketing groups to sell cashmere in bulk. The project team further developed linkages with companies seeking high-quality cashmere. As a result of the initiative, a niche market for premium jaidari cashmere has been established with several international buyers.
Knowledge
Knowledge

Enhancing farmer knowledge through training, documentation and farmer-to-farmer exchange

Agricultural biodiversity is the result of the interaction between the environment and genetic resources, carefully managed by farmers through selection and inventive development over thousands of years. Local skills, knowledge and culture, accumulated over generations, are integral components of agricultural biodiversity management. Nurturing and supporting the continuous development of farmer knowledge and skills is therefore key to enhancing agricultural biodiversity. Since women play a crucial role in the management of agricultural biodiversity, focusing efforts on women is particularly important.

Farmer knowledge is often tacit, rooted in experience and practice. It is not static, and continuously needs to be generated, adapted, shared and internalised. Tried in different countries and contexts from the early 1990s, Farmer Field Schools (FFS) have shown positive results in strengthening farmers’ capacities to analyse their agro-ecosystems and make their own informed choices in their local context. It is a radical departure from the conventional top-down technology transfer model that has been the standard in agricultural extension for decades. It provides an innovative learning platform where farmers, extension agents and researchers are equal learning partners. The participatory approach requires a significant change in attitude and perspective from institutions that are used to a one-way transfer of knowledge rather than an equal exchange and joint learning. The FFS methodology is based on learning in the field and from the field, building on what participants already know and wish to learn and apply further. By enhancing observation, analysis, and learning skills, it empowers farmers to make and trust their own judgements, instead of relying on external information sources. In an FFS, farmers are trained to systematically observe their crop ecosystem from week to week and, based on
their observations, make informed decisions on how to act next. Graduates are encouraged to share their knowledge with other farmers in their communities.

Facilitating farmer-to-farmer learning, and woman-to-woman in particular, is one of the most powerful tools to foster knowledge exchange and innovation. After all, seeing a fellow farmer successfully implement a new approach is much more compelling than trusting the advice of an extensionist. Such horizontal learning systems that stimulate sharing and learning between women, innovators and their peers include farmer cross visits or field days, farmer case studies, seed fairs and other exchange meetings. It could also involve the training and support of farmer trainers, to act as catalysts for community members through farmer-to-farmer extension.

Documenting farmer knowledge not only facilitates knowledge exchange, it can also support conservation of agricultural biodiversity through the empowerment of communities. Biocultural Community Protocols are a new
Biocultural Community Protocols

The concept of Biocultural Community Protocols (BCPs) was originally developed by Natural Justice and first implemented for livestock keeping communities by the League for Pastoral Peoples and Endogenous Livestock Development (LPP) and the LIFE network. BCPs provide an opportunity for communities to share knowledge with other livestock keeping communities and raise awareness of their issues among researchers, policy makers and development workers. They describe the ritual and ceremonial meaning of livestock, document traditional resource management and drought adaptation strategies, identify the factors that may have led to the decline of a breed, and make specific requests to outsiders for recognition of their role as custodians of biological diversity. Livestock keeping communities in Pakistan, India and Kenya have developed BCPS. They have increased the visibility of livestock keepers as guardians of biological diversity, empowered the communities by making them aware of their rights, contributed to the documentation of breeds and traditional knowledge systems, inspired local communities to pursue conservation activities, and also contributed to a feeling of global solidarity between livestock keepers.

Knowledge building is not limited to formal training and learning activities. It is a core element of all successful initiatives to enhance agricultural biodiversity through conservation, development, sale and exchange and advocacy. The use of new media, like video and web-based platforms, is increasing as a tool to improve service provision and knowledge building among and between farmers, extension agents and other stakeholders.
Advocacy
Advocacy

Lobby and advocacy for an enabling policy environment

A complex policy framework of treaties, agreements, laws and institutions govern the conservation, management and sustainable use of agricultural biodiversity at the national, regional and international level. They relate to a range of issues, from the rights of farmers and livestock keepers’, use of GMOs and pesticides, intellectual property, access and benefit sharing, to trade. Around the world, farmers, indigenous communities, other citizens and CSOs are mobilising to protect agricultural biodiversity, give farmers and livestock keepers a voice in policy processes, protect their rights and raise awareness and protect their rights and to raise awareness of alternatives. From the grassroots to the global level, movements and network organisations have emerged that promote an enabling policy environment for agricultural biodiversity through different entry points. Strategies range from opposing negative developments and non-supportive policies (e.g. the food sovereignty, anti-pesticides and anti-GMO movements), to raising awareness of alternative strategies and promoting conducive policies (e.g. the organic agriculture, open source seed, agro-ecology and slow food movements). Initiatives take place from the local to the international level and include demonstrations, campaigns, petitions, capacity building and policy dialogue. Network organisations play an important role in linking lobby and advocacy at the global and national level with impact and relevance at the local level.

The food sovereignty movement has booked notable successes in recent years to defend the rights of farmers to save, multiply, re-use, sell and exchange seed. At the international level, the reform of the Committee on Food Security (CFS) means that civil society is now actively involved in decision making processes. Local and national strikes, demonstrations and protests led to the
Ghana’s civil society protests Plant Breeders Bill

A series of civil society actions culminated in a nationwide demonstration by farmers, labour unions and civil society organisations in January 2014 in Ghana, when a proposed Plant Breeders Bill was put before Parliament. Signing the Bill into law and the subsequent joining of the UPOV Convention would have severe consequences for farmers’ rights and civil society action had been targeting elected officials with advocacy, lobbying and awareness campaigns to oppose the Bill. The protest in Accra and the grassroots campaigns that led to it, resulted in the Bill being referred to ‘the leadership of the House’ for reconsideration. At the demonstration, organisations including Food Sovereignty Ghana, the Convention Peoples Party, the Centre For Indigenous Knowledge (CIKOD), The General Agricultural Workers Union of TUC and the Rastafarian Council, launched the Coalition For Farmers Rights And Advocacy Against GMOs (COFAM) to strengthen their voice and harmonise the campaign efforts.

suspension of proposed seed laws in Colombia, Brazil, Ghana and Europe. In all cases, proposed legislation would increase corporate control over over seed and diminish farmers’ rights. The open source seed movement approaches the issue of privatisation of plant genetic resources through intellectual property right regimes from a different angle. Instead of focusing advocacy efforts on influencing the existing policy system that increasingly renders seeds a commercial proprietary resource, the movement promotes an alternative institutional and legal framework based on free and open access to germplasm.
Unlike farmers’ rights, the rights of livestock keepers have not been formally adopted in any policy framework. In the absence of legal enshrinement, the Local Livestock For Empowerment of Rural People (LIFE) Network, a group of non-government organisations, livestock keepers’, pastoralist associations and scientists, have developed tools to advocate for livestock keepers rights. Their Declaration on Livestock Keepers’ Rights has proven a powerful tool in policy negotiations. Biocultural Community Protocols are a legal tool to assert livestock keepers’ rights to fair and equitable benefit sharing under the Convention for Biological Diversity (CBD).

GM seeds form a threat to agricultural biodiversity and farmers’ rights for various reasons. A push for large-scale monocultures of GMOs comes at the expense of more diverse farming systems. In addition, GM technologies such as genetic seed sterilisation or “terminator technology”, increase dependence of farmers on a few multinational seed companies as it prevents farmers to replant their own seed. Genetically engineered crops have also increased the use of pesticides, particularly herbicides. Globally, the resistance against GMOs and their spin-offs like corporate control over seed and increased pesticide use is building. In 2013, the Global March Against Monsanto spanned six continents and included demonstrations in dozens of countries around the world. In Peru, concerted civil society action, including media campaigns, public statements and the engagement of the gastronomic movement, led to a ten year moratorium on the introduction of GM seeds into the country. In 2013, Brazilian civil society movements stirred a global protest to oppose the legalisation of terminator seeds in Brazil, putting the passage of the bill on hold. Campaigns by organisations like the Pesticide Action Network (PAN) raise awareness of the effects of pesticide use at national and international policy levels and promote alternatives.

Interest in healthy and nutritious food, local food traditions and environmentally friendly food production is increasing among consumers, producers and policy makers alike. Lobby and advocacy work by for instance the organic, agro-ecology and slow food movements have played a significant role in linking stakeholders and raising awareness on the role of agricultural biodiversity
for diverse diets, nutritious food and healthy ecosystems. Global and regional campaigns of the International Federation of Organic Agriculture Movements (IFOAM) raise awareness on how organic agriculture proactively maintains and builds agricultural biodiversity. Agro-ecology is also becoming an increasingly important movement for change. The approach promotes ecological practices that build on agricultural biodiversity and farmer agency. In Brazil, civil society advocacy coordinated by the Paraíba Semi-ared Articulation (ASA-PB) was fundamental in the development of a National Plan on Agroecology and Organic Production, launched in October 2013.
The agrobiodiversity@knowledged programme is a joint Hivos-OxfamNovib knowledge programme on agricultural biodiversity. The aim of this programme is to co-create and broker knowledge to catalyse a transformation towards a biodiverse, resilient and just food system. At the heart of the programme is a global knowledge and experience community of organisations working on agricultural biodiversity with millions of farmers worldwide, where evidence and insights are generated, shared and tested. The knowledge programme synthesises knowledge from a local to a global scale, conducts research on approaches and analytical frameworks that provide new perspectives on agricultural biodiversity and its role in resilient socio-ecological food systems, and improves horizontal and vertical knowledge flows.

www.hivos.net/Hivos-Knowledge-Programme/Themes/Agrobiodiversity-knownledged
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Mapping agricultural biodiversity initiatives: the Seedmap and Wikiseedia

AgroBioDiv: Mapping agricultural biodiversity initiatives, is a rich illustration of the breadth, scale and interconnectedness of local and informal sector initiatives by farmers, livestock keepers and civil society organisations, to promote and enhance agricultural biodiversity. This project forms part of an ongoing collaboration between the agrobiodiversity@knowledged programme, USC Canada and ETC Group to develop an interactive knowledge sharing platform on agricultural biodiversity for practitioners, researchers, policy makers, educators and students. Through stories and case studies, the Seedmap/Wikiseedia chronicles the threats to agricultural biodiversity and celebrates the collective action to nurture and defend it.

www.seedmap.org
The rich diversity of local and informal sector initiatives presented here, form the pieces of the puzzle of a global movement to promote and enhance agricultural biodiversity. Similarly, the copy you are holding forms part of a greater whole. The bigger picture only emerges when different copies are put together to form the word AgroBioDiv.