



COMMUNITY SEED BANKS IN NEPAL

PAST, PRESENT, FUTURE

Proceedings of a National Workshop, 14-15 June 2012, Pokhara, Nepal



Pitambar Shrestha, Ronnie Vernooy and Pashupati Chaudhary, Editors



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Pashupati Chaudhary¹, Editors**

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Participants of the national workshop on community seed banks

Table of Contents

Acknowledgement	vii
General Introduction <i>Ronnie Vernooy, Pitambar Shrestha and Pashupati Chaudhary</i>	1
In the Hands of Many: A Review of Community Gene/Seed Banks Around the World <i>Ronnie Vernooy</i>	3
Emerging Theory and Practice: Community Seed Banks, Seed System Resilience and Food Security <i>Bhuvon Sthapit</i>	16
A Brief Overview of Community Seed Bank Initiatives in Nepal <i>Bal Krishna Joshi</i>	41
Establishment and Present Status of Dalchoki Community Seed Bank in Lalitpur, Nepal <i>Bharat Bhandari, Mohan Hamal, Jitbal Rai, Dhurba Sapkota, Krishna Sangel, Bal Krishna Joshi and Pratap Shrestha</i>	47
Community Seed Banks: A Local Solution to Increase Access to Quality and Diversity of Seeds <i>Pitambar Shrestha, Sajal Sthapit and Indra Paudel</i>	61
Agrobiodiversity Resource Centre: The Cooperative Managed Community Seed Bank of Ranibas, Sindhuli <i>Dinesh Shrestha, Yadav Khanal, Mohan Khatiwada and Ram Prasad Baral</i>	76
The Story of Establishment and Management of a Community Seed Bank in Kachorwa Village of Bara District in Central Terai Nepal <i>Ramekwal Yadav</i>	87

Oxfam’s Experiences with Supporting Community Seed Banks to Enhance Local Seed Security	94
<i>Sudha Khadka, Safal A. Subba, Mahendra N. Mahato, Raj K. Adhikari and Heema Khadka</i>	
Policies and Procedures for Implementing Community Seed Banks in Nepal	101
<i>Suroj Pokhrel and Priyambada Joshi</i>	
The Story of Establishment and Management of the Sindhu Community Seed Bank in Thumpakhar Village of Sindhupalchok District	112
<i>D.B. Bhandari</i>	
The National Genebank, the Multilateral System and Community Seed Banks for the Conservation and Utilization of Agricultural Genetic Resources in Nepal	120
<i>Madan R. Bhatta, Bal K. Joshi and Devendra Gauchan</i>	
Banking Seeds by Smallholders in Nepal: Workshop Synthesis	130
<i>Pashupati Chaudhary</i>	
Appendix	
National Workshop on Community Seed Banks: Workshop Summary Report	141
Workshop participants	149

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The Editors

General Introduction

RONNIE VERNOOY, PITAMBAR SHRESTHA AND PASHUPATI CHAUDHARY

Community gene and seed banks have a history of about 30 years. They emerged in different parts of the world in response to concerns about the loss of agricultural biological diversity, the total loss of seeds caused by natural disasters such as floods and hurricanes, the impact of climate change, declining access to quality seeds, and demand from farmers to participate in locally driven biodiversity management strategies. They can be found around the world under different names, and are diverse in terms of size, form and function. Some countries, including Nepal, have more than one hundred community gene and seed banks at present time. Other countries have only a few nascent ones, such as Bhutan, Burkina Faso, China, Guatemala, Rwanda and Uganda.

Although in different countries they are known by different names, e.g., seed wealth centre, community seed reserve and seed exchange network, all community seed banks have in common that they are maintaining varieties of seeds for local use in farming systems for the direct benefit of a “community.” Community in this sense often has a specific geographic delimitation, such as ward, village, hamlet or district, but sometimes encompasses a much broader geographical area. Community seed banks can best be seen as examples of local level institutions created to address issues of seed conservation, particularly of farmer varieties, and in more recent years, also of seed selection, production, improvement and marketing. In addition, community seed banks have the potential to pool resources in the face of climate calamities through sharing of accessions among community seed banks at the regional or national level as well as between community seed banks and national and international genebanks. Some organizations, including Bioversity International, have started to explore this potential.

In Nepal, community seed banks have a long and rich history. Supported in particular by a number of non-government organizations and more recently, also by government agencies, they can now be found across the country from the *terai* to the high hill areas and from east to west. The latest account puts the number of active community seed banks at 115 (June 2012). However, detailed documentation of activities and results is not always available and is subject to change as time passes. Exchanges among staff of organizations working with community seed banks revealed that there is a poor common understanding about community seed banks in terms of definition, goals, functions, approaches, and forms of governance among practitioners and among members of community seed banks. In different parts of the country, the practices followed by different organizations vary significantly. One of the consequences has been difficulty developing a national strategy to strengthen community seed banks.

In light of these challenges, LI-BIRD, together with national and international partners, organized a two-day national workshop in Pokhara, Nepal in June 2012. The workshop brought together 40 participants representing farmers, researchers, community seed

bank practitioners, extension workers and national and international policy makers. The objective of the workshop, which, as far as we know, was the first national workshop of its kind anywhere in the world, was to seek answers to the following questions:

- How do we define a community seed bank?
- What are the key components, main characteristics, principles, approaches and working modalities of community seed banks?
- Can a useful typology be developed to bring consistency in understanding and practice?
- What policies are required to promote and sustain the role of farmers as custodians of agricultural biodiversity?
- What are key challenges and opportunities of community seed banks?
- How can community seed banks contribute to national and international biodiversity conservation strategies?
- What policy and practices are needed to make community seed banks sustainable in conserving and maintaining agricultural biodiversity?

These proceedings bring together knowledge of the contributions of community seed banks in all their richness and diversity. The first two chapters describe the history of community seed banks in the world and the theoretical perspectives which help us to understand the concept, definitions and global context. The third chapter discusses the entry of the community seed bank concept in Nepal and also presents a brief national overview. Chapters 4 to 9 include case studies of particular community seed banks that reflect rich experiences in Nepal. Chapters 10 and 11 reflect on the experiences of public institutions, but from two different systems viz. the Crop Development Directorate under the Department of Agriculture and the National Gene Bank under the umbrella of Nepal Agriculture Research Council. The former promotes community seed banks in Nepal to increase seed and food security through increased access to quality seeds while the other attempts to establish links between *ex situ* and *in situ* conservation of plant genetic resources. The proceedings serve both to take stock and to look ahead. We hope that they inspire people both within and outside Nepal working in or with community seed banks. We welcome feedback.

In the Hands of Many: A Review of Community Gene/Seed Banks Around the World

RONNIE VERNOOY

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Photos: Ronnie Vernooy

“Seeds, especially of food and other useful plants, should be taken care of by the people. They are too precious for all of them to be placed under the exclusive control of the few. The more hands that hold them, the safer they will be.”

M. and J. Fanton 1993. “The seed savers’ handbook”, p. 14, italics in the original

What’s breaking the silence got to do with it?

Community gene/seed banks have been around for about 30 years. They can be found across the globe in a diversity of forms in terms of function(s), size and scope, governance and management, physical appearance, technical aspects (e.g., seed storage facilities and techniques) and impact. Particular histories differ. Some countries have a relatively large number of them (over 100), e.g., Brazil, India, Nepal, Nicaragua, although exact numbers are hard to determine. Other countries have only a few or a few nascent ones, e.g., Bhutan, Bolivia, China, Guatemala, Rwanda. Other are exploring how to establish them, e.g., South Africa. Although the nomenclature varies, all such community gene/seed banks serve a core function of collectively maintaining seeds for local use (Development Fund 2011; Shrestha *et al.* 2012). In many countries of the “South,” they are usually known as community gene or seed banks while in the “North,” they are often known as seed savers

groups, associations or networks. Other names include seed exchange network (Brazil), seed wealth centre (Bangladesh), Seeds of Diversity Canada¹ (registered under this name as a grassroots organization; Pittenger 2000), community seed reserve (Costa Rica), farmer seed house and farmer seed network ('maison des semences paysannes,' 'réseau semences paysannes'², France).

There are surprisingly few detailed scientific studies about community gene/seed banks, their roles and impact (also noted by Engels *et al.* 2008: 150); an exception is a typology of community seed banks published in 1997 by Lewis and Mulvany, most likely the first attempt to review community seed banks globally. As far as we know, no *systematic, in-depth comparative* analysis has been carried out of community gene/seed banks in their variety of forms. The FAO's "Second global report on the state of the world's genetic resources for food and agriculture" (2010) does not have a single reference to either community gene banks or seed banks. A number of major books on the subject of agricultural biodiversity management, use and conservation, have no references either, e.g., Wood and Lenné (1999), Brookfield *et al.* (2003), Smale (2006), and Jarvis *et al.* (2007). Others mention community seed banks only in passing (Brush 2000). Publications on seed systems follow this surprising trend, e.g., Tripp (1997), Louwaars (2002), Lipper *et al.* (2010). There are some references to gene/seed banks in the published literature on the conservation of genetic resources diversity, e.g. Cooper *et al.* 1992, Almekinders and de Boef 2000, CIP-UPWARD 2003, Shrestha *et al.* 2007, de Boef *et al.* 2010. Overall, however, it appears that farmers and gardeners who have set up gene/seed banks in a variety of forms around the world have been "salvaging in silence," to borrow a chapter title from a book on genetic diversity in European agriculture by R. Vellvé (1992: 91-119).

This review aims to "break the silence" by offering some preliminary, mostly descriptive findings of the 30 years of experience of community gene/seed banks around the world. The results aim to serve two purposes. First, as an input for reflecting on the past: what has been achieved and learned? What have been the challenges? Second, for looking ahead: in the light of current challenges related to the sustainable use of agricultural biodiversity, such as the commercialization of agriculture, genetic erosion, and the impact of climate change, what roles could community gene/seed banks play? The review is based on a review of literature, predominantly "grey", in English, plus some in French, Spanish and Portuguese, found in libraries and on the internet, practical experiences supported by Bioversity International, and practical experiences collected through professional contacts. A more in-depth search and review by the author and colleagues are on-going. The review addresses briefly the following components: origins; functions; organization; seed management; connections; enabling environment; and sustainability (for a detailed analytical framework, see Vernooy and Halewood 2012).

1 <http://www.seeds.ca/>

2 <http://www.semencespaysannes.org/>

What have NGOs got to do with it?

“NGOs played a useful role in organizing and training farmers in collaboration with different national institutions. However, high reliance on NGOs is a challenge for the sustainability of community seed banks. This challenge seems to have been overcome in Nepal, where farmers managing CSBs have established a community biodiversity management fund...”

The Development Fund 2011, “Banking for the future”, p. 15

It is not easy to exactly pinpoint the origin of the establishment of community gene/seed banks, but there is no doubt that NGOs played an instrumental role and continue to do so in many countries around the world. In the “South,” NGOs set up community gene/seed banks most of all to conserve local/farmer varieties and/or rare varieties as a response to the loss of diversity due to societal forces or due to recurring natural disasters, most notably droughts and floods. Among the founders or co-founders of community gene/banks are NGOs such as the Rural Advancement Foundation International (RAFI, now known as ETC Group). RAFI, in 1986, produced the “Community seed bank kit,” as far as we could track down, the first *How to Do* guide for establishing a local gene/seed bank. Inspired by RAFI were other NGOs, such the Philippine-based SEARICE operating in a number of South-east Asian countries (in 1992, SEARICE assisted another Philippine NGO named CONSERVE to set up a community gene bank, see, Bertuso *et al.* 2000), and the Chile based CET operating in a number of Latin American countries. Unitarian Service of Canada (USC), based in Ottawa, with partner NGOs around the world established the Seeds of Survival program (late 1980s/early 1990s) which is still operational (Green 2012).³ Other examples include UBINIG in Bangladesh (the impetus in the late 1980s were floods and a cyclone; Mazhar 1996) and the Relief Society of Tigray (1988) and Ethio-Organic Seed Action (EOSA) in Ethiopia. The former received support from the Norwegian Development Fund, another continuous supporter of community seed banks around the world (Development Fund 2011). A pioneer in Zimbabwe was the Community Technology Development Trust (CTDT), which established the first community seed bank in 1992 following severe drought (Mujaju *et al.* 2003). In India, several NGOs took the lead, including the GREEN Foundation (starting in 1992), the Academy of Development Sciences (in 1994; see, Khedkar 1996), the Deccan Development Society (Satheesh 1996), the MS Swaminathan Research Foundation (in 2000) and Gene Campaign (in 2000). In Nepal, there were USC Canada Asia (in 1994) and LI-BIRD (in 2003); in Nicaragua, CIEETS and the Programa Campesino a Campesino (PCaC, Farmer to Farmer program) (SIMAS 2012). One notable exception to NGO involvement is the Plant Genetic Resource Centre of Ethiopia, a government agency, which supported a number of community gene/seed bank in Ethiopia and built direct links between the national and local levels (Worede and Mekbib 1993; Feyissa 2000).

3 <http://usc-canada.org/what-we-do/sos/> CONSERVE in the Philippines formed part of the Seeds of Survival program.

Partly preceding and partly in parallel with establishment in the “South”, in the “West,” many so-called seed savers groups, associations and networks are made up mostly of (hobby) farmers and gardeners from far and beyond (often thousands of miles apart from each other) who share a common interest in keeping traditional and local crop diversity alive. As such, “seed savers” form a community of practice more than a community in the sense of a place-bound social group. The USA based Seed Savers Exchange, a not for profit, member supported organization, was established in 1975 by Diane Ott Whealy and Kent Whealy.⁴ Its aim is the preservation of heirloom seeds through the building of a network of committed people who collect, save and share seeds and plants. Heirloom seeds are passed on from generation to generation. In the North American context, many heirloom seeds were carried by settlers originating from European countries. The organization is anchored by an 890-acre Heritage farm in Iowa where seeds are reproduced, catalogued and disseminated, and where educational activities take place.

“For the Member-Grower Evaluation Network (M-GEN) program, we use a common [characterization/descriptor] form for each crop type. This year, M-GEN participants are growing either cucumber, radish, lettuce, rutabaga, or collards. The M-GEN evaluation is a simplified version of the evaluations that we complete at Seed Savers Exchange. The main goals are to 1) engage our members, and 2) identify regional differences in performance for the M-GEN varieties. Participants are asked about seedling germination and vigour, plant health and productivity compared to other varieties they are familiar with, and their thoughts on taste. They also send in photos and measurements of the edible portion of the plants at market maturity.”

Tor Janson, coordinator of the Seed Savers Exchange Member-Grower Evaluation Network, June 1, 2012 (email to the author)

In 1986, inspired by the example of the USA, the Australian Seed Savers was set up by Michel and Jude Fanton. First established nation-wide, without government support, it has since developed into a network of (local) networks spread out across the country (Fanton and Fanton 1993; The Seed Savers’ Network and Megu’u Ogata 2003). Since 1995, the Australian network has supported the establishment and strengthening of such groups in almost 40 countries, e.g., Afghanistan, Bosnia, Cambodia, Croatia, Cuba, Italy, Japan, Kenya, Palau, Portugal, Serbia, Solomon Islands, South Africa, Spain, Taiwan and Tonga.

“From 1986 to 2008, we received 8500 seed samples of every size, either at our post office box or dropped at the Seed Savers office. We recorded each in a FileMaker Pro database, allocated them an accession number, tested them for viability with our volunteers and multiplied them. One third was multiplied in our Seed Gardens and the rest by our supporters and a team of expert seed savers, that we call regenerators. Now that activity is undertaken by our Local Seed Networks around Australia.”

Australian Seed Savers website, June 1, 2012, <http://www.seedsavers.net/>

4 <http://www.seedsavers.org/>

What's crop improvement got to do with it?

Although not all community gene/seed banks were strictly conservation focused when first set up, many were. Some that initially were conservation focused evolved over time to play other roles, such as seed production and crop improvement. Some were established following one or more cycles of crop improvement. Many of the more recently established community seed banks have a seed multiplication focus (for an example of maize seed banks from Guatemala, FAO 2011) or could best be described as seed producing entities (e.g., examples from Zambia, Nakaponda 2010). In cases where such entities become basically local contractors for commercial (multinational or national) seed enterprises or for government agencies, one could argue that they are no longer community seed banks as defined in this review. Many community gene/seed banks are part of much larger initiatives to conserve agricultural biodiversity (CIP-UPWARD 2003; de Boef *et al.* 2012, Jarvis *et al.* 2011; Mijatović *et al.* 2012; Shrestha *et al.* 2013; Worede 2011). In some countries, community seed banks have evolved from purely community-based activities to playing important roles in the implementation of (state) government policies, such as in Brazil where they deliver seeds to public entities such as schools and hospitals. Altogether, community gene/seed banks fulfil a multitude of roles:

- Conservation of local varieties including heirloom and rare varieties (food, fodder, herbs and medicines, religious uses)
- Restoration of “lost” varieties (for example, due to natural disasters)
- Crisis/disaster/shortage responsiveness and insurance
- Maintain and improve accessibility of seeds at the community level (traditional and modern varieties)
- Secure storage of seeds in areas affected by unrest, fighting and theft
- Offer seeds at low(er) costs (than the commercial sector)
- Facilitate seed swaps
- Guarantee seed sovereignty
- Help particular groups to obtain seeds
- Seed multiplication, including of participatory bred varieties
- Make money through the sales of seeds
- Share agricultural biodiversity knowledge and expertise
- Platform for community-based biodiversity management
- Link *in situ* and *ex situ* conservation
- Contribute to green or ecological agriculture, e.g., such as the “Nayakrishi Andolon” (“New agricultural movement”) in Bangladesh, or to a food sovereignty movement (at the international level represented by la Vía Campesina)

There are probably no two community gene/seed banks fully alike. On the one hand, there are diversity rich community gene/banks, such as the one established by the NGO Grama Vikas in India (2002), which operates at the village level, is managed by a Women Self-Help Group, covers several plots, and runs one small seed bank (storage facility). The women maintain indigenous varieties of 8 rice, 12 grains, and 35 vegetables. They carry out collection, replication, storage, distribution, seed quality testing, and variety selection.

They practice organic agriculture. They regularly organize seed festivals to encourage exchange and sharing of knowledge and seeds.⁵ On the other hand, there are single crop specialized community seed banks organized with the support of the non-government agency PROINPA Foundation (Promotion and Research of Andean Products) of Bolivia (2005-06), managed by groups of 15-25 farmers in one single community, operating just one seed production plot in one farmer's field, without a physical seed bank—the field is the bank! Each of the Bolivian community seed banks focuses on only one crop, i.e., Quinoa, of which farmers maintain 5-6 varieties/accessions, or Cañahua, of which farmers maintain 2-4 lines (Rojas *et al.* 2012).

Community gene/seed banks reportedly have contributed to maintaining, restoring and increasing genetic diversity at local and national levels, to improving access, availability and use of local varieties in particular, to reviving and reinvigorating cultivation practices, to diversifying production and consumption, and to generating income. Few in-depth impact studies are available, however.

What's collective action got to do with it?

Community gene/seed banks all have in common the element of collective action, although in practice, which belongs to the “collectivity” (and who does not), in what ways and to what effects, varies widely. The majority of community seed banks can be found in marginalized areas where peasant agriculture has remained central. As such, they are embedded in practices of existing forms of collective action. In general, this stands in contrast to the individualistic nature of “modern” industrial and commoditized agriculture.⁶ In many cases, community gene/seed banks build on, or at least try to do so, traditional institutions of access to and sharing (of seeds), cooperation (pooling of land, labour and knowledge), reciprocity (mutual support), and fairness. Often though, they also make use of “new” governance and daily management rules and regulations to maintain the common or collective good. Some of them have incorporated organizational, administrative and financial practices from modern management. Many of them make use of participatory action research and learning methods and tools, for example, by means of participatory plant breeding, including variety selection, which deepens knowledge, skills and practices of collective action.

In practice, collective action ranges from small scale (groups of households, a village), mostly for exchange of seeds and related knowhow, to large scale (national level), for the commercialization of seeds. It ranges from a focus on taking care of traditional varieties to a broad range of materials including modern varieties. In terms of day to day management, coordination and communication range from face-to-face interaction and hand delivery (of seeds) to use of email, internet-based seed purchase and distribution (catalogues), and crowd-sourcing (testing) by regular mail.

5 <http://gramavikas.org/Community%20Seed%20Bank.htm>

6 Cooperatives of various kinds exist in many countries and represent a kind of blend of individual and collective action. In some countries, some community seed banks have evolved to seed production and marketing cooperatives, e.g., Nepal, Brazil.

In India, several community gene/seed banks are managed by so-called Self-Help Groups (SHGs). Women operate many of these groups. SHGs play important roles in rural development more broadly through collective care taking, management and conservation of natural resources, collective management of credit, and joint planning and implementation of social activities (Rengalakshmi *et al.* 2003). In Nepal, farmers organized in the Agriculture Development and Community Society (ADCS), manage a community seed bank. ADCS plays the role of facilitator of community-based conservation of agrobiodiversity more broadly. It runs a community biodiversity fund which not only contributes to the conservation of traditional varieties, but also supports small business development. In Spain, a cooperative originally set up to produce food for its members in an agro-ecologically friendly way, developed and evolved to a large organic seeds producer and a local centre of agrobiodiversity research (Da Vià 2012).

Women are very active in most, if not all, community gene/seed banks. In many countries they are the principal seed selectors and guardians. In some countries, such as Nicaragua (SIMAS 2012,) women groups manage community seed banks from A to Z. The community seed banks form part of a larger effort to practice sustainable agriculture. As their and other experiences indicate, effective collective action depends on a number of factors, such as motivation, incentives and rewards, leadership, communication channels, connections, and political space. In-depth studies that look into these factors and how they are informed by gender, with regard to the vitality of community gene/seed banks have not been done as far as we know.

What's banking got to do with it?

The maintenance of a community gene/seed bank—the actual *banking*—requires the execution of a number of tasks, ranging from identification, selection, collection, conservation and distribution of materials. To carry out these tasks effectively, managers will have to decide which passport data to use, which farmer descriptors to integrate, which storage system to set up (keeping seeds healthy is an essential task), which documentation system to install, and what practices of evaluation, rejuvenation and utilization to use. There is no single way to run the technical side of a community gene/seed bank. No professional guide book(s) for community level gene bank *management* exists, as far as is known, but there are some useful texts about how to establish a gene bank (Zinanga *et al.* 2009; Shrestha *et al.* 2008) as well as a series of (farmer) radio “scripts.”⁷ Handbooks for how to save seeds written by seed savers’ pioneers are available on-line (Fanton and Fanton 1993; Cherfas *et al.* 1996).⁸ Mostly, community gene/seed banks have learned by doing, as detailed documentation of what works is difficult to find. Campbell (2012) details how challenging these tasks can be for a combined (open-pollinated) seed bank, seed swap and farmer network in the Ozark highlands of the USA. If

7 In 1994, Farm Radio International ran a series of emissions about starting up a community seed bank in seven steps. http://www.farmradio.org/english/radio-scripts/33-3script_en.asp
http://www.farmradio.org/english/radio-scripts/33-4script_en.asp
http://www.farmradio.org/english/radio-scripts/33-5script_en.asp
http://www.farmradio.org/english/radio-scripts/33-6script_en.asp

8 <http://www.seedsavers.net/seed-savers-handbook-online>

“training and education of assistants, greenhouse propagation, planting, field management, hand pollination, caging, bagging, harvesting, seed drying and storage, labelling, organizing of accessions, and maintenance of databases” (ibid: 516) are a challenge in the well-endowed “West,” it is not hard to imagine how demanding it will be in the “South.”

What have connections got to do with it?

Community gene/seed banks are most often part of local seed systems. They are characterized by their local nature in the broad sense of the meaning: confined to a geographic area, managed by people from that area, seed exchanges within that area. Others, however, have spread their wings. National and international NGOs have played important roles in bridging the local with the supra-local through networking of people, establishing communication channels, organizing events, and offering financial support. In a few cases, national government agencies, such as national genebank, research stations or breeding programmes, have established links with community gene/seed banks, although the examples are few. In the states of Karnataka and Tamil Nadu of India, about 50 community seed banks have formed a regional network with the support of the Green Foundation, a NGO (Ramprasad 2007); other community gene/seed banks are linked to a regional genebank equipped with a cold storage facility which is managed by the MS Swaminathan Foundation. In Ethiopia, the national genebank has returned varieties that had gone “missing” in communities to community seed banks. In Nepal, the recently established national genebank has expressed interest to establish direct links with community seed banks to exchange knowledge and seeds. In Brazil, community seed banks cooperate directly with some state governments to supply seeds of certain crops to public agencies such as schools and hospitals. In some countries, private seed companies have made contacts. In Thailand, a community seed bank has built a link to a local school to familiarize students with crops and crop diversity in the field. In Bangladesh, community seed banks are part of a social movement that provides technical, moral, social and political support (“Nayakrishi Andolon”, Mazhar 2000). No detailed research has been done on the impact of different kinds of connections on the functioning and vitality of community seed banks, but one could hypothesize that multiple, strong and dynamic connections could have a positive impact (Shrestha *et al.* 2008).

What’s an enabling environment got to do with it?

Practically, the operations of community gene/seed banks are regulated, directly or indirectly, by a number of national policies and laws, international treaties and agreements that concern farmers’ (traditional) knowledge, farmers’ rights, and both individual and collective farmer activities to produce, save, exchange and sell farmer-produced seeds, including of locally improved varieties. The CBD, the ITPGRFA, the WTO-TRIPs, UPOV, WIPO, the Convention on Climate Change, regional and bilateral trade agreements, are the main international “instruments” that relate to community gene/seed banks (Zinanga *et al.* 2009). At the national level, agrobiodiversity policy/laws, seed policies/laws, variety release procedures, IPR policies/laws, access and benefit sharing policies/laws, and policies/laws concerning farmer organization and farmers’ rights are of relevance.

With regard to the actual policy space that exists, considerable variety can be observed, ranging from an open to a constraining to a hostile environment. In only a few countries community gene/seed banks are clearly on the policy radar and receive some form of support, e.g., Brazil (Dias da Silva 2013), Bolivia (Rojas *et al.* 2012), Bhutan (Sangay Dorji, personal communication 2012), and Nepal (Shrestha *et al.* 2012). In others, although they have a long history, the current government policy of modernizing agriculture through modern varieties and chemical inputs actually neglects local crop development and conservation (Ethiopia). In several countries, policy makers have proclaimed that community gene/seed banks should play key roles in crop conservation and improvement including as a way to implement key components of the ITPGRFA (sustainable use, conservation, Farmers' Rights) and as means to adapt to climate change. Some efforts are underway to concretize this in some countries (Guatemala, India). In some countries, governments have declared that there is not a role for them or only a marginal one, e.g., Indonesia (Soetomo 1992).

Community gene/seed banks sometimes serve to open up policy space. In Nepal, for example, in a pilot project, ten of them have been invited to function as legitimate local institutions to provide Prior Informed Consent (PIC) to bio-prospectors as a way to implement the PIC provisions of the Agrobiodiversity Policy of 2007 and the draft ABS Law of 2003 (LI-BIRD 2011: 33). In the State of Paraíba, in the northeast of Brazil, a law was approved to legalize the distribution of seeds produced by community seed banks without the required formal certification by specialized agencies (Sabourin *et al.* 2005). In India, researchers are proposing that village-based seed banks become an integral part of the government's national seed policies, matched by adequate financial and technical support (Tonapi *et al.* 2012).

What's sustainability got to do with it?

In the light of renewed constellations of peasant farming (Da Vía 2012), the spread of community supported agriculture and organic agriculture, a growing seed and food sovereignty movement, and the search by many actors for effective adaptation to climate change it seems that interest in community seed banks is growing around the world. Our review suggests that community gene/seed banks can be important forms of local collective action contributing both to sustainable agriculture and the conservation of agrobiodiversity.

Some community gene/seed banks have lasted for more than a decade. Most of the "survivors" seem to have benefitted from technical and financial support from other organizations, NGOs in particular, but government as well. A strong sense of community ownership and belonging is another important factor of viability. Regular exchanges of seeds and knowledge are the beating heart of community seed banks. Community gene/seed banks that operate merely as repositories appear to have short life spans. Community gene/seed banks that take part in crop improvement efforts appear more dynamic and vital than ones merely focusing on conservation. An enabling policy environment can legitimize community gene/seed banks and provide a stimulus to grow. There are most likely other socio-economic, environmental, and political factors, but given the lack of

detailed documentation of the evolution of community gene/seed banks, it is hard to offer *very solid* evidence about sustainability. Here is what some of the pioneers have to say about viability:

“It is essential to associate seed production and marketing with applied plant breeding and seed research. We need to document existing potentials and introduce variability for demanded traits and crops. We foresee that CSBs will survive if they can provide the seeds that are needed and demanded, and if they can be operated as commercially viable enterprises.”

Berg and Abay 2008: 103 (Ethiopia case)

“As a community owned and managed activity, with integrated additional activities like local financial resource mobilization, the creation of a conservation fund, and other income generation activities, the CSB was found to be effective and sustainable.”

Shrestha et al. 2008: 108 (Nepal case)

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Emerging Theory and Practice: Community Seed Banks, Seed System Resilience and Food Security

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Photos: Sajal Sthapit (left), Mahesh Shrestha (top right) and Bhuwon Sthapit (bottom right)

Introduction

Agricultural biodiversity is the foundation of agriculture. Crop genetic diversity, a part of agricultural biodiversity, is one of the most important resources that smallholder farmers have to improve their livelihoods. In addition, it also serves as a means to attain food and nutrition security and income generation, and to build critical and fragile ecosystems services. In the rush to tackle global food shortages, over the last century or so, agriculture, especially modern agriculture, has earned a bad name due to its large contribution to the destruction of forests, use of already scarce water and increased carbon emissions and soil degradation. The large scale use of hybrids and modern varieties, and a concentration on only a few species, has contributed to large losses in crop genetic diversity worldwide. For agriculture to return to sustainability, it will have to increasingly make use of a much wider range of genes, species and ecosystems than it does today; preferably including more perennial crops. Most formal conservation of crop genetic diversity has historically focused on *ex situ* methods, i.e. establishing seed or field gene banks. However, the value of on farm management of local crop diversity by farming communities is being increasingly recognized as an indispensable complementary approach to conservation not only of the germplasm, but also of the traditional knowledge associated with it (Bioversity 2012a, 2012b).

On farm management of local crop diversity is a highly dynamic form of crop genetic resources (CGR) management, which allows the processes of both natural and human selection to continue to act in the production system (Frankel *et al.* 1975; Brush 2000). Farmer's ability to search for new diversity, select new traits, and cultivate and exchange selected materials with friends, relatives and community members are the processes that allow genetic materials to evolve (Doring *et al.* 2011). Such practices are increasingly valued as they enhance farmers' capacity to cope with adversity resulting from the consequences of socio-economic transformation, market forces and climate change. In order to maintain this capacity, a farmers' seed system should have a rich and diverse germplasm base – a genetically diverse portfolio of crops and their varieties- that is suited to a range of agro-ecosystems and farming practices, and resilient to climate change (Bioversity 2012; FAO 2011). This diversity provides flexibility to farmers to select cultivars with adaptive traits or market traits, as the situation may warrant.

Overall, some 80-90 % of seed used by smallholder farmers in developing countries is sourced from informal farmers' seed systems on farm (Almekinders and Louette 2000; Tripp 2001; Baniya *et al.* 2003; Louwaars 2007). At present, however, many farming communities are losing production options due to shrinking diversity on farm.⁹ Many farmers (due to poor storage facilities and capacity to keep seed for one or two seasons) have difficulty in accessing the genetic diversity that they once might have had. Reasons include that the new materials available to them either need more inputs than they can afford or are not suitable for the kind of land they hold. Nevertheless, research carried out in 27 crop species in 8 countries where traditional seed systems are working illustrated that farmers' seed systems still harbour rich genetic diversity (Jarvis *et al.* 2008) as they are open, integrated and dynamic which allows for seed flows and seed transactions from diverse sources. It include: domestication, natural introgression, natural selection, germplasm introduction, exchange, human selection, germplasm enhancement and breeding, and market outlets. Traditionally, provision of farmer's seed requirement constitutes self-saved seed, farmer-to-farmer exchanges and local market purchase, with the formal sector playing a minor role. In a cycle of sowing and re-sowing seed lot from plant population year after year, plants favoured under prevailing conditions are expected to contribute more seed to next generation than plants with lower fitness (Harlan 1992; Doring *et al.* 2011). When these plants are further selected for specific colour, types, qualities and post-harvest characteristics, they further migrate to a special area and colonize the area by increasing population size (Hasting and Harrison 1994).

A farmers' seed system is an informal and open genetic system, comprised of a number of nodes of smaller populations inhabiting agro-ecological niches connected by migration (seed flow) and colonization (multiplication=increased area by household or increased number of farmers in a village). A farmer seed system is, therefore, composed of a series of farmers—some of them being custodian farmers¹⁰-and the different ways in which genetic material is exchanged and moves between farmers, as well as the ways that genetic material

9 Over the past century, about 75% of plant genetic resources have been lost and a third of today's diversity could disappear by 2050 (FAO, 2011).

10 Custodian farmers are those farmers (men and women) who actively maintain, adapt and disseminate agricultural biodiversity and related knowledge, over time and space, at farm and community levels and are recognized by community members for it (Sthapit *et al.* 2013).

is selected and shaped by each farmer's behaviour. The informal seed system, which is also known as local or farmers' seed system¹¹, follows the principles of meta-population theory of conservation biology (van Dusen 2003; Levin 1976).

Farmers' seed system

Seed security is vital for food and nutrition security. Farmers' seed systems are those in which farmers produce, select, save, re-use and acquire seed outside official or large scale commercial channels. Reliability and availability of seeds at the right time and in the right price, as well as easy access, are crucial for poor smallholder farmers but such hallmarks might not be universal in all systems. Farmer seed systems are often considered good traditional practices for seed security and therefore, for ensuring food sovereignty. Studies have indicated that depending upon crops and countries over 60 to 85% of the seed of the main staple crops come through informal sectors in developing countries (Cromwell 1997; Tripp 2001; Baniya *et al.* 2003; Hodgkin *et al.* 2007; Louwaars 2007); this approaches 99% in the case of neglected and underutilized crop species (Sthapit and Padulosi 2011; Almekinders and Louwaars 2002; Louwaars 2007)¹². Such informal seed systems play a central role in the provision of planting materials in developing countries and are important for maintenance, adaptation and exchange of crop genetic resources in the landscape. The systems are very dynamic and integrated, with the resilience to cope with all kinds of external pressures (Bellon 2010). Our interest is mainly in systems that keep landraces in circulation.

Farmer seed systems have many functions but they are often not well recognized by the formal system. Four basic functions are different from the formal seed system: i) it maintains a germplasm base that provides diversity, flexibility and a basis for selection (Hodgkin *et al.* 2007; Louwaars 2007; Sthapit and Padulosi 2011), ii) it produces relatively good quality seed for household crop production (often free from diseases/pests/weeds if farmers are trained) with high germination and vigour (Biomonda *et al.* 2013; Singh *et al.* 2013), iii) it ensures access and availability of seed through various sources such as social networks, local markets and own selection (Tripp 2001; Lipper *et al.* 2010; Jarvis *et al.* 2011) and iv) most importantly, it involves sharing information and knowledge about the local seed such as knowledge of varietal performance, matching environment, growing methods, utilization, trade-off between traits, varietal plasticity, etc., based upon farmer's own experiences (Hodgkin *et al.* 2007).

A basic awareness of theories around on farm conservation, farmer seed systems and meta-population theory is necessary to move forward in the area of community seed banks.

11 Includes small-scale, unregistered seed producers, who sell the latest recommended varieties.

12 A criticism can be raised that the rate of informal exchange is high because the formal sector is not working in these crops. So does the informal system have value only because there is no alternative, or is it valuable for other reasons too? Practically, the informal system will persist for a while, but should it be replaced once the formal sector fills the role? Or will the formal sector never be able to play certain valuable roles of the informal sector? In reality, the formal seed sector has difficulty in meeting such high levels of diversity and there will never be enough resources to invest in NUS crop improvement and private/public sector seed enterprises.

This chapter presents key concepts, methods, drivers and challenges to better understand community seed banks so as to improve the chances that local crop varieties will be preserved and used sustainably around the world. We also assess how community seed banks are emerging as the platform of local community-based institutions to address issues of seed insecurity and as a means to reduce over-reliance on a handful of crops that puts local and global food security at great risk, especially in the context of climate change.

Definition

Community seed banks range from a single farm family seed bank to a community seed bank. They could deal with local landraces, introduced landraces or improved cultivars (Lewis and Mulvany 1997; Lipper *et al.* 2010; the Development Fund 2011).

I define community seed bank as a community driven and community-owned effort to conserve and use both local and improved varieties for food security and to improve the livelihoods of farmers. Three types of community seed banks can be identified: i) community gene bank (solely conservation of local varieties as PGR in small quantities), ii) community seed bank (solely concerned with access and availability of cultivars) and iii) community gene cum seed bank (carries out functions of both (i) and (ii)). The term 'community seed bank' should not be used if conservation and sustainable use of plant genetic resources for food and agriculture are not the major objectives.

It is not easy to pinpoint the genesis of community gene/seed banks, but there is no doubt that non-governmental organizations (NGOs) played a key role in the development of this concept and continue to do so in many countries around the world. The Development Fund (2011) and Vernooy (2013; chapter 1 of this publication) reviewed how the concept of the community seed bank evolved over time.

The global literature review reveals that a wide range of terms are used to describe community seed banks (Soetomo 1992; Satheesh 1996; Lewis and Mulvany 1997; Feyissa 2000; Mujaju *et al.* 2003; Rengalakshmi *et al.* 2003; Shrestha *et al.* 2006; 2007; 2008; Ramprasad 2007; Berg and Abay 2008; Zinanga *et al.* 2009; Development Fund 2011; Green 2012; Shrestha *et al.* 2012). These include "community gene bank" (Khedkar 1996; Rani 2000; Bertuso *et al.* 2000; Engels *et al.* 2008), "community gene and seed bank" (Rangalakshmi *et al.* 2003), "village seed bank" (Senapati 2011), "seed wealth centre" (Mazhar 2000), "diversity field fora" (Jarvis *et al.* 2011), "community-based seed systems" (CBSS)¹³. One of the main components of CBSS is to train farmers on the procedures and requirements of breeding. Those farmers are then licensed/given the authority to certify the quality of the seeds produced in the community. In Canada, USA and Australia, community seed banks function like a network of local seed growers that save and exchange heirloom seeds. These include Seeds of Diversity, Canada¹⁴; Seed Savers Exchange¹⁵; Decorah, USA; Seed Savers;

13 http://www.fidafrique.net/IMG/pdf/0_Systeme_CBSS_AMB.pdf

14 <http://www.seeds.ca/>

15 <http://www.seedsavers.org/>

Seed Exchange Societies¹⁶; and Seed Savers Network¹⁷ in Australia. Such networks (e.g. *Navdanya*¹⁸) also exist in India and Bangladesh (*Nayakrishi Andolan*) (Mazhar 2000), but the sharing of information and materials appears to be limited only to network members.

In the context of such diversity of terminology, the term community gene bank is often interchangeably used with community seed bank. However, for simplicity, at the community level, community seed bank (CSB) is preferred in this paper. The Community Biodiversity Development and Conservation (CBDC) program, MS Swaminathan Research Foundation (MSSRF), Bioversity International and LI-BIRD tried to implement community gene banks (focusing on maintaining germplasm of landraces) and community seed banks (providing access to quality seeds) having distinct roles and functions. Over time, farming communities decided to combine the elements of both community gene and seed banks in order to integrate the farmer seed system into local markets (Oxfam-Novib 2012; Lipper *et al.* 2010) and to address community needs and sustainability (Zinanga *et al.* 2009; Rani *et al.* 2000; Friis-Hansen and Sthapit 2000; Shrestha *et al.* 2012; 2013). Lipper *et al.* (2012) suggests that social capital will be an important tool in addressing some of the shortcomings of local markets as a seed supply source. Experience indicates that community seeds banks can facilitate information flows and exchanges of crop genetic resources, strengthen capacity of variety maintenance and improve the governance of local markets for supplying varieties and seeds. Key functions of these networks are saving and exchanging local seeds and keeping them under the control of the farming community, allowing easy access and use at an affordable price and in the right time.

Purpose

Community seed banks draw much attention as they can be used as a platform for community institutions to strengthen the roles of the farmer seed systems described above. Purposes of such community seed banks are not only saving and exchanging local seeds and keeping them under the control of the farming community for easy access and use for seed security at the community level but also consolidating community roles in promoting conservation, sustainable use and improvement of important local genetic resources / traditional knowledge.

Worldwide, community seed banks have been established with a diversity of specific objectives and goals (Table 1). Objectives include conservation of plant genetic resources, community/women empowerment, seed security, Farmers' Rights (recognition, access, participation in decision making and benefit sharing), food sovereignty, and community resilience. The key features of all community seed banks emerged from the workshop in Nepal (Chaudhary 2013; Shrestha *et al.* 2012). It is a community mechanism/institution or seed repository with specialized functions (to collect, store, multiply and distribute seeds); like a financial bank: depositing and lending (transaction) of seed similar to money.

16 <http://www.halcyon.com/tmend/exchanges.htm>

17 <http://www.seedsavers.net/>

18 <http://www.navdanya.org/>

In Nepal, CSBs are supported by a community-led seed management approach that includes production, collection, processing, storage, distribution (exchange, loan, grant, selling) and marketing of local as well as improved varieties. Sthapit *et al.* (2008b) defined a community seed bank as a community managed *ex situ* collection designed to enhance access to local varieties and associated knowledge for the benefits of the community. In other words, a community-operated seed bank that provides farmers access to seeds of local crop varieties and performs the function of community level backup of genetic resources, a repository of associated knowledge, and an institution to organize, mobilize and represent farmers' interests.

Table 1: Diversity of goals and objectives of community seed bank from selected published literatures

Promoted by	Objective of the seed bank	Overall goal	Citation
Bioversity International	Locate, collect, characterize, document and preserve local seed Multiply rare seed <i>in situ</i> Multiply seed of PPB products Platform for CBM to realize on farm conservation Conserve local varieties Improve farmers' access to local crop diversity Deposit and share rare and threatened local varieties Platform to share knowledge and materials (social learning) Provide strategic seed reserve for adversity Entry point for community based on farm management Create a link between the communities and the national genebank	Strengthen on farm conservation by <i>in situ-ex situ</i> linkage, evolutionary breeding, community resilience and food security	Shrestha <i>et al.</i> 2006; Shrestha <i>et al.</i> , 2008. Sthapit <i>et al.</i> 2008a,b Jarvis <i>et al.</i> 2011 Shrestha and Chaudhary, 2012 Sthapit <i>et al.</i> 2012 Vernooy, 2013
Community Technology Development Trust (CTDT), CBDC-Africa	Enable the conservation of diverse farmers' plant genetic resources within local communities as a safeguard against genetic erosion and minimize threats Strategic seed reserves at the community level in case of natural disasters Serve as a platform for knowledge exchange and trade of seed Venue for training and networking of farmers and service providers Create link between the communities and national gene banks for easy access to genetic resources	A strategy for the enhancement and regeneration of plant genetic resources and ensures Farmers' rights	Zinanga <i>et al.</i> 2009
Oxfam, Nepal	Easy access to quality seeds and associated technologies Conservation of landraces As a resource centre for materials and knowledge Empower community and increase social cohesiveness	Conservation, food security and livelihoods	Shrestha <i>et al.</i> 2012

Promoted by	Objective of the seed bank	Overall goal	Citation
Parivartan/USC, Canada	Conserve local seeds (emphasis on threatened) Provide quality seeds (mainly of vegetables) for all seasons Increase income Promote organic agriculture	Conservation, food security and livelihoods	Shrestha <i>et al.</i> 2012
Department of Agriculture, Nepal	Easy access to quality seeds and associated technologies Conservation and utilization of local landraces As resource centre for information Empower community and increase social cohesiveness	Seed and food security	Shrestha <i>et al.</i> 2012
The Development Fund, Norway, Bangladesh, Costa Rica, Ethiopia, Honduras, India, Nepal, Thailand, Zambia and Zimbabwe	Conserve local and modern varieties Increase local seed security and contribute to possible continued utilization of locally important genetic diversity Empower local institutions for managing local crop diversity and knowledge	Community resilience to climate change using diversity Farmers' rights	The Development Fund 2011
SAARC countries/ SAWTEE	Provide regional support to national seed security efforts; address regional seed shortages through collective actions and foster inter-country partnerships Increase seed replacement rate with appropriate varieties at a faster rate Act as a regional seed security reserve for member states of SAARC countries ¹	Regional seed and food security	FAO and SAARC, 2008 Adhikari, 2012
LI-BIRD, Nepal	Conserve access to local crop varieties, which are hard to find outside farmers initiative; provide access to quality seeds of varieties in demand (can be local or modern); Increase seed replacement rate; Provide strategic seed reserve for adversity Platform for social learning Create a link between the communities and National Gene Bank	Empowerment Use for food security Conservation through <i>in situ</i> and <i>ex situ</i> interface	Shrestha <i>et al.</i> 2012; 2013

Seed transactions in CSBs can happen in different forms such as seed loan, cash transaction and/or social responsibility of maintaining rare or unique varieties or multiplication/rejuvenation of local varieties for the community seed bank. Experience has demonstrated that community seed banks are very effective for safeguarding portfolio of local varieties, provisioning farmer's access to seeds of local crop varieties and strengthening multi-functionality of the informal seed system (Shrestha *et al.* 2006; Shrestha *et al.* 2008; 2010 and 2012). It has also served as a backup for crop genetic resources (Zinanga *et al.* 2009; Shrestha *et al.* 2012). In Nepal, this is also considered to be a strategy for on farm management of genetic resources as it empowers community-based local institutions to hold the collections of local crop diversity and take self-directed responsibility for maintenance, adaptation and dissemination of traditional crop varieties (Table 2). It is important to note that community

seed banks with the objective of on farm conservation are not designed to supply communities with their total seed requirement. Their key objective is to ensure access to local crop diversity by serving as a source of germplasm for multiplication and allowing farming communities to exchange (migration) and bulk up (colonization) in a decentralized fashion for evolutionary adaptation and seed flow through social seed networks and interventions like diversity fairs. This working modality in Nepal (Shrestha *et al.* 2006; 2008) is unique and stands out from community seed banks in other countries. It is also important that the scale of operation should be manageable at the community level. Diversity fairs are usually the entry point for establishment of a community seed bank. The working modality is simple, locally maintained, using traditional storage practices, and managed and controlled by the local community for sharing access to and benefits of crop genetic resources.

Table 2: Roles, responsibilities and rights of community seed banks in the context of community-based management of crop genetic resources.

Functions	Responsibility	Tools/methods ¹²	Rights ¹³
Maintenance	Deposition of local varieties/collection Characterization Documentation	Diversity fairs Diversity block CBR	Rights to gather/collect Right to save, use, sow, re-sow, exchange, share or sell farm produced seed Rights to register farmers' varieties
Adaptation ⁴	Multiplication Selection	Diversity block GB/PVS/COB/PPB	Rights to fair and equitable benefit sharing when a PGR conserved by farmers is used to breed new commercial variety Rights to access farmers' and other varieties from genebank Rights to release and register farmer bred varieties
Dissemination	Distribution	Social networks Diversity fairs PVS Diversity kits	Rights of farmers to exchange, barter, gift, share and sell seeds Rights to register community based seed producer groups and sell truthfully labelled seed
Continuity	Rejuvenation Seed health	Diversity block	Rights to recognition and reward from the government Recognition of community seed bank by the government

Note:- CBR: Community Biodiversity Register, GB: Grassroots Breeding, PVS: participatory Variety Selection, COB: Clint oriented Breeding, PPB: Participatory Plant Breeding, PGR: Plant Genetic Resources

Functions

Functions of CSB are wide ranging and they include: conservation of plant genetic resources; improving ease of access to local germplasm by the farming community, production distribution of quality seed, maintaining community ownership/control on plant genetic

resources, etc. Community seed banks aim to promote the management and sustainable use of both local and farmer-preferred modern varieties for food security and to improve the livelihoods of farmers. Many community seed banks refer only to community-based seed production and marketing (Manzanilla and Johnson 2012), but this term should not be used if there is no function of plant genetic resource conservation activity (Shrestha *et al.* 2012, LI-BIRD workshop synthesis).

Community seed banks tend to be small-scale local institutions that store seed on a short-term basis, serving individual communities or several communities in surrounding villages. This is a contrast with the functionality of a national genebank that usually is broader (see Table 3 for a comparison). Community seed banks usually are inexpensive, employing relatively simple low cost storage and documentation technologies. They carry out collection and reception (of materials), replication, storage, distribution, germination quality testing, and, in a number of cases, variety selection. During diversity fairs, surveys or four cell analysis, rare and unique crops and varieties can be identified and collected by/ deposited in the community seed bank. The collection of seed of diverse local varieties in community seed banks is usually maintained and administered by the local communities themselves to ensure the availability of relatively large samples of planting materials or to ensure the access of a small quantity of genetic resources in situations in which varieties are lost or threatened (Almekinders *et al.* 1994). Empowered households will deposit rare and unique local varieties that they maintain in the CSB as a form of social responsibility (e.g., CSB in Bara, Nepal), although such donations are not common.

Table 3: Comparative potential functions, complementarities and gaps of community seed banks and national genebanks

Functions	Community seed bank	National seed bank	Gaps
Collection	Safety duplicates stored in National Gene Bank (NGB) Passport data standardized Prior Informed Consent (PIC) in place	NGB serve as repository of CSB Targeted collection through CSB	Mechanism needs to be developed and formally put in place
Multiplication	Diversity block used to multiply small quantity seed and use farmers' plots for large scale production for supporting evolutionary selection	NGB use CSB network to multiply targeted seed multiplication in production environment to avoid genetic drift of the accession	Formation of policy and support needed for such linkage Technical capacity building benefits to CSB
Characterization	Not all CSBs do this function. Farmer descriptors used to characterize the materials in the diversity block to check for variants.	Essential activity of national gene bank and information shared with CSB as incentive for their contribution of seed to the bank	Farmer friendly information management and sharing should be devised; the current procedure and format of CBR is too cumbersome for farmers

Functions	Community seed bank	National seed bank	Gaps
Storage	Depending upon crop species, small quantity of seed stored in ambient temperature using local storage techniques and knowledge	Preserved at medium and long term cold storage with controlled temperature and humidity facility	Capacity building of CSB curators to combine local knowledge with scientific principles of seed longevity, germination and seed health Action research to develop a technical guide for CSB seed handling and management
Participatory Plant breeding	Knowledge and skill enhancement of farmers in participatory crop improvement ensures sustainability of CSB	Sharing gene bank materials for repatriation, landraces used as PVS and parents to improve and strengthen local seed system	Special training and collaborative programmes are needed to add value Policy support for release and registration of farmers' varieties
Documentation	Simple inventory from diversity fair, and CBR used	A standard germplasm documentation system is available	Minimum passport data complementation between CSB and NGB Minimum set of database management need to be developed and piloted for effective information management
Distribution	Context specific mechanism developed (seed transactions in kind and cash or social responsibility)	Freely accessible to all users – farmers, community and plant breeders and researchers Safety duplicates	Although there are limitations to farmers' to access NGB, awareness needs to be built up. Mainstreaming CSB into national PGR system Policy support as way to implement Farmers' Rights
Marketing	Provisioning of farmers' rights (benefit sharing) Prior Informed Consent	Link to community based seed production groups and local trade	Supportive seed regulatory framework

Note:- CSB: Community Seed Bank, CBR: Community Biodiversity Register, NGB: National Gene Bank, PGR: Plant Genetic Resources

Principles of a community seed bank

Easy access of portfolio of local crop varieties and availability of seed with associated information are important principles behind its establishment. Although the community seed bank is seen as a means of seed and food security, it is increasingly also seen as an open source of knowledge and genetic materials to ensure farmers' rights, community autonomy and ultimately, seed sovereignty of PGRFA (Shrestha *et al.* 2013; Kloppenburg 2010). Vulnerability is a key characteristic of rainfed and dry lands systems and seed diversity provides a key option to households for coping with vulnerability and building household resilience, by giving farmers options or mechanisms for recovering from adversity. As shown in Table 1, there is not a single identical type of community seed bank. But a number of core principles common to all CSBs can be identified by synthesizing purpose, functions,

roles and responsibilities, working modality, technical competencies, governance and information management. Drawing from the various Nepal case studies and learning, the following common principles of community seed bank emerged in the context of strengthening community based on farm management of agricultural biodiversity:

- Conservation and revival of traditional crop varieties and documenting traditional knowledge
- Access to quality and quantity of locally adapted crop/varieties seeds¹⁹
- Strengthening the multiple functions of the informal seed system and crop improvement
- Scale of operation should be locally managed and under the control of the farming community
- Empowering farmer organizations and supporting local governance
- Provides a platform for social learning and collective action

One key principle is to strengthen the multiple functions of the informal seed system that promote farmer-saved seed and exchange and access to crop genetic resource in a small quantity from the community seed bank. Integrating community seed banks with markets for sustainability might pose challenging principles of evolutionary maintenance of local crop diversity and need to be handled with caution. These principles might need reviewing if the purpose of community seed banks mainly focuses on commercial seed production and marketing of modern varieties, and their functions are more closed to small scale community seed producer groups (Devkota *et al.* 2008; Witcombe *et al.* 2010).

Typology

Lewis and Mulvany (1997) attempted to categorize five types of community seed banks destined for crop production without emphasis on genetic diversity conservation. They include: 1) *de facto* seed banks²⁰, 2) community seed exchange²¹, 3) organized seed banks²², 4) seed savers' networks²³, and 5) ceremonial seed banks²⁴. Within the changing global policy context and challenges, a wide range of community seed banks have evolved. No comprehensive literature reviews have been carried out so far but this chapter is based upon review and implementation of CSB in Nepal and elsewhere.

19 For instance, the ones that are now being supported by the Government of Nepal for the dissemination of registered seeds under the Seed Act 1988.

20 The sum of individual seed storage at household level or home gardens within a community.

21 Organized exchange of seed at household level in a community, for example, seed fair or diversity fair.

22 New local level institutions of organized collection, storage and exchange of seed of both local and modern varieties.

23 New networks of seed savers groups organized for sharing seeds and information of heirloom and heritage varieties in developed nations

24 Sacred groves and religious forest with focus on vegetative propagated perennial trees collectively managed to local customs and tradition.

Three types of community seed banks are emerging from the current analysis of reported case studies and grey literature reviews: i) community gene bank, ii) community seed bank, and iii) community gene and seed bank. Desk research and the first workshop of community seed bank practitioners in Nepal reveal that there is a wide range of variation depending upon various parameters. They include: i) goal and purpose of the seed bank (*in situ*, *ex situ*, complementary conservation, seed security, food security, seed and food sovereignty, community empowerment, community resilience, etc.), ii) rights and governance, iii) kinds of seed (traditional variety, modern variety, hybrid, GMO), iv) reproductive biology (self-pollinated, open and clonal, annual or perennial), v) agency (CBO, NGO, donor, university, government) and v) impact groups (custodian farmers, geographically selected area, marginal farmers, women farmers). So far no efforts have been made to compare and contrast these types. Based on these factors, a new typology framework is presented in Table 4.

Table 4: Typology of community seed banks

Parameters	Community gene bank	Community seed bank
Goal & purpose	In situ/on farm conservation Seed and food security Community custodianship and support access and control over PGRFA Farmers' rights	Community level seed and food security Seed sovereignty Community empowerment Community resilience
Function	Access to crop genetic resources	Availability of seed
Type of seed	Traditional varieties Source of GMO free CGR ⁵	Traditional varieties, modern varieties, PPB products, hybrids Source of GMO free CGR
Scale of operation	Community level	Community level with networks
Governance	Local organization	Local organization
Sustainability	CBM fund	CBM fund, CBSP, revolving fund
Collective actions	Yes with social responsibility of conserving rare and unique CGR	Yes
Promoted by	NGO	NGO, Government ⁶ and donors

Note:- PGRFA: Plant Genetic Resources for Food and Agriculture, CGR: Crop Genetic Resources, GMO: Genetically Modified Organism, CBSP: Community Based Seed Production, CBM: Community Biodiversity Management, NGO: Non-governmental Organization

CSBs are often donor or institution driven approaches at the outset; however, over time, many of them have redefined overall goals, objectives and functions as per the pressing needs of the community, the level of community awareness and empowerment of local institutions. The working modality and governance of community seed banks may differ according to the core purpose of the bank, key functions and principles. They often play diverse roles in local socio-political and socio-economic contexts.

Drawing lessons from Bara CSB in Nepal plant breeding, seed production and maintenance, breeding knowledge and skills are key capacity building interventions. Participatory plant breeding (PPB) processes bring farmers into contact with professional breeders and provide

a platform for sharing knowledge and skills related to plant breeding. By doing so, PPB can strengthen farmer seed systems and maintain their landraces in a better way as breeders do in their research plots. Besides offering varieties of farmers' own choice, PPB also contributes to farmers' rights to save, select and exchange the materials generated from their own local varieties and also to enhance their resilience to manage adversity (Halewood *et al.* 2007). Drawing from the diverse experiences and lessons of the community seed bank, it is conceptualized as the institutional platform for ensuring farmers' rights, recognition, and access to and benefits sharing of crop genetic resources (Figure 1). The framework of CSBs contributes to four key results: i) conservation and restoration of locally important crops and varieties, ii) empowerment of farming communities, iii) improvement of accessibility and availability of Plant Genetic Resources for Food and Agriculture (PGRFA), and iv) enhancement of community resilience to cope with adversity and to develop livelihood strategies.

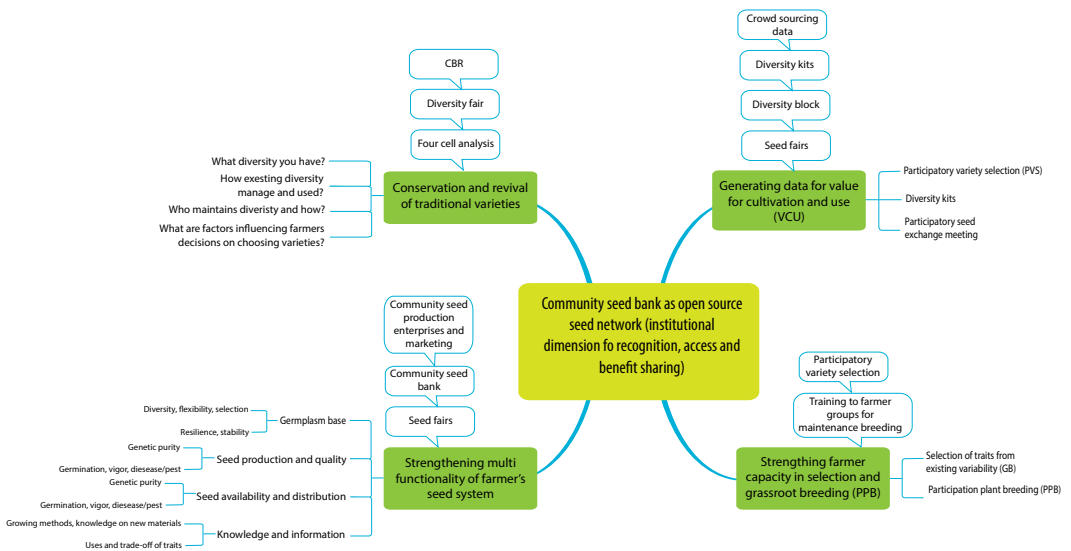


Figure 1. Conceptual framework of community seed bank as an institutional dimension of recognition, access and benefit sharing of crop genetic resources through strengthening farmers' seed systems and knowledge in selection and maintenance of varieties and seed (Sthapit, 2013).

Governance

A community seed bank, by terminology itself, is a community-managed approach that expands local practices from the household seed store to the community level through collective actions²⁵. The value of the community seed bank is that the system is governed by local people and locally developed rules and regulations. It facilitates to build social assets through mobilization of the local community, leading to community empowerment, and creates a platform of community based management of agricultural biodiversity through use and conservation. In the absence of local organizations, external projects or NGOs can use community seed banks to mobilize existing social capitals (trusts, networks and social

²⁵ Action taken by a group (either directly or on its behalf through an organization) in pursuit of members' perceived shared interest (Marshall 1998).

obligations) and organizational systems. Such a governance system is developed through the process of community-driven participation that integrates knowledge and practices into the social system, including local rules and norms (Sthapit *et al.* 2008ab). In order to build such social capital, the following steps were carried out by the Global *In situ* Project implemented by LI-BIRD, NARC and Bioversity International in Nepal: i) community sensitization, ii) strengthening local institutions, iii) development of rules and regulations, iv) construction of seed storage facilities, v) receiving seed deposits or collection of local seeds, vi) documentation of community biodiversity register/inventory/passport data, vii) mobilizing CBM funds for community development and conservation, viii) multiplication and ix) monitoring of seed transactions and impacts (Sthapit *et al.* 2006). There are great variations in governance systems, from an institutional framework similar to that of the national gene bank (Zinanga 2009) to very informal household seed stores (Ramprasad 2007; Senapati 2011). The success and sustainability of community seed banks depend upon how technical knowledge and management capacity of change agents are enhanced and how local institutions are empowered to make self-directed decision making. Over the years, a community seed bank operated by ADCS, Bara and supported by LI-BIRD has developed a local method (established since 2003) for ensuring that all their varieties are preserved every year at community level:

- The organization prepares packets of 250 gm of seeds for each of the 86 rice varieties and distributes them to farmers.
- Rice has to be grown by every farmer in the group. If someone does not have a rice field, he/she can grow finger millet or sponge gourd instead.
- They started this system because everyone wanted to grow only a few aromatic varieties.
- All rice varieties are also grown in a diversity block.

This system is effective in ensuring the preservation of local crop varieties through farmers' involvement, and can easily be replicated in other sites (e.g., Western Terai Landscape Complex Project (WTLCP)) area.

Are there examples to learn from?

In the past, many community seed banks were established worldwide with significant investments of resources in construction of physical assets such as buildings, machineries and equipment (Feyissa 2000; Mujaju *et al.* 2003; Zinanga *et al.* 2009). However, most of these are now non-functional. It would be good to learn from such failures so that similar mistakes can be avoided in the future. Shrestha *et al.* (2013) observed that community seed banks are most common in community biodiversity management programmes in Bangladesh, Ethiopia, France, India and Nepal.

It has been observed that most of the donor funded initiatives started with improving physical assets before consulting with the community. Consequently, the community of farmers never had a proper understanding about the functions of the community seed

bank and its roles and responsibilities. Most of what was done appears to be top down approaches without full understanding of the local needs and not valuing collective action by locals. Although there are no official statistics of community seed banks in the world, many countries reported from few (<10) to a large number (50-100) of community seed bank (Shrestha *et al.* 2012; 2013; Vernooy 2013). There are not many published case studies, or any successful examples, that mobilized social capital before collecting local varieties, characterizing, documenting and storing seed in locally constructed structures. Often, the purposes of establishing community seed bank were not clear. A technical guide for maintenance of genetic purity, germination, viability and seed health is yet not available that could be used to build the capacity of curators. A common standard format of passport data collection is not used to facilitate sharing of information and materials among networks of community seed banks and also national gene banks.

It was also observed that, as some community seed banks started to function, the people who established them soon changed their basic roles and changed priorities when they started to link to markets, and invested resources and energy in expanding scales of operation without developing local human resource capacity. Seed transaction records of 15 community seed banks in Nepal by LI-BIRD ranged over 2 tons of local and over 43 tons of modern varieties. Beneficiaries of accessing local seed are over 1800 whereas for modern seed just over 900 (Shrestha *et al.* 2013). In African countries, the volume of seed transaction per single community seed bank ranged between 40 to 300 tons (Engels, Polreich and Dullo 2008; Nakaponda 2010). When community seed banks try to function in such large scale seed production, there is potential risk of mismanagement in production and delivery of the quality of seed and maintenance of basic seed of local varieties, and also reduction in the dynamic and evolutionary on farm management of local crop diversity. In case a community wishes to convert its community seed bank to a small-scale community-based seed producer group (CBSP) or to a seed company in order to improve use and availability of high quality seed and improve farmer income (Devkota *et al.* 2008; Witcombe *et al.* 2010), they should be allowed to do so under the banner of community-based seed production group (CBSP) and not *per se* as a community seed bank. The advantage of such a decision is guided by the nature of technical capacity required in seed production and seed trade in rural markets. This can be addressed in policy guidelines at the country level. In Bara, Nepal, the number of total transactions of local crop diversity was small (39 kg of local and over 9000 kg of modern varieties). The purposes of this are to increase income of farmers by producing quality seed bred by PPB or a national programme, support on farm multiplication of small quality local varieties as crop genetic resources, spread seed through farmer to farmer networks and maintain the evolution of varieties in the local environment. Those community seed banks that strike the right balance between local capacity, facility and human resources are usually successful.

Shrestha *et al.* (2012) documented a few challenges in implementation of community seed banks from the first national workshop on community seed banks held in Pokhara, Nepal (14-15 June 2012). One of the challenges is to use the community seed bank as a local institutional platform for on farm management of local crop diversity and also to institutionalize good practices that address sustainability, and environmental as well as economic benefits. In

many studies, systematic steps for establishing and implementing community seed banks that support farmer seed systems, when perceived as an open source system²⁶ (diversity, flexibility, selection) with quality seed production and distribution are not followed (Lewis and Mulvany 1997; Friis-Hansen and Sthapit 2000; CIP-UPWARD 2003; Zinanga *et al.* 2009; Development Fund 2011; Shrestha *et al.* 2012). In addition, like in the case of any bank, only depositing and drawing funds is of limited value as it would not contribute to productive actions. Activities need to expand to providing loans. Similarly, in the case of CSBs, additional interventions, such as promoting PPB, can add value to the venture.

Drivers of successful community seed banks

Broadly, there were two types of drivers (motivating factors) for implementing community seed banks: internal and external. Internal drivers include building social capital such as trust, cooperation, collective action, local governance, community ownership, customary rights, state of genetic resources, traditional knowledge, community resilience, benefit sharing, etc. External drivers include international and national governance, climate change, support, recognition, etc.

Access to local varieties

Farmers have imperfect access to information²⁷ about varieties. Access to unique and locally adapted traditional local varieties is often poor within the community, even when a sufficient quantity of seed is available (Badstue 2006), simply because of poor access to information (Tripp 2001), weak social networks (Subedi *et al.* 2003), social exclusion (Sthapit and Joshi 1996), and weak institutional mechanisms (Shrestha *et al.* 2012). Farmers often assume that traditional local varieties are usually maintained by someone within the community and that they can obtain seeds from fellow farmers should they need them (Bellon 2004). Such assumptions are often wrong because of weak social connections (Poudel *et al.* 2007), farmers' decisions on land allocation to local varieties (Meng 1997) and farmers' aspiration of increased income through commercialization (Smale *et al.* 1994). As local institutions community seed banks monitor genetic erosion at the community level by roughly categorizing i) the number of households growing a particular variety in a large area, ii) the number of households growing in small areas and iii) the few households growing in the variety in small areas. This information is validated by inter-village diversity fairs to check the real availability of seed locally (Sthapit *et al.* 2006). Situations that relate to (ii) and (iii) are critical indicators of genetic erosion of the community landscape (Chaudhary *et al.* 2004). Having deeper understanding on how to maintain, monitor, and propagate seed exchange structures will help to use and reintroduce varieties where

26 The Open Source Seed Initiative (OSSI) from the USA suggests an alternative IPR system. It explores ways in which analogous 'biological open source' arrangements can be developed for plant germplasm. This approach could facilitate access to parent materials and pre-breeding materials, from which farmers could develop new varieties. OSSI was set up to facilitate innovation in plant breeding by creating a licensing framework for exchanging germplasm, thus preserving the right to the unhindered use of shared seeds and their progeny in subsequent breeding programs.

27 Access to diversity refers to people having adequate land (natural capital), income (financial capital) or connections (social capital) to purchase or barter for a variety (Sperling *et al.* 2006).

population size is declining as well as to conserve local crop diversity at local and national level. The community seed bank is one of the powerful locally driven institutions with a clear objective of local landrace conservation and also serves to link the theories of *in situ* and *ex situ* in practice. Sometimes a multitude of objectives might distract from the main purpose of the community seed bank and therefore, a distinct purpose needs to be identified from the outset.

Shrestha *et al.* (2006) in fact demonstrated the theory of the community seed bank in practice in Kachorwa, Bara site in Nepal. It is still functional with a careful balance between three key activities i) conservation of local crop diversity on a small scale, ii) enhancing plant breeding knowledge and skill of the community by participating in PPB and seed production, and iii) supporting community development and enhancing household income through CBM funds to ensure conservation of native crops *in situ*. Other communities have not taken the same level of ownership and collective actions in other projects or NGO driven community seed bank initiatives in Nepal (Shrestha *et al.* 2012). The historical development of community seed banks in Nepal is highlighted by Shrestha *et al.* (2013, in this proceeding) with multiple functions: conservation of landraces/local varieties; exchange and distribution mechanism; governance and operation of CSB and empowerment of local communities. Learning from Nepal case examples of other CSBs, it is possible to analyse sources of motivation for improving conceptual frameworks of the community seed bank in the context of farmers' livelihoods and food security as well as conservation of local crop diversity.

One of the key drivers of the success in Bara, Nepal might be related to difficulty accessing seed of local varieties through social connections and exchange. Of the 33 local rice varieties documented in 1998, only 14 could be found on farm in 2003. The number of growers of local varieties decreased from 68% to 32% and the total area occupied by local landraces decreased from 17% to 3% (Shrestha *et al.* 2008). This alarming situation became one of the motivating factors for establishing a community seed bank. Upon investigation of social networks in this village, Subedi *et al.* (2003) and Poudel *et al.* (2007) found that social seed networks were often weak, closed and linked only with smaller nodes of farmers. So access to local seed was practically difficult as traditional sources of local varieties were drying up.

Within few years (2003-2005) of establishment of the community seed bank in Bara, 38 to 43% of poor small holder farmers had access to seed of 11 to 23 local varieties (Shrestha *et al.* 2008) and this service has been well appreciated as there are no other sources of local crop varieties in the community. Similarly, the CSB in Talium, Jumla was established by farmers after they recognized that the crops and varieties that they depend on are not the ones that are easily available from external sources. So they are on their own to ensure access to their seeds.

Awareness

Diversity fair was conducted followed by documentation of Community Biodiversity Register in Kachorwa and Begnas villages of Nepal. These activities raised a significant

level of public awareness on the importance of local crop diversity. In spite of this, the loss of traditional crop varieties continues to be alarming even in this village (Chaudhary *et al.* 2004). Resource poor smallholder farmers who tend to have low production potential areas (i.e. rain-fed and low fertility lands) still need local seeds that match their specific edaphic and climatic conditions. This is one source of motivation when a seasoned community organiser introduces the idea of a community seed bank.

Participatory plant breeding

Communities tend to realize the value of conservation when farmers are directly involved in setting breeding goals of participatory plant breeding and developing their own variety by crossing a local variety with a modern variety. In central Terai Nepal, *Dhudhisaro*, a rice landrace was identified as a rare and unique variety grown by one household and 8.5% of the total area of farmland (0.05 *Katha* land) and was disappearing from the community (Rana *et al.* 1998; Chaudhary *et al.* 2004). *Dhudhisaro* landrace has no chance to survive in the present context unless productivity of *Dhudhisaro* is improved by improving lodging resistance and keeping the same level of grain quality. With the facilitation of the project staff, farmers decided to develop a new variety with the positive traits of *Dudhisaro* (good eating quality and adapted to rain fed conditions) and eliminate negative traits of *Dudhisaro* by incorporating lodging, disease resistance from the improved variety BG 1442. Within the span of 7 years they were able to develop a variety called Kachorwa-4 and started to do seed multiplication and selling quality seed to other farming communities and raising income to support a community seed bank and conservation of local varieties. In this process, the farming community not only have realized the importance of maintaining landraces but also gained knowledge in plant breeding, seed selection and marketing, thus motivating them to mobilize social capital for collective actions on community-based management of local diversity (Figure 1).

Legitimizing and strengthening local institutions

Another important driver is to mobilize social capital to generate a community based biodiversity management fund that can support a community seed bank and allow for seed transactions (Shrestha *et al.* 2012; 2013). This process helps to develop rules and regulations of local institution, governance, and establish legitimacy within the community as well as with local government. Seed production and marketing of PPB products and local varieties are being carried out to meet demand of local farmers and to generate income. Nevertheless, community seed bank is locally recognized for providing access of traditional local varieties whereas the extension, private and agrovet outlets are seen as the sources for modern and hybrid varieties. If in the future, if the CSB are integrated functionally into national gene banks²⁸, then the national genetic resource management system and other public sector need to be convinced how community seed bank can link *in situ* and *ex situ* conservation and provide backup service for on-farm seed security in the country.

28 There is another school of thought that the beauty of a community seed bank is that it is decentralised, community based and controlled and addresses local needs of the community, although supporting and linking the network of a community seed bank functionally allows for the flow of genetic materials both ways and strengthens community resilience in seed security.

Recognition

The community seed bank established by ADCS, Bara, has received recognition in various ways. It is registered in the local government which is a kind of recognition and provides local level legitimacy. The government nominated chair of ADCS to the National Agricultural Biodiversity Coordination Committee is invited to participate in various national policy meetings in policy decision-making. GEF/SGP/UNDP provided small grants to strengthen the community seed bank system. LI-BIRD has continued to highlight its contribution in Nepal and globally. Such recognition from donors, government and civil society has also been a source of internal motivation and pride for the community. A regular visit to the community seed bank by donors, government officials and farmers' groups has a positive impact in the local community. Similarly, some of ADCS members also got the opportunity to visit abroad.

Agent of change

At the outset, it is critical that one fully experienced community organizer should be based in the community as a change agent to present new ideas and techniques to adequately address community problems and break down barriers. Experience of social mobilization and technical competencies of such a community organiser²⁹ was a key external factor for the success of the community seed bank in Bara and later in other communities. Such change agents should work locally for developing teams of local leaders internally to mobilize social capital and bring about behavioural change. Such agents play a key role in establishing a legitimate governing structure and mechanism for seed production, distribution, sharing seeds and benefits and empowering Agriculture Development and Conservation Society (ADCS) and women's groups to take self-directed decision-making. Establishment of ADCS in the community helped to break the cultural barrier to work with women groups. Exchange visits of women's groups to successful CBOs sparked collective action.

Climate change

In the context of climate change, over-reliance on a handful of crops and crop varieties puts global food security at greater risk. Diversity fairs and community biodiversity registers have been eye-openers for communities that local crop genetic diversity is in danger of disappearing. During the last decade, farmers have experienced a number of stochastic events and unfavourable seasons that sparked the self-realization that farmers will be better off with a diverse portfolio of crops and varieties that match a wide range of agro-ecosystems and external factors. As a result, interventions that support and strengthen informal seed system are also newly acquired sources of external motivations (Sthapit *et al.* 2010). Climate Change, Agriculture and Food Security of CGIAR Research Programme 7 (CCAFS)³⁰ and other rural development donors have seen community seed banks as the platform of rural institutions that facilitate uses and availability of diverse portfolios of crops and varieties at the local level to improve community resilience in the face of climate change (de Boef *et al.* 2013; Gonsalves 2013).

29 We acknowledge the contribution of Pitambar Shrestha (LI-BIRD) and local level resource persons for spearheading the idea of ADCS and community seed bank in Bara, Nepal.

30 http://library.cgiar.org/bitstream/handle/10947/2565/crp_7_Proposal_Final.pdf?sequence=1

Policy

In many countries, the sudden interest in community seed banks has been triggered not only by climate change resilience, but also because CSBs might be an important tool to institutionalize farmers' rights over agriculture genetic resources in the context of growing pressure on these countries for securing breeders' rights. Since South Asian countries are a signatory to the Agreement of the SAARC Seed Bank and a party to other international agreements such as the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and the Convention on Biological Diversity (CBD), practitioners and experts are discussing the required functional linkages between the SAARC Seed Bank and community seed banks to ensure seed security and farmers' rights in the region. Countries still have a long way to go to strengthen their farmers' rights acts and rules that ensure rights to save, use, exchange and sell seed; protect traditional knowledge; and participate in decision-making and benefit sharing (Adhikari 2012; Bala Ravi 2009; Ruiz and Vernooy 2012).

Concluding remarks

It is important to develop agreement on the definition and typology of community seed bank and associated features. Unless that happens, there will be fragmentation and limited synergy. The concept of the community seed bank stimulates gene bank scientists, breeders and development workers to find new ways of collaborating with farmers and vice versa in the different functions of farmer seed systems. Farmers' seed systems can be substantially improved through the introduction of scientific knowledge and practices developed by the formal seed system. Participatory crop improvement using local crop diversity can enhance knowledge and technical competencies of community seed banks and address community needs for a diverse set of crops and varieties. There is renewed interest in the theory and practices of community seed banks for strengthening farmers' seed and food security. In the wake of climate change, community seed banks can provide immediate access to locally adapted diverse portfolios of crops and genetic diversity. This will in turn develop community resilience to cope with vulnerability caused by climate change and market forces. Furthermore, community seed banks as a platform of community-based management of agricultural biodiversity can ensure the effective implementation of Farmers' Rights (in terms of recognition, participation in decision-making, benefit sharing and developing supportive policy and seed regulatory frameworks). This also provides an opportunity to i) interact and integrate informal and formal seed systems for addressing local problems, ii) promote *in situ* and *ex situ* linkages to back up genetic resources locally as building block of crop improvement and food security, and iii) ensure community development in a sustainable way. There are many challenges and opportunities to use the platform of the community seed bank as an open source seed network in order to i) strengthen multi-functionality of farmer seed systems, ii) conserve and revive traditional crop varieties, iii) strengthen farmer capacity in selection of traits, plant breeding and seed production, iv) generate data for value for cultivation, and v) improve access to and availability of local crop diversity.

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A Brief Overview of Community Seed Bank Initiatives in Nepal³¹

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Photos: Pitambar Shrestha (left and top right), Chandra Gurung (bottom right)

Introduction

Agricultural genetic resources (AGRs) are the basis of human life. Diverse AGRs have been developed over time and maintained across regions by farming communities. However, diversity is now decreasing mainly due to increased availability and cultivation of modern varieties, both in the markets and through agricultural development agencies. Multiple use values of local varieties have been superseded by single value, i.e. the high yield of modern varieties. Over time, however, agronomists and farmers have begun to understand the value of local crop diversity for food security as well as the importance of access to seeds by farmers.

The modern agricultural system has increased the dependency of farmers on private seed companies for seeds and planting materials. This has led farming communities to look for the alternative, so that local diversity can easily be accessed and conserved. Community seed banks (CSB) have emerged as an alternative to conserve local diversity as well as to make seeds accessible to all farming communities. CSB is a dynamic system of conservation (conservation through utilization) and is considered a viable, effective and sustainable option for the conservation of AGRs. With the objective of preserving landraces and making planting materials and associated information available to farmers, the concept of

³¹ This paper was not presented in the workshop.

CSB emerged in Nepal in 1994. In the recent past, many organizations have supported the establishment of CSBs across the country.

Initiation of community seed bank in Nepal

In the past, farmers had three seed source options, namely saving and exchanging among farmers, buying seeds from seed companies and agricultural development agencies. The last two sources were only for modern varieties. USC-Canada Nepal (USCCN) recognized the importance of local crop diversity for improving food security and started sustainable agricultural activities in Dalchoki, Lalitpur in 1989. Since 1992, USCCN started a program, Landraces Enhancement and Conservation (LEC) with the objectives of 1) developing site-specific varieties by utilizing local crop genepools, 2) increasing agricultural diversity by conserving local landraces, 3) making them competitive and 4) strengthening farmer's informal seed networks. Conservation through utilization was the main strategy considered to conserve local crop genetic resources. Under the LEC programme, seed and plant selection criteria were developed in consultation with farmers. During discussion, smallholder and marginalized farmers reported that they could not save the seeds for the next season and that there was no way to obtain the seeds of local varieties. They mentioned, however, that seeds of modern varieties were available. To solve this problem, USCCN started collecting and storing seeds of local varieties, making them available to farmers since 1994 in Dalchoki VDC. This was the first community seed bank in the country initiated by a NGO. In 1996, a two-story building was constructed for storing seeds and displaying traditional agricultural tools and knowledge. The first floor was almost underground allowing to keeping the room cool without too much fluctuation in temperature. Gradually, Dalchoki CSB started collection, conservation, improvement and multiplication of locally available landraces, making them available to poor farmers (see, Bhandari *et al.* in this volume for details).

With a similar objective, Nepal Agricultural Research Council (NARC), Local Initiatives for Biodiversity, Research and Development (LI-BIRD) and Bioversity International supported a farming community to establish a CSB at Kachorwa, Bara in 2003 (Figure 1). This community seed bank has been managed by a farmers' organization since its beginning. Bara district is highly influenced by modern agricultural technologies, which has resulted in loss of traditional varieties and increased dependency for agricultural inputs. In spite of this situation, crop landraces have still been found in limited areas grown by a limited number of households to meet the seed requirements for variable growing environments and various household needs. Bioversity International's Global *in situ* conservation project brought awareness among the communities about the importance of local crop diversity and supported farming community to conserve and utilize the local genepools. Supported by the project, the Bara CSB focused on the conservation and enhancement of local varieties.

From the learning of the Global *in situ* conservation project, LI-BIRD has supported the establishment of 14 other CSBs across the country (in Jhapa, Sankhuwasabha, Dhading,

Tanahu, Nawalparasi, Dang, Bardiya, Kailali, Kanchanpur, Doti and Jumla districts). LI-BIRD has published many papers in proceedings and book chapters and also a source book on CSBs. Parivartan Nepal, a local NGO based in Hetauda, also supported the establishment of a CSB in Sindhuli district in 2006 focusing on local crop varieties (chapter 6 of this volume).

The Department of Agriculture (DoA) has been aware of the low adoption rate of modern varieties and very low seed replacement rate for cereal crops (about 6%), most likely due to the unavailability of suitable varieties and poor access to modern varieties by smallholder farmers. To address these challenges and improve the agricultural productivity of poor, marginalized and subsistence farmers, the Government of Nepal announced the establishment of a number of CSBs in its Budget Speech of the 2065/66 fiscal year. The DoA has developed CSB implementation guidelines including a plan to establish CSBs in different districts across the country. Until now, the DoA has supported the establishment of five CSBs in Dadeldhura, Sindhupalchowk, Okhaldhunga, Gulmi and Jajarkot. The main objectives of the CSBs under the DoA are to enhance access, exchange, use and management of quality seeds of farmers' varieties and modern varieties, according to the preferences and choice of the farmers, and their production, processing and storage in a community seed bank (see, chapter 9 of this volume for more details).

Oxfam Nepal introduced the CSB approach under the food security and livelihood programme in 2009 in Dadeldhura and Dailekh districts after realizing that the availability and access to seeds, both in terms of quality and quantity, were key constraints, especially for farmers in remote areas of Nepal. Oxfam Nepal has supported the establishment of 90 CSBs (65 in Dailekh and 25 in Dadeldhura districts) in 2009 with the objectives of promoting community access to quality seeds of crop varieties and associated technologies and the conservation of local varieties (chapter 8 of this volume).

In 2011, the Nepal Agriculture Genetic Resources Centre (Genebank, NARC) supported the establishment of a CSB in Simariya village of Sunsari district targeting the conservation and enhancement of local crop genetic resources. The genebank also provided training on CSB management to CSB members in 2012. The genebank considers CSBs as an important strategy for conserving genetic resources on-farm and started working with four CSBs (Dalchoki, Lalitpur; Kachorwa, Bara; Simariya, Sunsari and Gadariya, Kailali) from 2012.

At present (June 2013), there are a total of 115 CSBs in Nepal (Table 1 and Figure 1) including two CSBs in Parbat and Rasuwa districts. CSBs are mainly for crop species which produce orthodox seeds. However, the community seed bank in Gadariya, Kailali has established a field genebank of mango in 2011, the community seed bank in Purkot, Tanahu has maintained a field genebank of banana, and similar types of field genebanks are being established in Dalchoki and Kachorwa communities. Community field genebanks are for conserving crop species which either produce recalcitrant seeds or do not produce any seeds. They are managed by the community.

Table 1: List of community seed banks (CSB) in Nepal

Supported by	Year started	No. of CSBs	Districts	Priority crops
USCCN	1994	1	Lalitpur	Local crop species
LI-BIRD/NARC/ /Biodiversity	2003	1	Bara	Local crop species
Parivartan Nepal	2006	1	Sindhuli	Local crop species
LI-BIRD	2007	3	Bardiya, Kailali, Kanchanpur	Local crop species
	2008	3	Kailali, Kanchanpur	Local crop species
	2009	8	Doti, Dang, Nawalparasi, Tanahu, Dhading, Sankhuwasabha, Jhapa, Jumla	Local crop species
DoA	2009	3	Dadeldhura, Sindhupalchowk, Okhaldunga	Improved varieties
	2011	2	Gulmi, Jajarkot	Improved varieties
Oxfam Nepal	2009	90	Dadeldhura, Dailekh	Improved varieties
Genebank/NARC	2011	1	Sunsari	Local crop species
Total		113		

*CSBs in Parbat and Rasuwa have not been included in the Table due to limited information. Data based on information collected from collaborating agencies.

Target crop species and strategies

In Nepal, CSBs can be grouped into three categories based on the types of genetic materials they handle. These are a) CSBs which deal with only local varieties, b) CSBs which handle only modern varieties and c) CSBs which include both local and modern varieties. The first type of CSB is more important in regards to conservation of AGRs.

Basically, CSB is a system of conservation and utilization of local genetic resources, operated at local levels and run by the community. Broadly, CSB is a community-led management approach of agriculturally important planting materials which involves production, collection, processing, storage, distribution (exchange, loan, grant, sell) and marketing of locally important genetic resources.

A common CSB strategy is to include all kinds of planting materials that are important to the local community, either in a community seed bank or community field genebank. CSB is managed and controlled by a local community. CSB can sell or exchange the seeds with farming community members or provide space to farmers for storing seeds. A prime strategy of any CSB should be its contribution to food security at the local level through conserving and enhancing local crop diversity. Only conservation is not a long lasting strategy to sustain CSB, therefore, conservation through utilization should be the primary operational strategy of a CSB.

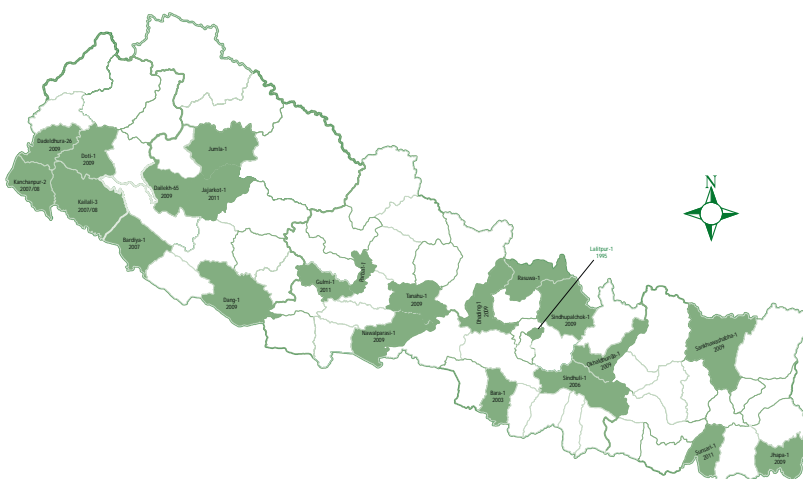


Figure 1: Locations and starting dates of community seed banks in Nepal

Importance and advantages of a CSB

It is well understood that CSB is a social system of conservation and utilization of local genetic resources, operated at local levels and run by the community. CSB ultimately helps to conserve genetic resources and associated traditional knowledge in an evolutionary way. The options of planting materials provided by CSBs to the farmers are considered an important approach to increase the production of crops at the household level. CSB plays an important role in sustainable agriculture development. The following are the major advantages and roles of CSB:

- CSB helps to conserve local landraces as well as improved varieties through continued utilization.
- Samples stored in the CSB are considered safety duplicates because many of these accessions are generally stored in the National Genebank.
- CSB supports the preservation of rare and endangered landraces.
- All farmers have easy access to planting materials when they are needed.
- Poor farmers do not need to store seeds for planting.
- CSB helps to continuously increase the adaptability of local landraces because of the dynamic nature of conservation.
- Farmers have selection options: seed bank as well as diversity blocks.
- Farmers have access to information regarding landraces and improved varieties.
- All local farmers have access to information on what planting materials are available at the local level.
- The use of a CSB for technology transfer and genetic resource characterization can be effective.

Lesson learned

Community seed banks and community field genebanks (CFGB) are effective and efficient systems for conserving agriculturally important varieties of different crop species in a particular locality. Conservation through utilization is the strategy followed in the CSB and CFGB which are dynamic systems for the conservation and evolution of genes. This ultimately contributes to food security due to the higher adaptability of varieties. All farmers in the community have access to all kinds of planting materials and associated knowledge that are available at the local level. Different approaches and strategies should be followed based on the localities and communities for sustaining the CSB and CFGB.

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Establishment and Present Status of Dalchoki Community Seed Bank in Lalitpur, Nepal

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Photos: USC Canada Asia (left), Piambar Shrestha (top right)

Introduction

Seed is the most valuable input for agriculture that has both public and private value in the economy and conservation of Plant Genetic Resources (PGRs) worldwide. Community seed bank is considered to be an approach that promotes conservation and use of local crop genetic resources through the functions of strengthening seed systems and mobilizing communities for managing information and PGRs that are at verge of loss from the local production systems. It is therefore a community-led approach in which farmers and their local institutions are involved in collection, storage, exchange, distribution and maintenance of local crop seeds.

Community seed bank is one of the concepts being advanced as a component of sustainable agriculture contributing to conservation and community livelihoods of marginal farmers and their production environments. It is believed that community seed banks were first initiated during the late 1980s in Africa, particularly in Ethiopia, as a response to hardship and famine, and later on, as an instrument of post war recovery of the country's crop

genetic resources (Berg and Abay, 2008). Later on, they spread around the world with the support of development organizations working in the sector of seed security and seed systems. USC Canada, an international non-governmental organization established in 1945 in Canada, has played a catalytic role in supporting and promoting small community seed and gene banks in its programme countries in Asia, Africa and Latin America. USC established CSBs to conserve local seeds and strengthen seed supply systems locally.

In Nepal, a community seed bank was first established in USC Nepal's Integrated Community Development Programme (ICDP) in Dalchoki Village Development Committee (VDC) of Southern Lalitpur in 1994. The Global project entitled "Strengthening the Scientific Basis of *In Situ* Conservation of Agricultural Biodiversity" jointly implemented by LI-BIRD, Nepal Agricultural Research Council (NARC) and Bioversity International systematically piloted community seed banks in 2003 as an option to conserve local landraces through empowering communities to develop a system that increases access to quality seed at the local level. It was reported useful for small and marginal farmers to make them self-reliant in seed and, also for farmers who are living in risk prone areas where there are frequent droughts, floods and so on (Shrestha *et al.* 2006). However, there is a lack of documentation of the historical background of the community seed bank, its process, progress and community benefits in Nepal. This paper attempts to fill this gap to some extent through a case documentation of the Dalchoki community seed bank.

Establishment of the Dalchoki community seed bank

Dalchoki Community seed bank is one of the results of the work of USC Canada in Nepal. USC Canada has been continuously providing assistance for the development of poor and disadvantaged communities of remote rural areas of Nepal for the last 35 years through various integrated development and sustainable agricultural programmes. In 1991, the then named USC Canada Nepal (USCC-N) started implementing Integrated Community Development Programme (ICDP) in Dalchoki, Ghusel and Lele VDCs of Southern Lalitpur. The goal of the programme was to enhance the socio-economic conditions of people through improving food security, formation and mobilization of rural capital, providing education support, improving sanitation conditions and the development of local institutions (ICDP annual report 1998). The programme in its first phase focused in providing trainings and support for activities such as group formation and mobilization, organic farming, seed management, bee keeping, livestock management, and improving schools and drinking water facilities. Initially, there was no plan to establish a community seed bank when USCC-N designed and started ICDP even though the programme had food security as one of the components.

The ICDP area was rich in the agricultural biodiversity that is essential for the enhancement of food and nutrition security. Farmers were growing several local varieties of cereals, pulses, oilseeds and vegetables in their farms. After five years of work, USCC-N, in second phase of the programme, realized that some of these crop varieties were in danger of loss from the production system locally. Most of the farmers were using low quality seeds

due to poor knowledge and skills in seed selection in major crops. Furthermore, the area was gradually receiving improved seeds and other production inputs such as fertilizer and pesticides from outside when the mobility of farmers increased to nearby cities. Community people expressed such situations in a food security workshop discussion in 1994 in which programme staff and communities began to think about community seed bank as a concept to integrate in ICDP. This would be done with the aim to promote seed security and conservation of crop genetic resources. ICDP planned to pilot a community seed bank immediately at Dalchoki VDC to conserve, enhance and multiply seeds of local varieties that help to increase access to seeds locally. The major stages of its establishment and development are summarized in table 1.

Table 1: Timeline of community seed bank establishment and development at Dalchoki, Lalitpur

Time frame	Activities
1991-1993	<ul style="list-style-type: none"> Initial implementation of ICDP in Dalchoki, Ghusel and Lele VDCs by USCN Formation of Dalchoki Community Development Committee (DCDC) and Ghusel Community Development Committee (GCDC)
1994-1996	<ul style="list-style-type: none"> Concept of community seed bank developed by food security related workshop and staff sent to Ethiopia for training on conservation and utilization of PGR through community seed/gene banking Initiation of local seed collection, documentation, conservation and production in Dalchoki, Nallu and Ghusel VDCs Expansion of working area into Shankhu, Bhukhel, Chaughare, Bhardeu, Bhattedanda, Ekudol and Malta VDCs of southern Lalitpur
1997-2002	<ul style="list-style-type: none"> Construction of community seed bank building at Dalchoki Mass training to farming communities on seed selection, storage and conservation CSB started producing, storing and exchanging seeds, particularly maize and some vegetables Loss of some physical properties and documents due to armed conflict situation ICDP phasing out and community seed bank handed over to community with a commitment to provide small support to continue and strengthen community seed bank functions for some additional years
2003-2009	<ul style="list-style-type: none"> CSB collected seed samples rather than producing and collecting bulk seeds as before Formation of organic agriculture cooperative to mobilize financial resources and promote marketing of seeds and agricultural produce Severely constrained to continue and maintain community seed bank functions due to conflict and lack of initiatives in CSB committee
2010 to date	<ul style="list-style-type: none"> Started reviving CSB activities in production, collection and exchange of seeds in some crops (maize, rapeseed, broad leaf mustard, peas, bean, radish) with the support of USCCA and SAHAS-Nepal Initiated documentation and monitoring the status agricultural biodiversity through working through groups and organizing seeds/diversity fairs Maintained the infrastructure of CSB complex with the support of the VDC and increased facilities for seed conservation Increased collaboration and linkages with local government (VDC, DDC) and other government agencies NAGRC, DADO to promote conservation and seed production as a mechanism for their sustainability

Source: Review report of LI-BIRD for USCCA (2009) and community discussions (2012)

The Dalchoki community seed bank emphasized the improvement of the landraces through participatory approaches and the enhancement of quality of farm saved seeds of crop varieties that help to increase production and productivity in households as well as the promotion of selling seeds in the local market as an option to generate income for community seed bank communities. Dalchoki community seed bank therefore has strong components of PGR conservation as it was inspired to halt the loss of crop varieties from the production system locally. To diversify its functions and promote utilization of locally potential crop varieties, collaboration with a local organic cooperative, government agencies and non-government stakeholders were developed.

Brief introduction to community seed bank site

All VDCs of USCC-Nepal programme areas in Lalitpur represent the rugged topography of hills and mountains, between the altitude ranges of 1200 to 2400 meters above sea level. Dalchoki community seed bank is located at an altitude of 2000 masl. and is about 20 kilometers south from the district headquarter, Lalitpur. It is the entry point for many other southern VDCs of Lalitpur district. Southern Lalitpur represents a remote area in terms of geography, access to public transportation and many other basic facilities and government support services, even though it is relatively close to Nepal's capital, Kathmandu.

ICDP VDCs are populated with Chettri, Magar and Tamang ethnic groups. Among them, Tamang is the dominant community in most of the programme VDCs. However, Chettri are dominant in Dalchoki, followed by Tamang. Agriculture and livestock are the major livelihood strategies in the area. The majority of farmers have a land holding which is not large enough to produce sufficient food for the family. Due to the work of non-governmental organizations to support communities, some households, particularly of Chettri and Magar communities, are motivated to produce vegetables and raise livestock as income generating activities. However, in the Tamang community, the majority of young people are out of the home in search of labour work in nearby urban and peri-urban areas.

Process of establishment and management of Dalchoki community seed bank

The programme organized a food security workshop in 1994 where the community seed bank concept was discussed for the first time as a way to promote local crop varieties by increasing awareness and access to quality seeds through community seed bank establishment. USCC-N then decided to support communities to establish a community seed bank that provides services for the community in its second phase of the ICDP. In the same year, USCN sent a staff to Ethiopia for PGR conservation training and exposure that helped greatly to enhance staffs capacity to support community to initiate the community seed bank. At the same time, the programme extended its working area in additional eight VDCs of Southern Lalitpur. In consultation with programme communities, USCC-N decided to select Dalchoki VDC for community seed bank as it was the entry point for many Southern VDCs that makes community easy to collect, exchange and sale seeds in the community seed bank.

The programme adopted a group approach to organize communities and to mobilize them in agriculture and community development interventions. 38 groups were oriented on the concepts of community seed banking for conserving local seeds and improving access to quality seeds through promoting seed production, collection, exchange and sale by the community seed bank. USCC-N supported documentation of agrobiodiversity in a Community Biodiversity Register (CBR) and the maintenance of a plant herbarium through group mobilization. During the period of 1997-2002, a modern community seed bank building was constructed with underground storage facilities. Community groups were provided trainings on seed conservation, selection and storage practices. Some of these groups took initiatives to transform themselves to Ecological Agricultural Cooperatives. Farmer groups of Dalchoki VDC started using the community seed bank as a common place to store maize seeds. However, the gearing up of the Maoist movement negatively affected community seed bank activities. A meeting of groups and a cooperative of Dalchoki VDC decided to establish a local institution named Dalchoki Community Development Committee (DCDC) in 2002. The purpose of DCDC was to provide services to the community and manage the community seed bank by mobilizing local groups and cooperatives. The programme provided small fund support for DCDC. USCC-N terminated ICDP and handed over the resources to communities, including community seed bank facilities to manage themselves. However, USCC-N continued to support the community seed bank through DCDC to strengthen activities after the programme termination.

In the initial years, USCC-N site based staffs played an active role in managing community seed bank activities. They documented biodiversity and maintained a herbarium of plant species as community resources. Seed samples of crop varieties were collected through mobilizing community groups of programme VDCs and maintained in the community seed bank. Gradually, USCC-N staffs realized the need of local institutions to manage the community seed bank and broadened the geographical coverage in ten VDCs. The community role in managing the community seed bank was increased when DCDC formed and took over the resources. Institutional modality and working procedures were developed but never implemented due to the limited capacity of community to understand and manage community seed bank functions by mobilizing community groups and cooperatives. Political unrest also affected DCDC's efforts to effectively manage the community seed bank. Some seeds and physical properties were destroyed, which discouraged DCDC to continue CSB activities in early 2000. Lack of technical staff in USCC-N at that time also hindered support in proper functioning of the Dalchoki community seed bank. Before handing over the community seed bank to DCDC, ICDP provided a number of trainings for community seed bank communities in each group and cooperative about agrobiodiversity conservation, promotion of organic and sustainable agricultural practices and promotion of local crop varieties. The majority of training participants were women. Resource farmers from each group and cooperative also received separate trainings and support for seed production, processing, storage and market management. These activities were of high priority because the community seed bank was viewed as a vehicle to disseminate sustainable agricultural practices to contribute for food security among farmers.

In 2006, they changed some of the executive members in DCDC to revive its functions and to coordinate groups, cooperatives and manage the community seed bank. USC Canada Asia (USCCA) supported their effort to continue community seed bank functions by hiring a local staff and maintaining some of the facilities for seed collection and storage. In 2009, an independent review of the community seed bank was done with the support of USCCA to suggest gaps and recommend support for improving local seed systems and agrobiodiversity management on farm. This review report, together with USCCA inputs, insisted to formulate a strategy and action plans for operating the community seed bank function under DCDC management. In 2010, the CSB had an opportunity to collaborate with SAHAS-Nepal's Local Initiatives for Food Security Transformation (LIFT) project that is also helping to revive community seed bank functions. Subsequently, DCDC has established its collaboration with local government, National Agricultural Genetic Resource Center (NAGRC) and District Agriculture Development Office (DADO) for conservation, enhancement and seed multiplication with particular focus on cereals, oilseeds and vegetable crops.

Status, capacity and provisions of community seed bank to provide services to communities

At present, the major activities being carried out by Dalchoki community seed bank are production and collection of maize, rapeseed and vegetables seeds and selling to farmers of the surrounding area. Mostly farmers from some wards of Dalchoki and nearby VDCs have been benefitted from this activity. However, DCDC has a wide network of many groups and organic cooperatives covering ten VDCs with 1,518 members, among which 59.3% are female (Table 2). Many of these groups and cooperatives are still active in their locality. These would be a great human asset to mobilize as they have been oriented by ICDP in the conservation of crop genetic resources and seed production as well as group saving and credit schemes that are helping to generate and mobilize financial resources locally. They could also contribute to provide small financial support for running community seed bank activities if they feel a sense of ownership of the community seed bank.

Table 2: Farmers groups and cooperatives and their affiliated members from ten VDCs

Group/cooperative	Number	Number of members		
		Female	Male	Total
Farmer's groups	30	692	756	1148
Organic agriculture cooperatives	8	208	162	370
Total	38	900	918	1,518

Source: Record obtained from Dalchoki Community Seed Bank

The capacity of DCDC has been analyzed based on its physical, technical, social and financial status. DCDC owns about a 1,000 square meter area with a facility for drinking water and rest rooms. It has a two-story concrete building with 28 metric tons seed storage capacity. There are four rooms that serve as a resource centre, a training hall and kitchen facilities. These are adequate facilities to serve as a community seed bank and resource centre for

Dalchoki and its adjoining VDCs. DCDC is also equipped with a hygrometer, thermometers and many other physical materials useful for seed storage and its management. Despite all these resources to mobilize for strengthening the community seed bank and resource centre, there was inadequate coordination between the DCDC committee and USCC-N staff to understand fully the community seed bank function, and to set up a working modality and guidelines for increasing the community role in its operation before taking over completely.

The DCDC received revolving fund support of NRs. 200,000 from ICDP to promote local seed and its conservation. However, DCDC did not receive payments on loan given. The committee was unable to play its active role during the insurgency period, thus limiting their opportunity to mobilize the fund and community groups in strengthening community seed bank activities. The profit margin for the purchase and selling of seed was not enough to cover the incidental cost of community seed bank operation due to the small number of transactions. Internal resource generation, which is important to sustain the DCDC, is very small as compared to cost of community seed bank management. On the other hand, Dalchoki organic agriculture cooperative where many community seed bank members are affiliated, has strong financial resources generated through group savings that are being mobilized as micro-credit loans for seed production and vegetable farming. DCDC has been collaborating with this organic cooperative to promote functioning of the community seed bank through market management for local production. They have shared office space and mobilized financial resources for DCDC members. However, clear demarcation of roles and responsibilities of these two organizations is yet to be established to maintain transparency and build synergy for promoting local crops and to mobilize many other groups of nearby VDCs. There is an opportunity to establish and strengthen DCDC's relationship with already existing organic agriculture and milk cooperatives in order to mobilize their groups and resources to reach out to many more farmers of the area.

The community seed bank has maintained seeds for display and as a backup depository for the short term. It is displayed with labelled information about crop variety and the farmers who are serving as resource for this particular variety. There are seeds of 17 varieties of 7 cereals, 12 varieties of 6 legumes, 6 varieties of 3 oil seed crops and 22 varieties of 14 vegetables in community seed bank collections, as observed recently (Annex 2). However, there is a need to assess the diversity in crop varieties through identifying duplications in the name of varieties. This can be done through discussions with expert farmers as well as through growing seeds in diversity blocks to assess morphological characteristics. As noted recently in a community meeting, useful discussion is going on to transform DCDC management to make it more inclusive by increasing the representation of nearby VDC groups and bringing more youth and women into the management positions. There is recent progress in developing a plan to diversify the services of DCDC as a resource centre in Southern Lalitpur for seeds, through the promotion of organic farming and livestock, the establishment of a community nursery and ecotourism as a strategy for sustaining DCDC. DCDC has extended its collaboration with SAHAS-Nepal's LIFT Lalitpur programme and NAGRC to strengthen its technical and managerial capacity in providing community seed banking and other services.

The Dalchoki community seed bank has a provision to buy surplus seeds from its members for a nominal price in the season and store them in the community seed bank. These seeds are redistributed again to the members in the next season who want to receive seeds. This is done under the condition that they should return two times the amount of seed of the same crop variety after the harvest. A revolving fund is mobilized to purchase seeds from group members. The community seed bank is allowed to sell extra seeds to outsiders at the market price. DCDC is required to maintain details of farmers, crops and varieties before distributing to them others. However, this is not always followed in practice. For conserving rare crop seeds, the community seed bank collects and stores with labelled information for a year and assigns to some of its group members to grow and return the seed annually. For seeds stored in the bank, the committee members are responsible to voluntarily take care of them in a scheduled time as decided by the committee. The purchase and sale price is fixed by the DCDC executive committee. However, these systems are yet to be ensured by the DCDC and the community groups and cooperatives. In recent time, the community seed bank started producing seeds of maize and rapeseed varieties for the market as an income generation opportunity for its members. DCDC is collaborating with DADO for their technical support to acquire source seed and maintain quality. Dalchoki agricultural organic cooperative is responsible for the market management of produced seeds.

Benefits of the community seed bank to the local community

It is not easy to quantify the many benefits that the community has received from establishing a community seed bank in Dalchoki. A series of orientations and trainings related to conservation, enhancement and use of local crops and other production resources has increased awareness about agrobiodiversity conservation and adopting ecological farming practices and helped to minimize the use of external seeds and other production inputs such as chemical fertilizers and pesticides in the area. The community seed bank therefore has been playing a catalytic role in increasing the skills and capacity of farmers on quality seed production and promoting use of local crop varieties since its establishment. These trained farmers are active in their groups and cooperatives and disseminate the useful information about the importance of local crop varieties and other forms of biological diversity to their fellows. They expressed their concerns to discourage promoting the use of hybrid seeds, fertilizers and pesticides in their communities. Such strong feeling is a good measure that farmers are adopting and continuing ecological farming practices in their farms that are fundamental to conservation and promotion of crop diversity.

In recent years, the community seed bank has mobilized 35 committed farmers of Dalchoki for seed conservation of local varieties, particularly of broad leaf mustard, radish, pea, bean and cauliflower (perennial variety), by planting them on their farms and, replacing seeds each year in the community seed bank collections. In 2011, it was noted that 30 farmers deposited seeds in the community seed bank whereas only twenty one farmers accessed seeds to fulfil their needs of growing some of the local crops (Table 3). Although the number of farmers and the transaction amount

was quite low, it has increased access to local crop seeds for farmers to grow in their diverse production environments. This is contributing to sustaining production and productivity and managing crop diversity on farm. It was noted during discussion with communities of Dalchoki VDC that the number of households saving seeds at households for next season production has increased significantly after community seed bank establishment.

Table 3: Number of farmers that deposited and accessed local crop seed from CSB in 2011.

Ethnic group	No of farmers providing seeds			No of farmers accessing seeds		
	Female	Male	Total	Female	Male	Total
Janajati	15	17	32	5	3	8
Dalits	2	0	2	2	0	2
Others	20	16	36	7	4	11
Total	37	33	70	14	7	21

Source: Record obtained from Dalchoki community seed bank

Some activities of the community seed bank, such as seed production and fund mobilization, have been providing direct economic incentives to its members through increasing access to quality seeds and small financial capital locally and promoting small earning opportunities for growers from the sale of seeds. In 2011, more than one ton of seed was collected and sold by the community seed bank. It is noted that 60% engaged in seed production and sales activities are women. This reveals that the community seed bank has supported the enhancement of technical skills and the capacity of women farmers to utilize agrobiodiversity as an income generation opportunity.

Table 4: Number of farmers involved in CSB promoted seed production activities in 2011.

Activity	No of Farmers			Amount sold (Kg)
	Female	Male	Total	
Maize seed production (Manakamana-3)	7	5	12	800
Vegetable seed production (peas, beans)	14	9	23	1,280
Total	21	14	35	1,080

Source: Record obtained from Dalchoki community seed bank

Community seed bank initiatives remained instrumental to establishing DCDC as a nodal community based organization and developing facilities to promote it as a resource centre for wider community use. They have promoted leadership ability among community members, youth and women while managing the community seed bank and other functions of DCDC. There are 11 members in DCDC's executive committee of which 3 leadership positions were held by women in recent years.

The community seed bank and its activities were found helpful in promoting the concept of sustainable agriculture among farming communities in Dalchoki and many other VDCs

in Southern Lalitpur. Dalchoki community seed bank itself has primarily provided indirect benefits to programme communities of other VDCs in the last few years. In the past, farmers of Chaughare VDC reported selling the seeds of peas and receiving beans, radish, garlic and broadleaf mustard from the community seed bank. Similarly, many farmers of Shanku VDC received seeds of peas and beans.

Issues and challenges

Dalchoki Community seed bank received relatively long-term support from USC Canada's Nepal programme to develop facilities and strengthen its capacity. A fund of NRs 200,000 was established at DCDC to promote community seed bank functions including seed preservation, production, exchange and marketing. These were some of the programme strategies to make the community seed bank sustainable after handing it over to communities. In 2008 the DCDC management committee reactivated to operate its functions with particular focus on Dalchoki VDC. The review of the community seed bank in 2009 made the committee recognize the need to develop a strategy and plan of actions to sustain the functions of the community seed bank and resource centre by maximizing the utility of its human, physical and financial resources. They searched for opportunities to establish linkages and coordination for seeking support services from the VDC and other district line agencies in order to maintain the infrastructure facilities and promote seed production activities in some crops. Recently, they developed a plan to use its resources to offer diversified services such as renting space for meetings and trainings as a resource centre, as well as a home stay that helps to sustain community seed bank functions. Additionally, DCDC is collaborating with Dalchoki organic agriculture cooperatives to use its facilities on a rental basis and provide marketing services for farmers' seeds and agricultural produce collected by the community seed bank. The cooperative also runs saving and credit schemes to support farmers financially. Recently, they are collaborating with SAHAS Nepal's LIFT programme and NAGRC for necessary technical and other support services to strengthen their capacity to manage the community seed bank and resource centre.

Seed transaction among VDCs is poor due to an inadequate amount of seeds of demanded crop varieties in the community seed bank. Even if seed is available, farmers do not have much trust on its quality due to a lack of quality control mechanisms in place. Rugged geography also hinders mobility and seed transactions through sale and exchange in the community seed bank. DCDC has yet to develop its guidelines to mobilize group and cooperative members in the conservation of rare crop seeds, maintain seed quality in storage and manage information. An inclusive and dynamic leadership is important in order to establish and maintain relationships with community groups, cooperatives, local government and many other relevant stakeholders. Such a leadership committee would be able to prepare a realistic plan to mobilize resources to benefit communities, analyze the situation and respond to it by making adjustments as required. We recommend that it is high time to think about and increase the capacity of women and youth representing various community groups and cooperatives in the management of the community seed bank and resource centre. This would help to increase the sense of community ownership and active

contributions. It is challenging to mobilize local people to ensure conservation of local crop seeds and enhance livelihoods of poor and marginal farmers. One of the important factors is the decrease of interest among farmers, particularly young and commercial farmers, to grow local crop varieties. This is mainly due to their low yield potential and market preferences. Ensuring seed quality, adding value to local crops and opening new market opportunities for value added products are therefore important aspects on which DCDC needs to focus more attention.

Conclusion

Dalchoki community seed bank, during the initial six years of its establishment was in a progressing phase to serve the community through seed production and distribution of local crop varieties locally. With the increase of political unrest, it remained passive for some years. Since 2008, it started reviving and strengthening its functions and initiated necessary collaborations with local government and non-government organizations. In recent collections, the community seed bank has maintained seeds of 57 landraces of 30 crops. It has supported farmers in production and sales of maize, rapeseed and some vegetables seed. It is collaborating with SAHAS Nepal's LIFT programme and NAGRC (national genebank) for necessary technical and support services to strengthen its capacity in managing the community seed bank and resource centre. As a result of the community seed bank, the amount of seeds saved by households for next season production has increased. However, there is a need to assess the level of contribution of the community seed bank to promote crop diversity.

To be sustainable, clearly defined short-, medium- and long-term strategies and workable yearly action plans with a provision for ensuring minimum financial resources are required. If it acts as a centre wherein community members either benefit by receiving seeds or information, or in which they feel a sense of pride, then they will be ready to engage and support the community seed bank and resource centre voluntarily when required. It is therefore important to make some kind of provision to have its own capacity to employ local volunteers or part-time staff and obtain financial resources to run as a community seed bank. The large geographic area that the community seed bank is expected to cover while serving several communities has caused some problems while also offering new opportunities. It has been difficult to provide support and services for some of the VDCs in their operational areas. It is therefore realistic to redefine operational areas to serve communities based on capacity, local needs and priorities.

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Annex 1: SWOT analysis of Dalchoki community seed bank

<p>Strengths</p> <ul style="list-style-type: none"> • Rich in physical infrastructure (seed store, office space and training hall) • Committed and motivated CSB members • Trained farmers on sustainable agriculture, organic farming and seed production • Increased awareness among farmers on conservation and use of agrobiodiversity • Establishment of groups and cooperatives to promote organic farming in 8 VDCs • Established linkage with local body, DADO and NAGRC 	<p>Weakness</p> <ul style="list-style-type: none"> • Inadequate focus on on-farm conservation of agrobiodiversity • Limited services to farmers groups of other VDCs • Seed production without adequate study of its market • Limited internal resource generation • Low priority in fund mobilization to support community seed bank activities • Limited knowledge on seed quality control and certification for the market • Inadequate coordination with government line agencies • Poor record keeping
<p>Opportunities</p> <ul style="list-style-type: none"> • Favourable agro-ecology for vegetable seed production • Rich diversity of promising local varieties • Easier access to market and technology to utilize crop diversity • Large geographical coverage • Longer funding support and continuous technical advice from USC Canada Asia • Flexible government policy to link agrobiodiversity conservation with income generation activities 	<p>Challenges</p> <ul style="list-style-type: none"> • Difficult in mobility due to wide geographical coverage to mobilize and support community in community seed bank activities • Quality seed production, certification, storage and marketing in local crop varieties • Increasing pressure on local varieties from high yielding varieties and improved technologies

Source: Focus Group Discussion (2011) and community seed bank Review Report (2009)

Annex 2: List of crop and varieties maintained in the community seed bank in 2011

Crop type	Crop	Varieties
Cereals	Maize	Pani Makai, Local yellow, local white, Golku Chepare, Dhide, Manakamana-3
	Wheat	Mudule
	Buckwheat	Mitthe, Tite
	Sorghum	Local
	Finger millet	Nangre, white, Dalle
	Barley	Local
	Rice	Taichung, Pokhareli Masino, Khumal-4
Oil seeds	Rapeseed	Bikash, Pragati, Baltori, Thulo tori
	Sarsiu	Local
	Alas	Local
Pulses	Soybean	Black, grey, white
	Bean	Kidney bean, white bean, grey bean, mottled bean
	Peas	Sano, thulo
	Horse gram	Local
	Lentil	Local
	Rice bean	Local
Vegetables	Beans	Four season, Nagarkoti, Fababean
	Cowpea	Tane, Kathe
	Cress	Local
	Broadleaf mustard	Dunde, marpha, Kande, Khumal, Guzmuzze
	Soup	Local
	Potato	Sano golo
	Amaranths	Local
	Pumpkin	Local white, Local green
	Tomato	Sano golo
	Chilli	Dalle
	Ladies finger	Local
	Brinjal	Local
	Sponge gourd	Local
	Radish	Local
Others	Colocasia	Local
	Sweet Potato	Local
	Perilla (Silam)	Local seto

Community Seed Banks: A Local Solution to Increase Access to Quality and Diversity of Seeds

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Photos: Pitambar Shrestha (left), Mahesh Shrestha (bottom right)

Introduction

Economies of scale play an important role in the viability of the formal seed sector. With the objective of increasing production on a commercial scale, the priority of the formal seed sector is usually to trade in a selected few varieties of a few major crops. Commercial seed companies are not in the business to provide seeds of a diversity of varieties specific to the niches of smallholder farmers. Therefore, despite the growth of the commercial seed sector, the majority of the smallholder farmers in the developing countries still use farm-saved seed (Development Fund 2011).

Smallholder farmers in subsistence agriculture maintain diverse types of crops, trees and animal breeds to meet household food and fuel needs, but also in order to earn income, perform religious and cultural rituals and enhance the fertility of their farms. The need for maintaining diverse types of seeds is also because modern varieties are mostly confined to productive land, whereas landraces are adapted to marginal ecosystems (Rana *et al.* 2007). In addition, some farmers grow some crop varieties to maintain social prestige. Apart from saving from their own harvest, farmers obtain seed and planting materials through informal networks based on exchange and gifts or purchases from relatives and neighbours or through purchase from local markets (Subedi *et al.* 2003). This is what is

called the informal seed system and it is estimated that in most developing countries smallholder farmers obtain up to 80% of all seeds through it.

One approach that appears to be successful in addressing some of these issues is the development of community seed banks. Community seed banks are operated by local organizations that hold collections of seed that are maintained and administered by communities in a central facility or in a structure that is shared among a range of individuals. According to LI-BIRD's experience, the community seed bank is an approach that provides farmers access to seeds of local crop varieties and performs the function of community level backup for genetic resources. It also serves as a repository of associated knowledge and as an institution to organize, mobilize and represent farmers' interests. Since the early 1990s, many development organizations began to support the establishment of community seed banks with the primary goal of enhancing seed and food security (Shrestha *et al.* 2013a). Some researchers have recognized that this approach can be instrumental in addressing key issues related to seed security, on farm conservation of agriculture biodiversity, informal seed systems and enhancement of rural peoples' livelihoods (Development Fund 2011, Jarvis *et al.* 2011, Shrestha *et al.* 2013). However, systematic studies on the effectiveness of CSB for the above goals are yet to be done.

In Nepal, the implementation of community seed banks began in the mid-1990s through a USC-Canada coordinated project (Joshi 2013, Bhandari *et al.* 2013; see, previous chapter). In 2003, with the support of LI-BIRD in partnership with NARC and Bioversity International, a different model of the community seed bank was developed in Bara district of the central lowlands of Nepal as part of a global agrobiodiversity project (Shrestha *et al.* 2004). In this novel community seed bank approach, priority was given to collection, storage, regeneration or multiplication and distribution of local crop varieties along with traditional knowledge and associated information. Also included were seed production and sales of a few improved varieties of major food crops such as rice, wheat and lentil, in order to meet local farmers' needs and generate some financial resources as a mechanism to sustain the community seed bank institution. Since then, based on the Bara case learning, LI-BIRD has supported the set up another 14 community seed banks throughout Nepal (Map 1). In addition, the Ministry of Agricultural Development and a few NGOs have piloted community seed banks in some districts. However, these community seed banks have emphasized increasing the seed replacement rate of modern varieties to enhance food security rather than the promotion of local varieties (CDD 2009). We describe the process of establishing a community seed bank and its management, the current status of community seed banks supported by LI-BIRD, and their contribution to local seed security and livelihood improvement.

Description of community seed bank sites

The existing CSBs are located across the country from the southern lowlands Terai plain to the northern high hill area and from the east to the western corners of Nepal; 10 out of 15 community seed banks are located in the lowland terai area. Two sites, Jogimara and Purkot, represent the mid-hill area and another three, namely Tamaphok, Ghanteshwor

and Talium, are located in mid- to high hill agro-ecology (Figure 1). In terms of climatic conditions, the ten sites of the lowland terai area with an altitude of 70 to 213 masl. experience more or less a similar type of subtropical climate, with the maximum temperature going up to 42 °C in May-June in some places and with January being the coldest month with a minimum temperature of about 4.1 °C. But there are variations in terms of amount of rainfall per annum, with the highest amount of rainfall in Nawalparasi (2145 mm). There is not much variation in terms of crops grown across the lowland sites. Rice, wheat, lentil, potato and maize are grown as primary food crops (Subedi *et al.* 2003).

The other four sites, Jogimara, Purkot, Tamaphok and Ghanteshwor, represent the mid-to high hill agro-ecosystem. Climatic variation is observed as being from sub-tropical to temperate. Maize and finger millet are common in all sites, but potato and cardamom are predominant in Tamaphok, while rice is dominant in Purkot.

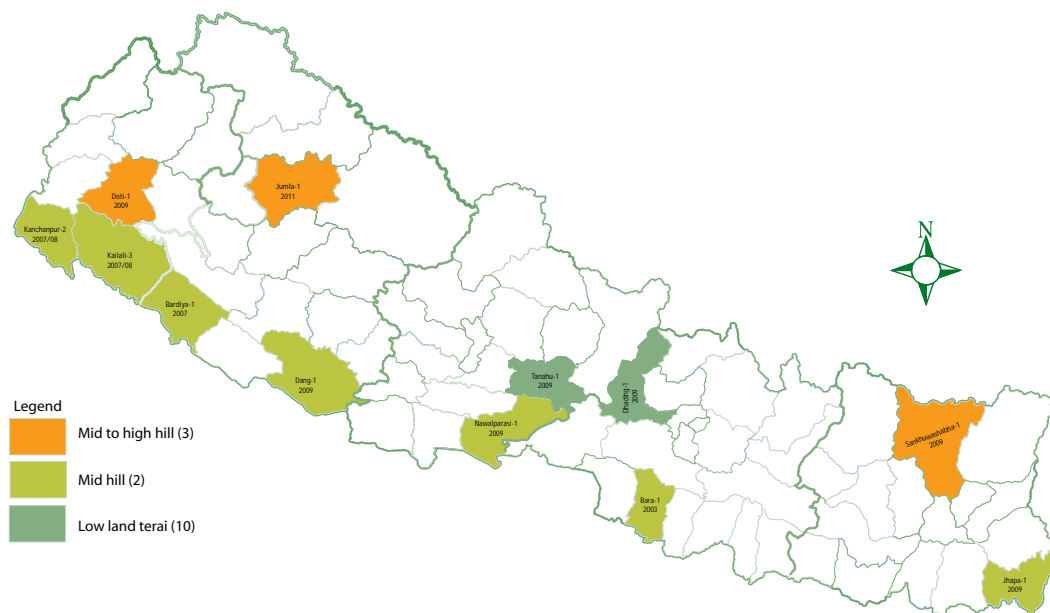


Figure 1: Map of Nepal showing number of community seed banks supported by LI-BIRD and year of establishment

Process of establishing a community seed bank³²

In 2003, LI-BIRD facilitated the establishment of a community seed bank for the first time in its history at Kachorwa village of Bara district in the Central Terai, Nepal, as a part of a global project called Strengthening the Scientific Basis of *In Situ* Conservation of Agricultural Biodiversity. This project was globally coordinated by Bioversity International (then IPGRI) and in Nepal jointly implemented by LI-BIRD and NARC from 1998 to 2006. Prior to its establishment, partners in the global project debated whether a community

32 Adopted and modified from Shrestha *et al.* 2006 and 2008.

seed bank should be established or not, considering that community seed banks may not support on-farm conservation of agriculture biodiversity. To settle the argument, the issue was taken to the community and after a half-day discussion among selected members who had been actively engaged in project activities, project team members agreed to pilot the concept (Shrestha *et al.* 2005). The experience of establishing a community seed bank at Kachorwa, Bara was documented systematically and later on, the same steps were applied in scaling out this approach in other sites across Nepal (see Annex 1 for an overview of key features of the 15 community seed banks supported by LI-BIRD).

Once the sites for on-farm agricultural biodiversity management projects were identified, considerable time was allocated to assess existing farmers' groups and establishing both ward and Village Development Committee (VDC) level Biodiversity Conservation and Development Committees (BCDC). Then, various awareness raising activities, such as a community biodiversity register and a diversity fair, were organized to sensitize the community. The aim was to raise awareness about the value of biodiversity, the need for conservation and the potential to bring lost genetic resources back to the area. To build the capacity of BCDC members, the project team organized training and exposure visits on topics including community-based biodiversity management practices, such as community biodiversity register, community seed bank management, and group management. Emphasis was given to both conceptual and practical aspects of seed handling and storage, including the maintenance of a community biodiversity register, multiplication practices of traditional seed, and maintenance of small quantities of seed in traditional seed storage structures.

Rules and regulations regarding the mechanism for seed collection, regeneration, quality control and distribution were formulated, and roles and responsibilities of community seed bank members in seed management were defined according to the interests of the community and in accordance with the local context, customs and values. Similarly, traditional seed storage structures such as *Mor* (made of rice straw), *Ghaila* (made of mud), *Kothi* (made of mud and bamboo), and *Chaintha* and *Mouna* (made of bamboo) were used. No 'external' technical knowledge was needed to build and maintain these facilities. Contributions from local people for the physical infrastructure were encouraged in order to build ownership and make management of the community seed bank locally sustainable. Seeds were collected by organizing diversity fair and by locating seed sources using the community biodiversity register. Adequate attention was paid to collect rare and threatened crop varieties that were grown by just a few households in small plots. These were carefully collected from the individual custodians, nodal farmers, neighbours and relatives of members, as well as from neighbouring villages.

A community biodiversity management fund was created to develop options for livelihood and income generation and link these with the conservation of local varieties. About 80% of the fund was provided by the project and the remaining 20% from the contribution of individual members. Loans for income generation activities were provided to members to conduct income generation activities of their own choice. This occurs yearly at low interest rates (12% per annum), giving priority to the poorest members of the group. One of the

rules of the fund is that the members who took loans have to grow at least one or two preferred local varieties in a small area of their farmland so that they would contribute to on-farm conservation of local varieties as well as a reduction in regeneration costs of the community seed bank. Seed production and marketing of both local and improved varieties are carried out to meet the seed demand of local farmers as well as to generate income.

Major functions of the community seed bank

Community seed banking represents a multidimensional approach that helps to build social capital through the mobilization of the local community, leading to empowerment. Core activities are the conservation of local crop varieties and documentation of associated information and traditional knowledge and increasing farmers' access to quality seed, addressing not only local level seed and food security but also adverse impacts of environmental factors such as climate change and natural disasters (drought and floods). Another important aspect of LI-BIRD's community seed bank approach is linking conservation with income generation activities to improve the livelihoods of community seed bank members. The generic functions of a community seed bank are discussed below.

Conservation of local varieties and documentation of traditional knowledge

Community seed banks aim to promote conservation and sustainable use of local and improved variety seeds for seed and food security and to improve the livelihoods of farmers. Participants of the national workshop on community seed banking, held from 14 to 15 June 2012 in Pokhara, Nepal, stressed that the term community seed bank should not be used if there are no plant genetic resources conservation activities (Shrestha *et al.* 2012 a.). Hence, the identification, collection, safe storage, continuous regeneration, and provision of easy access to seeds and planting materials, as well as documentation of associated information and traditional knowledge (including passport data), are core elements of any community seed bank. Table 1 summarizes the local crop diversity in the 15 community seed banks supported by LI-BIRD (2012 data).

Table 1: Summary of local crop diversity accessible by community seed banks, 2012

Name of site	No. of cereal crop varieties	No. of vegetables & pulses varieties	No. of oil seeds crop & varieties	Total
Kachorwa, Bara	91 (3)	11 (6)	1 (1)	103 (10)
Belawa, Bardiya	37 (3)	49 (9)	8 (4)	94 (16)
Shankarpur, Kanchanpur	35 (3)	13 (9)	8 (4)	56 (16)
Gadariya, Kailali	48 (3)	63 (9)	8 (4)	119 (16)
Masuriya, Kailali	50 (3)	57 (9)	8 (4)	115 (16)
Pathraiya, Kailali	47 (3)	21 (9)	8 (4)	76 (16)
Beldandi, Kanchanpur	27 (3)	13 (9)	8 (4)	48 (16)
Agyauli, Nawalparasi	23 (2)	7 (2)	2 (1)	32 (5)
Rampur, Dang	68	9	-	72
Shivagunj, Jhapa	77	42	-	119
Jogimara, Dhading	30	39	-	69
Purkot, Tanahun	38	11	-	49
Ghanteshor, Doti	28	32	-	60
Tamaphok, Sankhuwasabha	34	29	-	63
Talium, Jumla	8	24	4	36

Source: Collected from community seed banks' record by LI-BIRD staff. Figures in parenthesis indicate the number of crop species. Name of cereal crops: Rice, Wheat, Finger Millet, Maize, Barley, Buckwheat, Minor millets. Name of vegetables and pulses: Sponge gourd, Pumpkin, Ridge gourd, Bottle gourd, Taro, Elephant foot yam, Cow pea, Beans, Soy bean, Broad bean, Horse gram, Pigeon pea, Pea. Name of oil seed crops: Rape seed, Lean seed, Sesame.

Seed distribution, regeneration, production and marketing

Increased access to diverse planting materials with a focus on local plant genetic resources is another primary goal of community seed banks. There are a number of sources to obtain improved variety seeds and hybrids, such as the District Agriculture Development Office (DADO), Nepal Agricultural Research Council (NARC), National Seed Company (NSC), agrovets and private seed companies, but in case of local varieties of several crops, there are no formal or informal institutions offering these resources. At present, community seed banks are the only collective mechanism involved in collection, regeneration, multiplication and distribution of diverse local plant genetic resources suitable to local conditions.

Community seed banks have developed a number of mechanisms to provide easy access to seeds. For example, in Kachorwa, Bara, seeds are provided on a loan basis to both members and non-members within the village, but for outsiders only on a cost-recovery basis. If a member takes a kilogram of seed during planting time, he/she has to return 1.5 kg pure seed to the community seed bank after harvesting the crop. In case of the gourd family, borrowers have to return a single matured fruit from which seeds are then taken by the community seed bank. Many of the community seed banks promoted by LI-BIRD have employed this system for distributing seeds. Experience has demonstrated that this system is very important for poor members of the community who do not have cash to buy seeds.

Community seed banks employ various strategies to regenerate seeds from their collection each year and replace old seed stock with new, healthy and vibrant seeds. These include, i) distribution to members on a loan basis, ii) establishment of diversity blocks, iii) distribution of seeds to the users of the CBM fund and iv) cultivation of one local variety by each member. Apart from these, they also keep a small amount of seeds in the community seed bank as a remnant stock so that, in case of crop failure, they have some seeds to regenerate again. Unfortunately, community seed banks have had some bad experiences, such as the washing away of a whole community seed bank due to unusual rainfall and floods (Shankarpur, Kanchanpur). Learning from such experiences, the community seed banks in Kailali district have initiated exchange of seeds among community seed banks, so that they can replace them easily in case they lose any variety for any reason. In addition, some groundwork has also been initiated to keep safe duplications in the national genebank.

Higher volume seed production of selected local as well as improved varieties that have high demand in the locality is another task that community seed banks have been carrying out since their establishment. This function of community seed banks has been highly valued by local people because they can buy quality seeds of both local and improved varieties at a reasonable price at their doorstep and on time. It is also a matter of trust as seeds are produced locally, by trained people, and people have the advantage of seeing the performance of the standing crop. In case the quality of seed is unsatisfactory, it is easy to complain and even demand money back, which is hard to do if seeds are purchased from outsiders. In 2011, nearly 2000 people obtained different types of local seed and nearly 1000 received improved variety seeds from community seed banks supported by LI-BIRD. The quantity of seeds distributed by the community seed banks was 2 and 43 tons of local and improved varieties respectively (Table 2). The volume of the transaction of local varieties seems low, but this is because they were mostly vegetables, which do not require high quantity transactions. In the case of improved varieties, they were mainly rice and wheat seeds. Details of the volume of transactions of both local and improved varieties of all the community seed banks in 2011 are presented in table 2.

Table 2: Summary of the volume of the transaction of seeds from community seed banks and the number of people accessing seeds in 2011

Location	No. of user		Volume of seed transaction in 2011 (kg)	
	LVs	IVs	LVs	IVs
Kachorwa, Bara	77	185	38.5	9020
Belawa, Bardiya	175	196	100	4830
Shankarpur, Kanchanpur	144	115	50.89	5300
Gadariya, Kailali	50	47	25	2965
Masuriya, Kailali	208	180	15	14150
Pathraiya, Kailali	120	184	29.2	3676
Beldandi, Kanchanpur	29	38	5	2592
Agyauli, Nawalparasi	264	-	94	-
Rampur, Dang	36	-	294	-

Location	No. of user		Volume of seed transaction in 2011 (kg)	
	LVs	IVs	LVs	IVs
Shivagunj, Jhapa	322	-	282	-
Jogimara, Dhading	113	8	-	355
Purkot, Tanahun	26	-	15	-
Ghanteshor, Doti	139	-	862	-
Tamaphok, Sankhuwasabha	70	-	-	-
Talium, Jumla	66	18	300	36
Total	1839	971	2110.6	42924.0

Source: Collected from community seed banks' records by LI-BIRD staff

Linking conservation with livelihood improvement: establishment and mobilization of a community biodiversity management fund

In most cases, farmers grow both local and improved varieties, depending on agro-ecology, land type, availability of options and socioeconomic and cultural requirements. Some local varieties can compete with modern ones, while others do not. For on-farm conservation of agricultural biodiversity it is useful to consider total biodiversity. However, demonstrating immediate tangible (financial) benefits from the use of some local varieties is a challenge. To address this bottleneck, LI-BIRD has been promoting the establishment of a community biodiversity management fund that provides the opportunity to generate additional income mostly from farm based income generating activities. Once the fund is established, it is mobilized as a loan among the members for production purposes, eg. starting a small business, rearing livestock, etc. But the rule is that users of the CBM fund must be involved in conservation of local varieties collected at the community seed bank. The establishment of such a fund is an integral part of the CBM process that promotes both on-farm management of genetic resources and improves peoples' livelihoods through the mobilization of local social as well as financial capital (Shrestha *et al.* 2012b, 2013b).

The process of establishment of a CBM fund is started with mutual understanding between the community and LI-BIRD. One of the preconditions to establishing a CBM Fund is that the community must commit 10-20% of the start-up funds and they play a leadership role in all aspects of implementation.

Currently, more than 4 million Nepalese rupees have been mobilized by the 15 community seed banks to conduct income generating activities for their members. Nearly 700 members (88% of whom are from resource poor to medium level income households) enjoy easy access to financial resources without the obligation to provide any collateral. CBM fund users have been conducting income generating activities such as rearing goats, pigs and running small businesses (fresh vegetable cultivation), generating profits in a short period of time. Most members are involved in conserving local crop varieties and regenerating seeds conserved at the community seed bank (Table 3). This indicates that these two functions can be fulfilled at the same time.

Table 3: Summary of CBM fund linked to community seed bank, its users and income generation activities

Name of site	Average no. of users/year by socioeconomic category				Flow of fund by socioeconomic category (NRs)				Major income generating activities
	Rich	Medium	Poor	Total	Rich	Medium	Poor	Total	
Kachorwa, Bara	5	40	47		40000	320000	376000	736000	Goat rearing and small businesses
Belawa, Bardiya	9	14	19		26000	40000	54000	120000	Crop production, goat and pig rearing
Masuriya, Kailali	2	21	11		7000	73500	38500	119000	Pig and goat rearing, beekeeping and vegetable cultivation
Gadariya, Kailali	6	32	20		16400	76450	58950	151800	Pig rearing and cereal crop production
Shankarpur, Kanchanpur	2	16	24		9000	72000	111000	192000	Pig and goat rearing, vegetable cultivation, small business
Pathraiya, Kailali	7	28	10		16000	80000	33000	129000	Vegetable cultivation, pig and goat rearing
Beldandi, Kanchanpur	2	14	15	31	8000	58000	53000	119000	Goat rearing, cereal crop production, small business
Agyauli, Nawalparasi	2	24	2	28	25000	400000	25000	4050000	Goat, pig and cattle rearing, fish farming, vegetable cultivation and small business
Rampur, Dang	18	46	4	68	220000	381000	37000	638000	Rearing of goat and buffalo, vegetable cultivation, small business
Shivagunj, Jhapa	6	16	12	34	90000	235000	160000	485000	Goat, chicken, pig and cattle rearing, local rice cultivation
Jogimara, Dhading	2	12	27	41	12000	63000	103000	178000	Vegetable cultivation, goat rearing, small business
Purkot, Tanahun	19	41	54	114	54000	172200	206360	432560	Goat rearing and vegetable cultivation
Ghanteshor, Doti	0	2	5	7	0	30000	75000	105000	Goat and buffalo rearing and vegetable cultivation
Tamaphok, Sankhuwasabha	2	9	39	50	7000	33500	92500	133000	Goat and pig rearing, beekeeping
Talium, Jumla	0	1	7	8	0	15000	77000	92000	Cultivation, of vegetable, fruits and herbal plants
Total	82 (12)	316 (45)	296 (43)	694 (100)	5 30 400 (13)	20 49 650 (50)	15 00 310 (37)	40 80 360 (100)	

Source: Collected from community seed banks' record by LI-BIRD staff. Figures in parenthesis indicate the percentage, \$1=85 Nepalese rupees.

Associated functions of community seed banks

Community mobilization for promoting conservation and use of genetic resources

Establishment of a community seed bank starts with community mobilization through awareness raising and capacity building activities, such as a village workshop, diversity fair, exchange visits, and training (Shrestha *et al.* 2006). Within the framework of Community-based Biodiversity Management (CBM), the local institutional building process is started through an assessment of the functioning of existing farmers' groups formed by governmental or non-governmental organizations. If farmer groups exist in all villages within a defined geography for a project, a Village Development Committee (VDC) level Biodiversity Conservation and Development Committee (BCDC) is formed with representation of all groups. If there is no existence of farmer groups, a ward level committee is formed which consists of 9 members including women, *dalit*³³ and indigenous people in all nine wards of a VDC. A VDC-level committee is formed with one representative from each ward (Shrestha and Chaudhary 2012). LI-BIRD has deployed the formation of VDC level BCDCs in its project sites (Table 4). This body ultimately implements overall CBM activities including the operation and management of a community seed bank. In terms of legal aspects of the BCDC, there is yet no legal provision for its establishment and operation. However, the representative structure of this farmers' committee can be one way of fulfilling the void of meaningful participation of farmers in local development planning. In fact, the VDC in Purkot have recognized their BCDC as an effective structure of the Agriculture, Forestry and Environment committee guided by the Local Self Governance Regulation (article 47.1 Kha).

Table 4: List of Biodiversity Conservation and Development Committees and their members

S.N.	Name of site	Type of local institution	Structure at ward level	No. of groups/sub-committee	No. of total members	No. of women members
1.	Kachorwa, Bara	Local NGO	FGs	11	385	355
2.	Belawa, Bardiya	BCDC	FGs	12	274	100
3.	Shankarpur, Kanchanpur	BCDC	FGs	9	231	118
4.	Gadariya, Kailali	BCDC	FGs	21	465	311
5.	Masuriya, Kailali	BCDC	FGs	9	414	223
6.	Pathraiya, Kailali	FGCC	FGs	15	334	173
7.	Beldandi, Kanchanpur	BCDC	FGs	11	209	95
8.	Jogimara, Dhading	BCDC	WBCDC	9	335	160
9.	Agyauli, Nawalparasi	BCDC	WBCDC	9	562	NA
10.	Rampur, Dang	BCDC	WBCDC	9	266	NA
11.	Shivagunj, Jhapa	BCDC	WBCDC	9	517	NA
12.	Purkot, Tanahun	BCDC	WBCDC	9	1194	NA
13.	Ghanteshor, Doti	BCDC	WBCDC	9	315	NA

33 Known as socalled untouchable caste

S.N.	Name of site	Type of local institution	Structure at ward level	No. of groups/sub-committee	No. of total members	No. of women members
14.	Tamaphok, Sankhuwasabha	BCDC	WBCDC	9	1425	NA
15.	Talium, Jumla	BCDC	WBCDC	9	397	140

Note: WBCDC: Ward Level Biodiversity Conservation and Development Committee, HHs: Households, FGs: Farmers' Group, NA: Not Applicable. In case of Agyauli, Rampur, Shivagunj, Purkot, Ghanteshwor, Tamaphok and Talium, the number of members denotes the number of households as the BCDCs of those VDCs consider all households of the VDC to be members of BCDC.

Develop linkage and collaboration with local government and line agencies

Community seed banks are free to independently implement their activities. Collaboration with local and national level stakeholders can strengthen their technical, managerial and financial resources, thus contributing to a long-term sustainability. It is also important to strengthen their service delivery capacity so that farming communities from a wider geographical area and a larger number of households benefit. All the community seed banks supported by LI-BIRD have been trying to develop functional collaboration with VDC, DDC, DADO, NARC and other NGOs, with varying degrees of success. Some have received land for construction of the physical structure of the community seed bank as well as support for construction materials and funding (Table 5). Furthermore, community seed banks are also functioning as learning centres for various stakeholders including the young generation, in and outside the village. It has become a venue where people can come to understand and learn about the importance of agricultural biodiversity. Since, the BCDC managing the CSB is comprised of volunteers; the operation of the community seed bank itself requires human resources to conduct seed collection, cleaning, storage, seed distribution, record keeping, fund mobilization and monitoring. Consequently, a CSB is able to generate local employment for one or two farmers with high school education.

Table 5: Spheres of collaboration of community seed banks with governmental and non-governmental organizations across Nepal

Name of organization having collaboration	Address of community seed banks	Type of support received until now
Village Development Committee (VDC)	Kachorwa, Shankarapur, Gadariya, Masuriya, Beldandi, Pathraiya, Belawa, Rampur, Purkot, Tamaphok, Jogimara, Shivagunj, Ghanteshwor, Talium (14)	Land, Funding, construction materials, recognition
District Development Committee (DDC)	Kachorwa, Jogimara, Masuriya (3)	Funding, recognition
District Agriculture Development Office (DADO)	Masuriya, Shankarapur, Pathraiya, Rampur, Shivagunj, Talium(6)	Registration of group, Source seed for seed production, Technical, recognition
Nepal Agriculture Research Council's Research Stations (NARC)	Kachorwa, Belawa, Masuriya, Talium (4)	Source seed for seed production, Technical, recognition
NGO/INGOs	Kachorwa, Masuriya, Talium (3)	Funding, technical, recognition

Source: Records of community seed banks (2012)

Development and implementation of sustaining mechanisms

In most cases in Nepal and elsewhere (see, chapter 1 of this volume), the process of establishing community seed banks is facilitated by NGO driven projects. These projects usually end after 2-4 years' technical, financial and capacity building related activities. But wherever LI-BIRD starts a community seed bank, it develops the practice to explore longer term means of support from the very beginning. Activities such as the establishment of a CBM fund, value addition and marketing, and seed production and marketing of both local and improved varieties are among several options that can contribute to sustainability. Financial resources generated from such sources are used to establish and manage diversity blocks and buy goods and services that are necessary for the community seed bank.

There are other ways to sustain community seed bank activities. For example, in the community seed bank of Kachorwa, Bara, all the users of the CBM fund have agreed to grow at least one local variety of rice for conservation and regeneration purposes. They also have the rule that all members have to conserve at least one local variety. In Gadariya of Kailali district, farmers groups have divided the responsibility of establishing a diversity block of one crop per group. The group members work collectively to maintain a diversity block. Some community seed banks have received grants from national NGOs, VDC and DDC to strengthen their technical, financial and management capacity. For example, the community seed bank of Kachorwa, Bara, received a "Using diversity research award" from the South Asia Network for Food, Ecology and Culture (SANFEC) to conduct a farmer level economic study of ecological agriculture. They also obtained a UNDP/Small grant, which helped them to strengthen their community seed bank. These are just a few examples. The point is that it is important to develop location specific mechanisms that are feasible in the local context either through market or non-market means.

Lessons learned

Since 2003, LI-BIRD has learned a good deal about community seed banking using newly gained insights for establishing new community seed banks. The experience has demonstrated that community seed banks are effective institutions for conserving local varieties and providing easy access to diverse types of seeds and planting materials to farmers. Awareness of local farmers has been central to the achievements. Experience has also indicated that when conservation activities of local varieties are coupled with income generation activities, community seed banks can operate more successfully in the long run. Another important lesson is that the establishment of a community seed bank can best be started when community people are convinced about its roles in seed security, food security and conservation of valuable plant genetic resources. Likewise, the establishment of a CBM fund and its mobilization for conservation of rare and threatened local varieties and for income generation is an important strategy to sustain the process.

Emerging issues and challenges

Despite several positive aspects of community seed banks, both farming communities who have been implementing community seed banks and LI-BIRD as a facilitating organization have faced a number of technical and policy related challenges. In community seed banks across the country, a number of local crop varieties have been collected and conserved by farming communities, but proper characterization and evaluation of those collections are largely yet to be done. Science-based technical guidelines for managing community seed banks do not yet exist despite almost 30 years of practical experience. Research on viable local seed storage structures and of seeds stored also has been scarce.

There are also a number of policy challenges associated with community seed banks, such as the absence of legal registration and recognition of community seed banks. A national agrobiodiversity policy has been in place in Nepal since 2007, but there are no acts or guidelines that support it. Furthermore, our research and extension system are promoting improved varieties and technologies without considering the loss of genetic resources. There are no incentives from the government of Nepal to support community seed banks and the farmers who have been conserving valuable plant genetic resources on-farm. Community seed bank guidelines developed and piloted by the Department of Agriculture have limited scope and mainly intend to increase the seed replacement rate. The guidelines do not say anything about existing community seed banks. At the local level, there has been good collaboration with VDC, DDC and DADO, but this is mostly on an ad-hoc basis and it is largely dependent on personal relationships. Community seed banks are struggling to obtain institutional support from local governments. The government of Nepal has established a national agriculture genetic resources centre or national genebank, but a mechanism for linking the national genebank and community seed banks is still under discussion. Linking community seed banks with the Svalbard Global Seed Vault is another issue to be discussed. Some studies have indicated that community seed banks could be an appropriate local unit for giving Prior Informed Consent to give access to genetic resources to outsiders, but such a provision has not been included in the draft act of access to and benefit sharing of the use of genetic resources.

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Annex 1 : Characteristics of community seed bank sites supported by LI-BIRD

Name of site	Geographic location	Elevation (masl.)	Annual rainfall (MM)	Mean temperature (°C)	Total no. of households	Major Inhabitants	Major crops
Kachorwa, Bara	Terai lowlands plain	80-90	1515	24.6	1418	Yadav, Jayaswal, Muslim,	Rice, Wheat, Maize, Potato, lentil
Belawa, Bardiya	Terai lowlands plain	100-300	1912	Max=19-38, Min= 6-24	2263	Tharu, Brahmin, Chhetri, Muslim, BK	Rice, Wheat, lentil
Masuriya, Kailali	Terai lowlands plain	183	1840	Max= 19-44, Min=7.5-23.5	1630	Tharu, Brahmin, Chhetri, BK	Rice, Wheat, lentil
Gadariya, Kailali	Terai lowlands plain	176	1840	Max= 19-44, Min=7.5-23.5	1404	Tharu, Brahmin, Chhetri, BK	Rice, Wheat, Lentil
Shankarpur, Kanchanpur	Terai lowlands plain	180	1770	Max= 21.5-39.4, Min=6.9-25.1	722	Tharu, Brahmin, Chhetri	Rice, Wheat, lentil
Pathriya, Kailali	Terai lowlands plain	179	1840	Max= 19-44, Min=7.5-23.5	2282	Tharu, Brahmin, Chhetri, BK	Rice, Wheat, Lentil
Beldandi, Kanchanpur	Terai lowlands plain	187	1770	Max= 21.5-39.4, Min=6.9-25.1	1721	Tharu, Brahmin, Chhetri	Rice, Wheat, Lentil
Agyauli, Nawalparasi	Inner terai lowlands plain	157	2115	Max= 38.7, Min= 5	2035	Tharu, Brahmin Chhetri	Rice, Wheat, Lentil
Rampur, Dang	Inner terai lowlands plain	776	1400	Max= 35.3, Min= 4.1	2334	Tharu, Brahmin, Chhetri	Rice, Wheat, Lentil
Shivaguri, Jhapa	Terai lowlands plain	90-140	2314	Max=25.5-35.8, Min=8.2-24.5	2691	Brahmin, Chhetri, Tajpuria, Tharu	Rice, Wheat, Lentil
Jogimara, Dhading	Mid hills	292-1770	NA	NA	1157	Chepang, Brahmin, Chhetri, Newar	Maize, Finger millet, Vegetables
Purkot, Tanahun	Mid hills	629	1694	Max= 36-38, Min=5-10	1800	Brahmin, Chhetri	Rice, Maize, Finger Millet
Ghanteshor, Doti	Mid to high hills	1770	1145	Max= 36.4, Min=4.6	375	Brahmin, Chhetri, BK	Maize, Wheat, Vegetables
Tamaphok, Sankhuwasabha	Mid to high hills	2179	2000	NA	1425	Jimi, Brahmin, Chhetri, Tamang	Maize, Potato, Finger millet, Cardamom
Taliun, Jumla	High hill	2240-3000	866	Max= 16.4, Min=3.5	923	Brahmin, Chhetri and Dalits	Rice, Barley, Finger millet, Beans, Buckwheat

Source: Baseline survey and site selection reports and http://www.cbs.gov.np/district_profile_contents.php.

Agrobiodiversity Resource Centre: The Cooperative Managed Community Seed Bank of Ranibas, Sindhuli

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Photos: Parivartan Nepal

Introduction

Genetic diversity plays a significant role in improving the food security and livelihood of humankind. Farmers have been maintaining, conserving and developing a wide array of crops since farming was started. Nepal, in terms of species richness at the global level, occupies the 25th position, while at the continental level it has the 11th position (MoPE 2000a). In the top 10 biodiversity hotspot countries of Asia, Nepal stands at the 5th, 9th and 10th positions respectively with regard to species diversity of birds, mammals, and angiospermic flowering plants (MoPE 2000b). Over 400 species of agricultural and horticultural crops and about 200 species of vegetables have been recorded (MoPE 2000a). The continuous survival of all floral and faunal diversity requires concerted efforts by local communities who are the custodians of agrobiodiversity.

The community seed bank (CSB) has emerged as an effective rural institution at the community level. CSBs strengthen farmers' access to diversity of crop genetic resources which in turn contributes to local food security of poor farmers and ensures the conservation of agrobiodiversity on farm (Shrestha *et al.* 2005, Maharjan *et al.* 2011). In 2007, the community of Ranibas Village of Sindhuli District organized a cooperative named Ranibas Organic Agriculture Cooperative Society. This Society started conserving local varieties of various crops through the establishment of an agrobiodiversity resource centre. The resource centre is functioning as a community seed bank in the village. This paper will describe the establishment process and management of the agrobiodiversity resource centre.

Historical background

Ranibas is a small village of Ranibas Village Development Committee (VDC). It is predominantly populated with Brahmin and *Chhetri* followed by the *Majhi* tribal community. Most of the people depend on subsistence farming for their livelihoods. Rice is the number one staple crop followed by maize, wheat and lentil.

In 2000/01, USC Canada Nepal started implementing a multidisciplinary community development initiative named People's Empowerment Program (PEP) at Ranibas and other 5 VDCs of Kamala River basin area of Sindhuli District. Promotion of organic farming was one of the major components of the program. Through a social mobilization process, communities were encouraged to maximize the use of local resources for farming and discouraged to use hybrid seeds, chemical fertilizer and pesticides.

In one of training sessions at Ranibas, farmers expressed the difficulty of finding seeds of many local species and varieties. They also wanted to know whether or not they could produce vegetable seeds on their farm. Considering farmers' interests and the program's previous experiences in seed production, an exercise was conducted to identify crops and varieties of vegetables for which seeds could be produced locally. During the discussion, a large amount of vegetable diversity was recorded and many of the vegetables were found to be conserved on farm. Then the program decided to build and support the community to institutionalize on farm conservation efforts through organizing the community and setting up an agrobiodiversity resource centre in 2006. Later on, it was developed as a cooperative and named "Ranibas Organic Agriculture Cooperative Society" with the following objectives:

- to supply vegetable seeds of required quantity and quality to its members according to the planting season
- to promote on farm conservation of rare and endangered species of crops
- to support poor farmers for generating income from cooperative businesses based on on farm and off farm activities.

In 2007, the program was handed over to a local NGO called Parivartan Nepal. Since then, Parivartan Nepal has been implementing agrobiodiversity focused programs in partnership with USC Canada Asia. The role of Parivartan Nepal is to provide technical guidance and financial support for strengthening the resource centre as per need basis.

The process of establishing an agrobiodiversity resource centre

The Agrobiodiversity Resource Centre, Ranibas was established as a part of long-term multi-sector community development programme running with the funding support of USC-Canada. There were more than 200 informal self-help groups formed and operational during the project period (2000-07). Among them, a group of Ranibas VDC ward no.1 came up with the vision of local seed conservation. The project encouraged them to for-

mulate and execute various activities for the promotion of local seed conservation, quality improvement and sustainable utilization. In the initial years, they only focused on conservation activities but later on, the centre planned to initiate seed production and marketing for income generation. In order to institutionalize the centre's activities, the concept of organizing members into a cooperative emerged. Finally, the Ranibas Organic Agriculture Cooperative Society was established with support from the project. The steps to establish the agrobiodiversity resource centre were as follows:

- Organization of an educational training programme focusing on the importance of local seeds, their quality improvement and management
- Identification of local seeds particularly of vegetables and cereals initially through discussion, interaction and observation
- Documentation of local crop diversity through the community biodiversity register (CBR)
- Exchange of ideas and experiences about seed conservation with relevant organizations during workshops/meetings
- Discussion amongst community members for initiating the community seed bank to be managed by themselves
- Establishment of an agrobiodiversity resource centre and organic agriculture cooperative to manage the resource centre
- Providing support for necessary infrastructure and other items (building for office space, furniture and equipment such as a grinder, weighting scales, etc.)
- Providing financial and technical support to promote utilization of local produce and seeds through running an outlet of organic products that links the community with the local market
- Support for need based capacity development activities such as formulation of appropriate norms, review meetings and establishing linkages with the market and service providers

The agrobiodiversity resource centre and conservation of agricultural biodiversity

Since its inception, the Agrobiodiversity Resource Centre has been promoting production and conservation of local crops on farm, particularly cereals, pulses and vegetables cultivated in the Kamala river basin area of Sindhuli district. Its major concern is conservation of plant genetic resources and their sustainable use. In addition, it encourages its members to adopt organic farming for livelihood improvement. As a result, the cooperative members have been producing crops and seeds by employing organic methods of production. The cooperative also assesses market potentiality for their produce and have opened up an outlet at the district headquarters to sell organic produce. Currently, it is closed because the cooperative is planning to move to their own village.

The centre has maintained 143 varieties of 43 crops (Table 1; for details, see Annex 1). Out of these, 47 varieties are reported as rare, i.e., they could have been lost in the absence of the agrobiodiversity resource centre. The cooperative has identified 32 seed producer/

saver farmers amongst its members. These members are voluntarily taking responsibility for the conservation of at least one rare local variety identified by the cooperative. There is a system of rotation of conserving rare varieties among farmers. Every year one farmer takes responsibility for one variety and then the next year that responsibility is given to another farmer. The cooperative has also formulated a detailed guideline for seed and money lending (see, Annex 2).

The profiles of seed producer/saver farmers' are kept at the centre so that everyone can know who is responsible to conserve which crop and variety. After each harvest, seed samples are replaced at the centre along with a detailed description of the year of production, the names of farmers, the names of the crops/varieties and the quantity of seed produced. The centre plays the role of mediator; if someone wants to get a particular seed the centre contacts the respective seed producer/saver farmer. The centre also sets the price for the seed of each crop and updates the price annually. If anyone needs a bulk volume of seed, he/she needs to inform the centre prior to the planting season. Because of space limitation the centre is unable to keep a large volume.

Table 1: Summary of agricultural biodiversity conserved at the agrobiodiversity resource centre

Crop category	Number of species	Number of varieties	Number of endangered varieties
Cereal	6	58	20
Legume	8	25	7
Vegetables	9	21	7
Spices	10	15	6
Root crop	6	15	6
Oil Seed	4	9	4
Total	43	143	43

Source: records obtained from community seed bank

In addition to conservation and seed production, the centre aims to find and collect local varieties that had disappeared from the area. Once seeds are collected, they are provided to interested farmers and the farmers must return double the quantity of seed originally obtained from the centre.

Management of the agrobiodiversity resource centre

All the seed producer/saver farmers are well trained in seed selection and quality enhancement. They are responsible for maintaining seed quality. However, there is a monitoring team formed amongst the cooperative members for monitoring in the field during the cropping season. The team reports directly to the executive committee of cooperative.

At present, the cooperative has assigned two members to look after the centre's activities at least 3 days of each month (i.e., the very first and last 2 days of each Nepali month). Besides this, the centre is opened when required. The assigned persons are responsible to keep all records of the resource centre. In return, the cooperative provides a minimum honorarium to them. There is a monthly meeting of the centre's members wherein they share experiences, discuss challenges and develop new plans. In addition, the members collect monthly savings which they provide to needy members on loan.

The cooperative has a total of 153 members including 77 women. It has included 16 farmers' groups in the neighbouring wards of Ranibas VDC as members. Each group is composed of 10-12 members from their locality. An inclusive executive committee has been formed through a democratic process for day to day management. The committee has 15 members, including 4 women. The committee has collected group fund of NRs. 537 000 (around 6300 US\$) as of 2011. It includes seed fund of NRs. 32 000 (380 US\$) provided by different organizations. The fund is only mobilized for seed conservation purposes. Only the seed producer/saver farmers have access to the seed fund. The centre is planning to reduce the interest rate of the group fund.

The benefits of the agrobiodiversity resource centre

The resource centre is playing a vital role in the conservation of local crops of the area through social mobilization. Its regular meetings, orientations and discussions are instrumental to encouraging community members to conserve local varieties. Members of the cooperative are receiving direct benefits from the agrobiodiversity resource centre in many ways. They have access to information on the availability of seeds, the type and quantity required for the season and who has what variety of seed. The centre informs all of its members if any new suitable variety for the area is found and/or if any variety that is lost from the region is found in other places. The centre also responds to members' request for new varieties through contacting larger networks. It serves as a good forum for discussion, and eventually enhancing seed security at the community level through conserving and promoting locally adapted crop landraces.

The centre introduced a new variety of pigeon pea named *Seto* local in the village during the year 2007. It was well suited to the local condition. Hence, it was adopted by many farmers immediately. Now, more than 5 tons of pigeon pea are produced and sold at the local market. It is one example of how the centre is contributing to increase the income of farmers.

Cooperative members receive loans from a revolving fund at a low interest rate (18% per annum) for various purposes. The lending process is simple, easy and quick. In addition, 32 seed saver farmers are involved in producing seed and have earned extra income from selling seed through the agrobiodiversity resource centre. The seed fund is utilized to encourage farmers to conserve endangered crop varieties. Besides, seed exchange amongst members and non-members is also promoted. Since the resource centre does not

have a systematic record keeping practice of seed production and distribution, it is hard to quantify how much seed of a particular variety was produced and how much was sold and exchanged within and outside community.

Sustaining mechanism of the agrobiodiversity resource centre

The centre is imbedded in a cooperative which is an active institution governed by cooperative law. The cooperative has combined regular savings and lending services for production purposes with seed conservation activities. The regular meeting for group savings activities by its members directly supports the seed related activities including seed conservation, production and marketing.

The core fund that includes savings and shared capital is providing around NRs. 100 000 revenue annually. As mentioned, there is a separate conservation fund (NRs. 32 000) allocated from the contribution of supporting organizations, viz., Parivartan Nepal and LI-BIRD.

The centre has its own office space and necessary physical resources previously developed through the support of USC. There is a strong common bond amongst the members which is an important asset for sustaining the process. These combined human, financial and physical assets are instrumental to continue the process even though there is no direct support from external agencies.

The cooperative has established linkages with local VDC, NGOs and district line agencies such as District Agriculture Development Office (DADO) and District Livestock Service Office (DLSO) to receive support and services to achieve its mission. However, the cooperative needs to increase their effort to provide more benefits to the community through their activities so that the young generation will follow them to take a lead role to sustain the organization in future.

A summary of the main strengths, weakness, opportunities and threats can be found in Annex 3.

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Annex 1: Details of crops maintained at agrobiodiversity resource centre (seed bank) at Ranibas

S.N.	Crop	# of Variety	# of Endangered Variety
Cereals			
1	Rice	42	14
2	Maize	6	2
3	Wheat	2	0
4	Finger millet	6	2
5	Sorghum	1	1
6	Foxtail millet	1	1
	Sub-total	58	20
Legume crops			
1	Pigeon Pea	3	1
2	Lentil	2	0
3	Pea	3	1
4	Black gram	3	1
5	Chick pea	1	0
6	Horse gram	1	1
7	Cow pea	6	2
8	Bean	6	1
	Sub-total	25	7
Vegetables			
1	Bitter gourd	2	1
2	Lady finger	2	1
3	Bottle gourd	2	0
4	Snake gourd	2	1
5	Egg plant	2	1
6	Pumpkin	4	1
7	Chayote	1	0
8	Sponge gourd	4	1
9	Tomato	2	1
	Sub-total	21	7
Spices			
1	Fenugreek	1	1
2	Dill <i>Shup</i>	1	0
3	Cress	1	0
4	Coriander	2	1
5	Black pepper	1	1
6	Perilla	1	0
7	Garlic	1	0

S.N.	Crop	# of Variety	# of Endangered Variety
8	Chilly	3	1
9	Ginger	2	1
10	Turmeric	2	1
	Sub-total	15	6
Root crop			
1	Yam	3	1
2	Sweet potato	2	1
3	Potato	2	0
4	Taro	6	1
5	Elephant Foot Yam	1	0
6	Cassava	1	0
	Sub-total	15	3
Oil Seed			
1	Soybean	4	2
2	Mustard	3	1
3	Linseed	1	0
4	Sunflower	1	1
	Sub-total	9	4
	Total crops 43		

Annex 2. Seed guideline of agrobiodiversity resource centre, Ranibas

Seed producer farmers' perspective:

- Seed producer farmer must meet the terms determined for seed production.
- Apart from sample seeds, farmers should store extra seeds in warehouse.
- Farmers are not allowed to sell the seeds kept in their houses without any prior information to cooperative.
- Seed producer farmer must produce seed according to the commitment made in a contract.
- Seed sample should be sent to the cooperatives as per the season.
- The seed producer farmer should take all the responsibilities for any complaints received concerning the seeds produced and sold in the market in the case of not fulfilling basic requirements set by cooperative.
- Quality and quantity of seeds determined by cooperative has to be produced.
- Farmer should inform the cooperative about the result of germination test prior to sale.
- Only climate adapted seed should be produced.
- Produced seed should be organic.
- According to the nature of seeds at least 10gm to 100kg seeds should be stored by seed producer farmer.

Rules to be considered while taking seeds from cooperative

- If a customer confirms to purchase the seed as per the seed sample, are commendation from the cooperative is required to sell the seeds to the costumer.
- Cooperative will charge 10% additional costs as service charge.
- If seed is leftover in the season, the cooperative returns those seeds to the relevant farmers.
- Endangered corps seeds can be exchanged or traded in "double system" among members. (One should return double of seed taken)

Action to be taken by cooperative

- At the time of registering a farmer's seed sample, the amount of seeds kept in farmers warehouse should also be documented in a register.
- Cooperative has to make arrangement for the distribution of seeds from farmers' warehouse.
- Cooperative will charge 10% additional costs as service charge.
- Cooperative has to form monitoring committee to monitor the seed production process and also it is responsible to get reports from monitoring committee.
- All the stored seed will not be sold, old seeds will be replaced and used for other purposes (e.g. food and feed).
- Cooperative should arrange to collect and provide the seeds of endangered and existence varieties to seed producer farmers for the purpose of seed production.
- Seeds of those varieties for which seed production cannot be done by farmers but can be grown locally. The cooperative should procure the seeds of those varieties and arrange to distribute to the farmers by keeping appropriate revenue.
- The record of seeds and seed quantity according to their growing season should be disclosed publicly to the farmers in the growing season.
- Cooperative should arrange for truthful labelling to sell seeds.
- If farmer deposits the seeds which have not fulfilled the minimum requirement while producing, the cooperative can take remedial action against those farmers but should refrain from discrimination based on caste, class, religion, gender and social status.
- Cooperative will organize promotional and dissemination activities of seeds collected in the cooperative, and prepare action plan, including seed collection of endangered species, coordinate with stakeholders, organize training and workshop etc.
- Cooperative should have prior approval from executive committee for farmer's participation in any training or workshop.
- Cooperative has to participate in district, regional or national level agriculture or seed fair and has to publish financial statement after returning from fair.
- Cost of seeds has to be determined by cooperative according to seasons. However, price will be different for group members and non-member.
- If cooperative provides seeds of extinct variety to farmers for seed production, farmers' have to return double amount of originally received.
- If non-member farmers want to produce seeds, they will be included for seed production only after subscribing as member and charging additional NRs. 51 as per the rule of cooperative.
- If any seeds are damaged for any reason during transaction from other areas, cooperative will provide compensation as per the decision made by executive committee according to availability of the fund.
- If farmers are seeking seed after the season, the cooperative will arrange to provide seasonable seeds as alternative.
- Cooperative should inform farmers about the market demand timely.
- Suggestion will be provided for planting crops according to crop calendar.
- Seeds will be distributed to the farmer with group guarantee.

Annex 3: SWOT analysis of the agrobiodiversity resource centre, Ranibas, Sindhuli

<p>Strengths</p> <ul style="list-style-type: none"> • Common bond among the members. • Own building. • Equipped with minimum equipment, furniture & materials. • Trained persons on seed related issues • Good diversity in crops and varieties. • Committed members on conservation. 	<p>Weakness</p> <ul style="list-style-type: none"> • Less skills/knowledge on Participatory Variety Selection (PVS)&Participatory Plant Breeding (PPB) • Less dynamic leadership • Lack of linkages & coordination with research centres • Not properly implied rules formulated • Less involvement of youths • Lack of fund raising skills.
<p>Opportunities</p> <ul style="list-style-type: none"> • Increasing local and outside market demand for organic products. • Increased local market for local seeds particularly vegetables. • Good diversity on crops & varieties • Good communication and transportation facilities 	<p>Threats</p> <ul style="list-style-type: none"> • Increased promotion of improved and hybrid seeds in the area recently by development organizations in recent period. • Low attraction of youths to stay in village and do farming.

The Story of Establishment and Management of a Community Seed Bank in Kachorwa Village of Bara District in Central Terai Nepal³⁴

RAMEKWAL YADAV

Agriculture Development and Conservation Society (ADCS), Kachorwa, Bara, Nepal



Photos: Pitambar Shrestha (left and bottom right)

Summary

Kachorwa village is characterized as a high potential production system and farmers have ample access to agriculture input and technologies. Farmers opted for modern agriculture input and technologies to increase farm production but this led to the loss of rice landraces from farmers' fields even though an on farm conservation of agricultural biodiversity project was underway. Thirty three rice landraces reported in the baseline study in 1998 decreased to 14 when compiling a community biodiversity register in 2003. This scenario led the project team and community to establish a community seed bank. A nodal farmers' organization called 'Agriculture Development and Conservation Society' (ADCS) was established to manage the community seed bank as well as to lead overall management of agricultural biodiversity at the community level. Since its establishment, with support from various national and international development organizations, it has developed its physical, financial, social and human capital to mobilize natural capital, i.e., plant genetic resources. The number of women groups has increased from two to nine with 380 members, including 355 women. Until now, the community seed bank has collected and conserved more than

34 Author of this chapter represents farmers' organization called ADCS, which has been managing a community seed bank since 2003. To encourage and recognize them, this chapter has been presented in Nepali language except summary.

100 local varieties of various crops. ADCS has been managing a community biodiversity management fund of nearly 1 million Nepalese rupees which has contributed to on farm conservation of landraces collected through the community seed bank and increased income of its members through income generating activities. Apart from this fund management, a saving and credit cooperative has also been established to formalize the monthly saving of its members which is nearly 2.5 million Nepalese rupees at present. Establishment of a diversity block, participatory plant breeding, seed production and marketing are other regular activities which are not only benefiting local people but are also sustaining mechanisms of the community seed bank, even if there is no support from external agencies.

कचोर्वा गाउँमा सामुदायिक बीउ बैंकको स्थापना तथा विकासप्रक्रिया

रामएकवाल प्रसाद यादव

कृषि विकास तथा संरक्षण समाज, कचोर्वा, बारा, नेपाल

परिचय

कचोर्वा गा.वि.स. नेपालको मध्यतराईमा अवस्थित बारा जिल्लाको दक्षिणपूर्वमा भारतसँग सिमाना जोडिएर रहेको छ । यहाँ पूर्णरूपमा मधेसीमूलका यादव, कलवार, मुस्लिम, साह, तेली तथा दलित जातिका मानिसहरूको बसो वास छ । यस गाउँका कृषक समुदाय तथा समूहहरूसँग मिलेर वि.सं. २०५५ देखि २०६३ सम्म जैविक विविधता, अनुसन्धान तथा विकासका लागि स्थानीय पहल (ली-बर्ड), नेपाल कृषि अनुसन्धान परिषद् (नार्क) र बायोभर्सिटी इन्टरनेशनलद्वारा इन्सिटु परियोजना सञ्चालन भएका थिए । यी परियोजनाका मुख्य उद्देश्य मूलतः कृषि जैविक विविधताका विभिन्न पक्षहरूका बारेमा अनुसन्धान गर्नु थियो । त्यसक्रममा परियोजनाको नियमित कार्यक्रमका रूपमा स्थानीय जातका बालीहरूको यथास्थानीय संरक्षणका लागि विभिन्न किसिमका जनचेतनामूलक तथा अनुसन्धानमूलक कार्यक्रमहरू सम्पन्न भए । परियोजनाको शुरूमा गाउँका सबै टोललाई समेटेर २२ वटा कृषक समूहहरू गठन गरिएका थिए तर परियोजनाले समूह परिचालनका पक्षमा आवश्यक ध्यान पुऱ्याउन नसकेकाले ती समूहहरू विस्तारै निस्क्रिय बन्दै गए । अर्कातिर स्थानीय जातका बालीहरूको संरक्षणसम्बन्धी अध्ययन अनुसन्धान तथा सर्वेक्षणहरू निरन्तर सञ्चालन भइरहेका थिए, यसैक्रममा धानका स्थानीय जातहरूको लोप हुनेक्रम निरन्तर बढिरह्यो । परियोजनाले सम्पन्न गरेको आधाररेखा सर्वेक्षणमा ३३ किसिमका धानका स्थानीय जातहरू पहिचान गरिएका थिए तर त्यसको केही वर्षपछि समुदायले सञ्चालन गरेको सामुदायिक जैविक विविधता अभिलेख अनुसार धानका १४ किसिमका जातहरू मात्र फेला परे । अर्कातिर शुरूमा गठन गरिएका कृषकसमूहहरू निष्क्रिय भएपछि पुनः दुईवटा महिला समूहहरू गठन गरिएका थिए तर ती समूहहरू स्थानीय जातका बालीहरूको संरक्षण तथा प्रवर्धनमा भन्दा पनि मूलतः बचत सङ्कलन गरी घरायसी काममा परिचालन गर्ने कार्यमा सीमित थिए । त्यसबखत महिलाहरूलाई कार्यक्रममा सहभागी हुनाका लागि धेरै सामाजिक प्रतिबन्धहरू पनि विद्यमान थिए ।

यिनै कुराहरूलाई मध्यनजर गरी वि.सं. २०५९ मंसिर महिनामा ली-बर्डका अनुसन्धानकर्ताहरू तथा सामुदायिक जैविक विविधता अभिलेख भर्न संलग्न समुदायका सदस्यहरूको सहभागितामा बसेको बैठकमा स्थानीय बालीहरूको संरक्षण तथा प्रवर्धनका लागि विभिन्न विकल्पहरूका बारेमा छलफल भयो । अन्ततः सामुदायिक बीउ बैंक स्थापना गर्नु नै उपयुक्त विकल्प हुने ठानी त्यसै अनुसार निर्णय गरियो । यस कार्यपत्रमा

कचोर्वामा सामुदायिक बीउ बैंक स्थापना गर्ने कार्य कसरी अघि बढ्यो र हाल सामुदायिक बीउ बैंकको अवस्था कस्तो छ भन्ने बारेमा चर्चा गरिएको छ ।

सामुदायिक संस्थाको स्थापना र बीउ बैंकको थालनी

कचोर्वा गाउँमा सामुदायिक बीउ बैंक स्थापना गर्ने कुरा निकै आकर्षक थियो तर त्यसैअनुसार काम गर्नु त्यतिकै चुनौती पनि । एकातिर परियोजनाको प्रारम्भमा गठन गरिएका २२ वटा समूहहरू निष्क्रिय भएका थिए भने अर्कातिर आम कृषकहरू उन्नत जात र प्रविधिको विस्तारमा निकै अघि बढिसकेका थिए । खुल्ला सिमानाका कारण उनीहरूलाई उन्नत मल, बीउ र प्रविधिमा सुलभ पहुँच पनि थियो । अतः ली-बर्डका कर्मचारीहरू र सामुदायिक जैविक विविधता अभिलेखीकरण कार्यमा संलग्न कृषकहरूसँग गहन छलफलगरी कचोर्वा गाउँका सबै टोलका प्रतिनिधि कृषकहरूको सहभागितामा वि.सं. २०६० वैशाख ९ गते कृषि विकास तथा संरक्षण समाज नामको संस्था स्थापना गरी जिल्ला प्रशासन कार्यालय कलैयामा स्थानीय गैरसरकारी संस्थाका रूपमा दर्ता गरियो ।

कचोर्वामा सामुदायिक बीउ बैंकको थालनी वि.सं. २०६० वैशाख ९ गते गरिएको हो । प्रारम्भमा परियोजनाले उपलब्ध गराएका १९ किसिमका स्थानीय जातका धान तथा केही रहुर र कोदाको बीउ समुदायका एकजना सदस्यका घरको एउटा कोठामा परालको मोर, माटाको घैला र बाँसको कोठी जस्ता कृषकहरूले बीउ भण्डारण गर्ने सामाग्रीहरूको व्यवस्था गरी परम्परागत रूपमा राखिएको थियो । कचोर्वामा सामुदायिक बीउ बैंकको थालनीका लागि परियोजनाका एकजना कर्मचारीले उनको व्यक्तिगत तर्फबाट रू. पन्ध्र सय नगदसमेत उपलब्ध गराएका थिए ।

समन्वय, सहकार्य तथा भौतिक संरचनाको विकास

कचोर्वामा सामुदायिक बीउ बैंकको थालनीको चर्चा चल्न थाल्यो । इन्सिटु परियोजनाको एक साभेदार संस्था बायोभर्सिटी इन्टरनेशनलले सामुदायिक बीउ बैंकको भवन निर्माण र संस्थागत विकासका लागि १०००/- डलर उपलब्ध गराउने निर्णय गर्‍यो । समुदायका सदस्यहरूको पहलमा गा.वि.स.बाट १ कट्टा जग्गा र रू. १२,०००/- बराबरको जस्तापाता प्राप्त भयो । अन्ततः महिला समूह तथा संस्थाका सदस्यहरूको रू. ३५,०००/- बराबरको नगद र श्रमदान सहयोगमा बीउ भण्डारण कोठा र बैठककोठाको निर्माण सम्पन्न गरियो । ली-बर्डको पहलमा सामुदायिक बीउ बैंकको क्षमता अभिवृद्धिका लागि सानफेक नेटवर्कबाट पर्यावरणीय कृषि र परम्परागत कृषिको आर्थिक पक्षको तुलनात्मक अध्ययनका लागि र यूएनडीपीको साना अनुदान कार्यक्रमबाट पनि परियोजनाहरू प्राप्त भए । यी परियोजनाहरू र कृषि विकास तथा संरक्षण समाजको आफ्नै स्रोतसमेत गरेर हाल सामुदायिक बीउ बैंकका लागि आवश्यकबीउ भण्डारण कक्ष, कार्यालय, सभाकक्ष आदि भौतिक संरचनाको व्यवस्था भईसकेको छ ।

स्थानीय बीउ सङ्कलन, संरक्षण र वितरण

स्थानीय जातका बालीहरूको पहिचान, बीउ तथा जानकारीहरूको खोजीनिती, सङ्कलन, अभिलेखीकरण र स्थानीय कृषकहरूको मागबमोजिम बीउ-उत्पादन तथा वितरण गर्नु सामुदायिक बीउ बैंकको मुख्य काम हो । वि.सं. २०६० मा सामुदायिक बीउ बैंक शुरू गर्दा धानका १९ जातहरू थिए । त्यसपछि हालसम्म पनि सामुदायिक बीउ बैंकले बीउ सङ्कलनको कार्यलाई निरन्तरता दिइरहेको छ । हालसम्म यस बीउ बैंकमा धानका ८८ किसिमका स्थानीय जातहरूको सङ्कलन र संरक्षण भएको छ । वि.सं. २०६९ देखि ली-बर्डको नुस परियोजनाको सहयोगमा फर्सी, गहत, आलस, ओल, जौ, वंगलाजस्ता कम

प्रयोगमा आएका र हराउँदै गएका बालीहरूको पनि बीउ सङ्कलन, संरक्षण र प्रवर्धनको काम शुरू भएको छ । सङ्कलन गरिएका स्थानीय जातका बीउहरू निरन्तर उत्पादन तथा कृषकहरूको मागबमोजिम सुलभरूपमा वितरण गरिन्छ । यसरी बीउ वितरण गर्दा सामान्यतया सदस्यहरूलाई डेढा चलन अनुसार र सदस्य नभएका कृषकहरूलाई सरल मूल्यमा उपलब्ध गराइन्छ ।

स्थानीय जातका बालीहरूको संरक्षणका अतिरिक्त स्थानीय कृषकहरूको आवश्यकतालाई मध्यनजर गरी कृषि विकास तथा संरक्षण समाजले उन्नत जातका बीउहरूको पनि उत्पादन तथा बिक्रीवितरण गर्ने गर्दछ । यसबाट बीउ-उत्पादन गर्ने कृषकहरू एकातिर प्रत्यक्ष लाभान्वित भएका छन् भने अर्कोतिर स्थानीय कृषकहरूले पनि तुलनात्मकरूपमा कम मूल्यमा गुणस्तरीय बीउ सजिलै पाएका छन् । यसका अतिरिक्त सामुदायिक बीउ बैंकका लागि यो कार्यक्रम दिगो आर्थिक स्रोतको माध्यम पनि बनेको छ ।

तालिका १: कचोर्वा सामुदायिक बीउ बैंकमा सङ्कलन गरी संरक्षण गरिएका स्थानीय जातका बालीहरू

बाली	जातसङ्ख्या	बाली	जातसङ्ख्या
धान	८८	गहत	१
रहर	२	आलस	१
घिरौला	२	बंगला	२
कोदो	२	जौ	१
फर्सी	२	ओल	२
		जम्मा	१०३

स्रोत: सामुदायिक बीउ बैंकसम्बन्धी रजिष्टरहरू

जैविक विविधता प्रदर्शनी क्षेत्रको व्यवस्थापन

सामुदायिक बीउ बैंकमा सङ्कलन र संरक्षण गरिएका स्थानीय जातका बीउहरूको नियमित रूपमा बीउ-उत्पादनका लागि जैविक विविधता प्रदर्शनी क्षेत्रको स्थापना गरिन्छ । यस कार्यबाट प्रत्येक वर्ष बीउ नवीकरण हुन्छ, स्थानीय बीउको माग गर्ने कृषकलाई यसैबाट बीउ दिन सकिन्छ र केही हदसम्म स्थानीय जातहरूको संरक्षणका लागि चेतना अभिवृद्धिको काम पनि हुन्छ । जैविक विविधता प्रदर्शनी क्षेत्रको स्थापना गर्दा धानका हकमा प्रत्येक जातको धान ९ वर्गमिटर क्षेत्रफलमा लगाइन्छ भने अन्य बालीहरूको प्रतिजात क्षेत्रफल बालीअनुसार फरकफरक हुन्छ । यसको सम्पूर्ण व्यवस्थापन कृषि विकास तथा संरक्षण समाजले गर्दछ ।

तालिका २: कचोर्वा सामुदायिक बीउ बैंकले उत्पादन तथा बिक्रीवितरण गरेका उन्नत जातका बीउको विवरण

वर्ष (वि.सं.)	बाली	बीउ-उत्पादन गरिएको जात	बिक्री परिमाण (के.जी.)	बीउ खरिद गर्ने कृषक सङ्ख्या
२०६४	धान	कचोर्वा-४, कचोर्वा-५, हर्दिनाथ-१	३७३२	१००
२०६५	धान	कचोर्वा-४, हर्दिनाथ-१	३४००	१२९
२०६६	धान	कचोर्वा-४, कचोर्वा-५, हर्दिनाथ-१	४२००	२२५
२०६७	धान	कचोर्वा-४, कचोर्वा-५, हर्दिनाथ-१	५६०८	१७५
२०६८	धान	कचोर्वा-४, हर्दिनाथ-१	८५००	३१५

वर्ष (वि.सं.)	बाली	बीउ-उत्पादन गरिएको जात	बिक्री परिमाण (के.जी.)	बीउ खरिद गर्ने कृषक सङ्ख्या
२०६८	गहुँ	एल.एल.-२९७	११५	३
२०६९	गहुँ	एल.एल.-२९७, आदित्य	३००	१२
२०६९	धान	कचोर्वा-४, हर्दिनाथ-१	-	-

स्रोत: बीउ-उत्पादन तथा बिक्रीवितरणसम्बन्धी रजिष्टरहरू

सामुदायिक जैविक विविधता व्यवस्थापन कोष स्थापना तथा परिचालन

स्थानीय जातका बालीहरूको दिगो रूपमा संरक्षण गर्नेकार्य निकै चुनौतीपूर्ण छ । स्थानीय जातका हरेक बालीहरूका आ-आफ्नै गुण, विशेषता र महत्त्व हुन्छन् तर आमकृषकहरूमा स्थानीय जातका बालीहरू कम फलछन् भन्ने धारणा छ । जसले गर्दा धेरै कृषकहरूले वर्षौंदेखि खेती गर्दै आएका स्थानीय जातका बालीहरू खेती गर्न छाडिसकेका छन् । यस्तो अवस्थामा सामुदायिक बीउ बैंकको स्थानीय जातहरूको यथास्थानीय संरक्षण गर्ने कार्य चुनौतीपूर्ण बनेको हो । यो चुनौतीको सामना गर्न इन्सिदु परियोजनाको अन्त्यतिर सामुदायिक जैविक विविधता व्यवस्थापन कोषको अवधारणाको विकास गरिएको हो । जसअनुसार प्रारम्भमा कृषि विकास तथा संरक्षण समाज र स्थानीय महिला समूहहरूको रू २५,०००/- र ली-बर्डको रू ५०,०००/- को आर्थिक सहयोगमा एउटा कोषको स्थापना गरियो । कोषको रकम समूहमा आबद्ध निम्नवर्गका कृषकहरूलाई प्राथमिकता दिई ऋणका रूपमा कम ब्याजदरमा (वार्षिक १२ प्रतिशत) उपलब्ध गराउने र ऋण लिने कृषकहरूले उक्त रकम विशुद्ध आयआर्जनको काममा लगानी गर्नुपर्ने प्रावधान अनुसार परिचालन गर्न थालियो । यसका अतिरिक्त ऋण लिने कृषकले सामुदायिक बीउ बैंकमा संरक्षित स्थानीय जातको एउटा बाली रोप्नुपर्ने नियम पनि बसालियो । यसबाट एकातिर निम्नवर्गका कृषकहरूको आम्दानी बढ्यो भने अर्कातिर स्थानीय जातका बालीहरूको संरक्षणको सुनिश्चितता पनि भयो । आफ्नो खेतबारी नहुने सदस्यले पनि घरवरिपरि रहर वा घिरौंला तथा अन्य उपयुक्त बाली लगाउनुपर्ने हुन्छ । यस कोषमा हालसम्म ली-बर्डबाट रू १४०,०००/- यूएनडीपीको साना अनुदान कार्यक्रमबाट रू ३,२९,२५०/- महिला समूहहरूबाट रू ६०,०००/- र ब्याज रू २,१४,७५०/- समेत गरी जम्मा रू ७,३६,०००/- पुगेको छ । यस कोषबाट लाभान्वित हुने कृषकहरूको विवरण निम्न तालिकामा प्रस्तुत गरिएको छ :

तालिका ३: कचोर्वा गा.वि.स.मा सामुदायिक जैविक विविधता व्यवस्थापन कोष परिचालनबाट लाभान्वित हुने कृषकहरूको विवरण

वर्ष (वि.सं.)	ऋण रकम रू	लाभान्वित सदस्यसङ्ख्या
२०६२	७५,५००/-	२६
२०६३	१,५०,०००/-	३५
२०६४	२,५५,२३५/-	६८
२०६५	४,४८,०००/-	९२
२०६६	५,००,०००/-	१००
२०६७	५,७५,०००/-	११५
२०६८	६,३४,०००/-	१२२
२०६९	७,३६,०००/-	९२

स्रोत: सामुदायिक जैविक विविधता कोष परिचालनसम्बन्धी रजिष्टरहरू

संस्थागत विकास तथा महिला सशक्तीकरण

कचोर्वा गाउँमा कृषि जैविक विविधता संरक्षणका लागि संस्थागत संरचनाको राम्रो विकास भएको छ । कृषि विकास तथा संरक्षण समाजका बहुसङ्ख्यक सदस्यहरू कृषि जैविक विविधताको महत्त्व र यसको यथास्थानीय संरक्षणका बारेमा सचेत छन् । सामुदायिक बीउ बैंक, सामुदायिक जैविक विविधता व्यवस्थापन कोष, मासिक बचत सङ्कलन तथा परिचालनजस्ता कार्यक्रमहरूले गर्दा महिला समूहको सङ्ख्या २ बाट १० पुगेको छ । ३८० जना सदस्यहरूमध्ये ३५५ जना त महिलाहरू मात्रै छन् । सदस्यहरूको मासिक बचत रकमलाई वैधानिकता र व्यवस्थित रूपमा परिचालनका लागि दिगो कृषि बचत तथा ऋण सहकारी संस्थाको स्थापना गरिएको छ । हालसम्म सहकारीमा ऋण पूँजी रू १४,६७,९९१/- पुगेको छ भने रू ४१,२१७/- जगेडा कोषमा राखिएको छ । व्यवस्थित रूपमा सञ्चालन गरिएको यो सहकारी स्थापनाको दुई वर्षमा नै जिल्लामा उत्कृष्ट सहकारी बन्न सफल भएको छ ।

धानमा सहभागितामूलक बाली प्रजनन कार्यक्रम

नार्क र ली-बर्डका वैज्ञानिकहरू तथा कृषकसमूह मिलेर इन्सिटु परियोजना अवधिमा धानका स्थानीय केही जातहरूमा शुरू गरिएको सहभागितामूलक बाली प्रजनन कार्यक्रमबाट स्थानीय जातको गुण भएको उन्नत जातको विकास भएको छ । विकास भएका जातहरूमध्ये कचोर्वा-४ सबैभन्दा राम्रो मानिएको छ र ली-बर्डले राष्ट्रिय स्तरमा सिफारिसको प्रयास गरिरहेको छ । बीउ-उत्पादन कार्यक्रममार्फत प्रत्येक वर्ष कचोर्वा-४ को बीउ-उत्पादन र बिक्रीवितरण भइरहेको छ ।

सामुदायिक जैविक विविधता व्यवस्थापनको स्रोत केन्द्रका रूपमा कचोर्वाको पहिचान

कृषि विकास तथा संरक्षण समाज यसको स्थापनाकालदेखि नै ली-बर्डको साभेदार संस्थाका रूपमा कार्यरत छ । गा.वि.स./जि.वि.स., नेपाल कृषि अनुसन्धान परिषद् र जिल्ला कृषि विकास कार्यालयसँग पनि निरन्तर समन्वयमा छ भने परस्पर सेवा नेपाल र यू.एन.डी.पी./साना अनुदान कार्यक्रमसँगको साभेदारीमा एक-एक वटा परियोजना सम्पन्न भइसकेका छन् । हालसम्म नेपालभित्रबाट ५२ वटा र अन्तर्राष्ट्रिय स्तरबाट ११ वटा भ्रमण टोलीले यहाँको सामुदायिक बीउ बैंकको भ्रमण गरिसकेका छन् । यी भ्रमण टोली मूलतः ली-बर्डमार्फत आएका हुन् । अतः कचोर्वा गाउँ र कृषि विकास तथा संरक्षण समाजले सञ्चालन गरेका सामुदायिक जैविक विविधता व्यवस्थापनका कार्यक्रमहरूले गर्दा कचोर्वा गाउँले स्रोतकेन्द्रको रूपमा पहिचान पाएको छ ।

सामुदायिक बीउ बैंक दिगोपनाका आधारहरू

सामुदायिक बीउ बैंक दिगो रूपमा कसरी सञ्चालन गर्न सकिन्छ भन्ने कुरा धेरैका लागि चर्चाको विषय हुन सक्छ । तर कृषि विकास तथा संरक्षण समाजले भने यसको दिगोपनाका लागि प्रशस्त पूर्वाधारहरू तयार गरिसकेको छ । किनभने यसका सदस्यहरू संरक्षणप्रति प्रतिबद्ध छन् कृषि जैविक विविधता संरक्षण वर्तमान तथा भविष्यको खाद्यसुरक्षाको आधार हो भन्ने कुरामा एकमत छन् । संस्थाका बहुसङ्ख्यक सदस्यहरू युवापुस्ताका छन् र उनीहरूको नेतृत्व विकास प्रक्रियामा संस्थाले पूर्ण सहभागिता जनाएको छ । त्यसै गरी सामुदायिक बीउ बैंकले सहभागितामूलक बाली प्रजनन कार्यक्रमबाट विकास भएका र स्थानीय स्तरमा बढी माग भएका उन्नत जातका बालीहरूको बीउ-उत्पादन तथा बिक्रीवितरण गर्दछ, जसबाट सामुदायिक बीउ बैंकले नियमित रूपमा आयआर्जन गर्दछ । त्यसै गरी अर्को महत्त्वपूर्ण काम

भनेको सामुदायिक जैविक विविधता व्यवस्थापन कोषको सञ्चालन हो । यसबाट पनि संस्थाले ब्याजका रूपमा नियमित आयआर्जन गर्दछ । यसका अतिरिक्त कृषि विकास तथा संरक्षण समाजले सामुदायिक बीउ बैंक स्थापना गर्दादेखि नै गा.वि.स. तथा जि.वि.स. बाट पनि समय-समयमा सहयोग तथा कार्यक्रम पाइरहेको छ । तसर्थ यी सबै कार्यहरू सामुदायिक बीउ बैंकको दिगोपनाका आधारहरू हुन् ।

सामुदायिक बीउ बैंकका समस्या, चुनौती र समाधानका उपायहरू

सामुदायिक बीउ बैंक भट्ट सुन्दा निकै आकर्षक लाग्छ तर त्यसका चुनौतीहरू पनि प्रशस्तै छन् । प्रथमतः कुनै पनि राष्ट्रिय नीति तथा कार्यक्रमले सामुदायिक बीउ बैंकलाई छुन सकेको छैन । बाली विकास निर्देशनालय अन्तर्गतको सामुदायिक बीउ बैंकसम्बन्धी कार्यक्रम तथा निर्देशिकाले बाली विकास निर्देशनालयले सीमित जिल्लामा सञ्चालन गरेका सामुदायिक बीउ बैंकहरूलाई मात्र समेटेको छ । कृषि जैविक विविधता नीतिमा पनि यससम्बन्धी कुराहरू पर्न सकेका छैनन् । तीबाहेक स्थानीय स्तरमा पनि स्थानीय बीउप्रति आम कृषकहरूको चासो र चाहना घट्दो छ । सामुदायिक बीउ बैंकको दिगो सञ्चालनका लागि आवश्यक आन्तरिक आर्थिक स्रोतहरू त छन् तर सीमित तथा साना आकारका छन् । सदस्यहरूले प्रायः जसो बिना पारिश्रमिक काम गर्नुपरिरहेको छ । अभै धेरै कृषकहरूको चाहना हुँदाहुँदै पनि कचोर्वाका बहुसङ्ख्यक कृषकहरूलाई यस कार्यक्रममा समावेश गर्न सकिएको छैन ।

अतः यथाशक्य कृषि जैविक विविधता संरक्षणसँग सम्बन्धित सरकारी तथा गैरसरकारी निकायहरूले हालसम्म सामुदायिक बीउ बैंकहरूले गरेका कामहरू समेटिने गरी कृषि जैविक विविधता नीतिमा परिमार्जन गर्नु अत्यावश्यक देखिन्छ । दोस्रो सामुदायिक बीउ बैंक तथा राष्ट्रिय कृषि आनुवंशिक स्रोत केन्द्र अर्थात राष्ट्रिय जीन बैंक र सामुदायिक बीउ बैंकका बीचमा समन्वयका लागि राष्ट्रिय जीन बैंकले आवश्यक पहल गरी वार्षिक रूपमा कार्यक्रम तथा निश्चित बजेट विनियोजन गरिनु अत्यावश्यक छ । यसबाट सामुदायिक बीउ बैंकमा आबद्ध कृषक तथा स्थानीय समुदायका साथै समग्र राष्ट्रकै हित हुने कुरामा दुई मत हुन सक्दैन ।

सन्दर्भसामग्रीहरू

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Oxfam's Experiences with Supporting Community Seed Banks to Enhance Local Seed Security

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Photos: Oxfam, Nepal

Background

Availability and use of quality seeds can play an important role in increasing agricultural production and productivity thereby contributing to improved food security. However, poor availability and access of bountiful quality seeds is a key constraint to agricultural productivity, especially for farmers who are residing in remote areas of Nepal. Traditionally, farmers in remote areas retain seed from each harvest thus maintaining local genetic materials while reducing the need to buy seeds every season. But this practice also hampers the introduction and use of new varieties and can result in a decline of seed quality in many areas following a poor harvest. Moreover, lack of improvements in seed storage at the farmers' level accounts for considerable storage losses (up to 20%). Considering this as a pertinent issue, since 2009, Oxfam and its partners imbedded the community seed bank (CSB) approach in Oxfam's Sustainable Livelihood and Food Security (SLFS) programme to provide a community managed 'social safety net' for seeds.

The CSB model promoted by Oxfam

Community seed bank is a community-led seed management approach (production, collection, processing, storage, exchange and marketing), which serves both local crop

varieties and improved varieties, thus enhancing local seed security. A key outcome of such an approach is the strengthening of local capacity to produce, multiply and manage adequate quality seed that will provide a sustained model for community-based management of this key food security asset.

Community seed banks promote retention of quality seed that is screened on 'deposit' and augmented by improved multiplied seed; improved storage reducing losses due to rodents, insects and moisture; and improved access to different seed (crops and varieties). Farmers will be able to spread storage risk between their home and the community seed bank and be able to 'borrow' seed when needed (including different varieties). This provides the opportunity for the farmers to try new crops or cropping strategies, or simply use different seeds of the same crops. The approach makes use of a multi-stakeholder approach by engaging farmers, Village Development Committees (VDCs), district line agencies and the private sector (local seed suppliers and traders) in the development process. The advantage of involving local suppliers is an injection of cash into the local economy, utilization of locally adapted seeds, more competitive prices and increased integration of small farmers into the local seed market, which also stimulates the development of the seed market. The pricing mechanism during seed transaction is agreed upon in coordination with the District Agriculture Development Office (DADO), District Chamber of Commerce and Industries (DCCI) and farmers, keeping the market fluctuation and subsidized rates in concern. Figure 1 depicts the model used by Oxfam.

Community seed banks therefore play a vital role in ensuring seed security and improving farmers' access to seeds, developing entrepreneurship, conserving agricultural biodiversity and associated traditional knowledge and providing options for adapting to climate change. The specific objectives of community seed banks are to:

- promote easy access of community members to quality seeds of preferred crop varieties and associated technologies
- establish a resource centre in the community for quality seeds and information
- conserve local crop varieties
- empower community and increase social cohesiveness

The process of CSB establishment

Prior to establishing a community seed bank, a participatory assessment of food security and agricultural development is done which helps to identify gaps and opportunities. An assessment of the local seed system is considered to be an integral part of such a study. In Oxfam's working areas, the following steps were employed to establish a community seed bank.

Step 1: Orientation and community sensitization

Step 2: Identification of seed producing farmers and formation of a seed producers group

- Step 3:* Establishment of a seed management committee consisting of 5-7 members (members of community seed producers and the producers group are eligible to become members of such committee)
- Step 4:* Capacity building of the committee members on both technical and administrative aspects
- Step 5:* Formulation of operating guidelines, regulations and development of a seed production and management plan
- Step 6:* Registration of seed management committee at DADO and formulation of steering committee for quality assurance (Coordination with regional seed laboratory to adopt seed quality control mechanisms, including monitoring visits)
- Step 7:* Production of seed at the local level as per the plan
- Step 8:* Construction of a community seed bank structure (using locally available materials as far as possible)
- Step 9:* Equipping the structure with storage bins, mini seed processors and weighing machine (value addition options)
- Step 10:* Collection of quality seeds by various means, including purchasing from contact farmers (For storage facilities minimum charge or guarantee is taken, generally one of the following):
- On fixed price
 - Exchange
 - On loan (payment after harvesting)
- Step 11:* Documentation of deposits to and withdrawals of seeds from the bank and seed stocks in the CSB
- Step 12:* Establishing linkages and collaboration with governmental and non-governmental organizations (collaboration to adopt seed quality control mechanisms)
- Step 13:* Improving affiliation with existing or a newly formed cooperative
- Step 14:* Monitoring impacts of community seed bank interventions

Note: These steps are not necessarily followed in this order and some of them can be accomplished simultaneously.

Functioning of community seed banks

Community seed banks are established either in the community or at the VDC level based on the preferences of the communities and other local stakeholders. The VDC level seed banks play a coordinating role to link the network of community level seed banks and provide services to seed producers/keepers at the community level. All community and VDC level CSBs/Cooperatives have their own three years business plans. Cooperatives are registered through the District Agriculture Development Office in the respective Regional Cooperative Division Office. Each community seed bank is managed by a Seed

Management Committee (SMC) selected from the seed producer group which consists of 5 to 7 members. Seed producer farmers are selected based on criteria such as willingness to participate, teach, learn and continue the production, gender and commitment to run the enterprise by managing quality and quantity of seeds. Each SMC receives trainings in both technical and administrative aspects of seed management and also receives support to develop the operating guidelines and regulations for operation of the seed banks. At cooperatives there is a CSB sub-committee. Monitoring of CSBs is coordinated by this sub-committee, focusing on documentation of seed deposits and withdrawals from the banks by the beneficiaries, seed stocks (variety, quality and quantity) and adherence to the operating guidelines and regulations.

Strong linkages and collaboration with governmental and non-governmental organizations (Collaboration with regional seed laboratory to adopt seed quality control mechanisms, e.g., certification, quality, and truthful labels) are fostered by cooperatives.

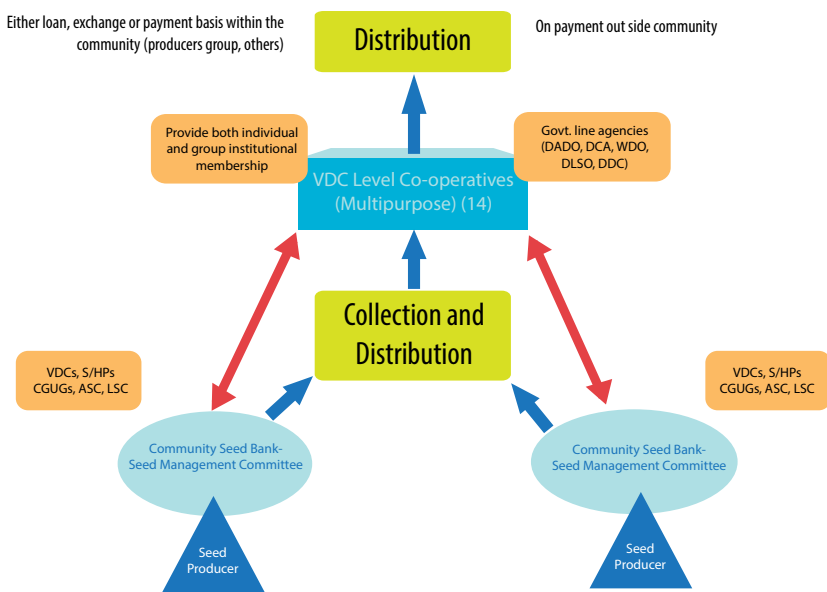


Figure 1: Community seed bank operation and management model adopted by Oxfam

Note:- DADO: District Agriculture Development Office, DCA: , WDO: Women Development Office, DLSO: District Livestock Service Office, DDC: District Development Committee

Status of Oxfam supported CSBs

There are 90 community seed banks in two districts (25 in Dadeldhura and 65 in Dailekh). 14 of these are at the VDC level (5 in Dadeldhura and 9 in Dailekh) under SMC management and are registered as cooperatives in the Regional Division Cooperative Office with facilitation support from the District Agriculture Development Office. The average cost of infrastructure construction and required equipments for a CSB was about NRs four hundred thousand which was done in collaboration with local community organizations and other stakeholders. Out of the total cost, community forest user's groups (CFUGs) contributed 20%, local communities contributed 13% in kind for the purpose and the project supported a remaining 67% of construction costs.

Lal Bahadur Oli (48) of Jharkanda community says, "With establishment of a seed bank in our community, we have stored 700 kg wheat (WK-1204) and 150 kg pea (Sikkim local) in the seed bank. A sum of 200 kg wheat was distributed to farmers last September and the rest is in the process. Therefore, there has been a huge improvement in seed storage and we don't have to go to our neighbours to borrow seeds, as we are able to obtain them from our seed bank and plant them on time. Moreover, we obtain quality seeds with no rodent affect."

The community level seed banks are equipped with a total of 797 metal seed bins with 100-300 Kg capacity and a total of 60 *Dolias* (locally made bamboo seed containers) to store seeds. The VDC level seed banks are equipped with more equipment apart from seed bins, such as weighing machine sets (36 in total), corn cellars, jute sacks (1000 pieces), 150 sprayers (plastic and metallic), seed treating drums (9) and sprinklers (140) and insecticides/pesticides against rodents/pests which are used by farmers groups and controlled by SMCs as required in the CSBs. Apart from machinery, these are also equipped with stationeries (registers, safe box, markers, etc.) to keep record of seed transactions. The community seed banks at the VDC level have been storing an average 40.45 MT/year of seed and those at the community level have been storing on average 20 MT/year of improved variety seeds of different crops (maize, paddy, peas, beans, wheat, ginger and groundnut). The improved seeds are of superior quality with higher productivity potential. Oxfam and DADO have provided source seed of these improved varieties to seed producing farmers. Out of 90, 76 CSBs are established in a simple wooden house and some are placed in a lead farmer's or seed keeper's house. Some of them are collectively used as seed bank and Participatory Learning Centers³⁵ (PLCs). A total of 8592 households (26% *Dalits* and 20% *Janjati*) directly benefitted from constructed seed banks.

Impact

It was observed that most of the village level seed banks are operating well and have already started buying seeds from seed producing farmers, who are contracted to produce agreed crop varieties and sell them to the farmers in their respective villages. In addition, the CSBs are also selling seeds to district level seed cooperatives and development agencies

³⁵ PLC is the forum for local people, especially women, to discuss their own issues and plan their activities to secure their rights along with other developmental agendas.

operating in nearby districts. For instance, the seed bank of Dewal Divyapur sold maize seeds to Dadeldhura Farmers' Cooperative (Dafacos) and the Seed bank of Jogbuda sold wheat seed to an NGO called RUDES, Baitadi.

Establishment of seed banks has increased the access of the target households as well as other beneficiaries of nearby villages to improved varieties and better quality of seeds. As per the baseline survey carried out by Oxfam in 2011 in 14 VDCs of Dailekh and Dadeldhura districts, only 16.1% of farmers were using improved cereal seeds. After the intervention of the project, it was reported in the End of Action Evaluation (EAE) that 100% of the target households had access to improved cereals in 2011. The seed banks established in targeted VDCs have significantly reduced the loss of seeds in storage (due to rodents, pests and dampness) to less than 15% as compared with 25-30% in traditional seed management practice.

The process has empowered the community with regard to management, use and marketing skills. There is a strong realization of improved farmers' capacity in seed management skills/ practices, seed preservation, storage and post-harvest techniques. From seed sales, farmers earned a total of NRs 4 851 161 which ultimately improved the village economies and increased the purchasing power of these groups. They were able to spend more on their household expenses, nutritious food, and on the health and education of their children from this income.

Most of the CSBs have already established linkages and coordination with government bodies, non-government organizations and the private sector within and outside their own districts. This has increased support from those entities as well as trading opportunities.

Farmers and farmers' groups visit community seed banks for seeds, technical input/advice and facilitation of savings and credit schemes, hence, CSBs are becoming key institutions in the communities.

Sustaining mechanism

The following measures have been taken as sustaining mechanisms for community seed banks:

- Community seed banks are linked with farmers' groups and with VDC level cooperatives for marketing and access to services and inputs.
- Registration of farmers groups and cooperatives with DADO and cooperative division from whom they receive substantial technical support and regular monitoring by DADO and Cooperative division.
- Funds generated from selling produced seeds to other communities/cooperatives/ agro vets/NGOS, etc., are being used as a credit facility to farmers.

- CSBs not only increased coordination with government bodies, but also with private sector actors within and outside districts. These linkages have expanded the horizons of the farmers for trading opportunities for their agricultural products.

Challenges

In spite of great scope and importance of community seed banks, there are some challenges:

- Self-sustainability of community seed bank due to lack of fund
- Inadequate capacity and knowledge of farmers in managing seeds
- Inadequate technical skill to maintain seed quality
- Inadequate storage facilities
- Inadequate market linkage for farmers' seeds
- Shortage and poor quality of foundation seed
- High dependence on NGOs or a few dedicated farmers

Recommendations

To fully reap the benefits of CSBs in enhancing farmers' access to and control of seeds, as well as their contribution to managing seed systems, we recommend that:

- The CSB approach is one of the best mechanisms to improve food security by improving seed quality and conserving local seed stock and knowledge. Thus out-scaling of CSBs is needed to reach as many farmers as possible, especially in marginalized areas. We need to adapt mechanisms to share experiences of the CSB development process with interested farmers, farmers' groups and communities.
- CSBs should be included in government agriculture development and food security strategies as a vehicle to improve food security and adaptation to climate change.
- More extension services should be provided for sustainable market linkages of seeds at the national level.
- Regular support should be provided to CSBs for quality assurance of seeds.

Policies and Procedures for Implementing Community Seed Banks in Nepal

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Photos: Pitambar Shrestha (left), Chandra Gurung (bottom right)

Introduction

The Seed Replacement Rate (SRR) of major cereal crops (rice, maize and wheat) was only about 7 % during the year 2008 in Nepal (CDD, 2008/2009). The Crop Development Directorate (CDD), which is the main responsible organization for the seed production program under Department of Agriculture, found two major reasons for the low SRR. Seed production programs were thought to be important to improve SRR by making improved seeds available at the farmers' level so that more and more farmers can benefit. However, the major problem found to be addressed in the seed production programs was the problem of seed storage and seed used as food because of the presence of a majority of subsistence level farmers. On the other hand, local varieties that play a vital role in the food security of subsistence farmers were found to be vanishing at a fast rate. Hence, emphasizing only improved varieties may accelerate the rate of disappearance of local varieties.

The Crop Development Directorate felt the need to implement a program that could resolve all these problems ranging from seed production and distribution of improved varieties to conservation of local varieties. To address these challenges in the light of improving agricultural systems of poor, marginalized and subsistence farmers, the Government of Nepal endorsed the concept of the Community Seed Bank (CSB) through the budget speech of 2008/09. CSBs were thought to be effective to improve farmers' access to quality seeds. The program was implemented in the fiscal year 2008/2009.

Initially, the CSB programme was piloted in three districts, viz., Dadeldhura, Sindhupalchok and Okhaldhunga. From 2011/2012, two more districts viz. Gulmi and Jajarkot were added in the programme.

Purpose of community seed banks

The main objective of CSBs are to enhance access, exchange, use and management of quality seeds according to the preferences of farmers produced, processed and stored locally in a community undertaking.

Specific objectives of CSBs are:

- to establish and strengthen community seed banks to carry out collection, storage and exchange of quality seeds
- to develop community managed infrastructure, such as seed storage house, seed processing plant, threshing floor etc.
- to introduce formal seed quality control systems (seed certification, quality declared seed and truthful labelling) as a joint action by farmers and Regional Seed Testing Laboratories (RSTL)
- to promote conservation and utilization of local landraces
- to improve farmers' access to quality seeds, especially to *Dalit*, ethnic groups, women and conflict affected households

The scope of community seed banks

The community seed bank programme implemented by Department of Agriculture (DoA) mainly focuses on food security, but it emphasizes the conservation of landraces simultaneously. Thus, it is a mixed model, focusing on the circulation of improved varieties to enhance their availability which in return will improve food security status. In addition, conservation of endangered local varieties is also an important activity of a CSB.

Process of establishment of community seed bank

Setting up a CSB requires rigorous work by dedicated people to ensure expected outputs. As suggested in the CSB implementation guidelines, the following steps are employed to initiate community seed banks (see, Figure 1 for a schematic representation):

Step 1: *Sharing of CSB operational guidelines with stakeholders*

The procedure begins with the organization of half-day orientations and consultative workshops for major stakeholders. Finalization and the approval process are initiated at local level after this workshop.

Step 2: *Orientation Training for DADOs on the procedures of establishing a CSB*

Orientation training on setting up a community seed bank is organized for DADO staff. Participants are trained on the various aspects of establishing a

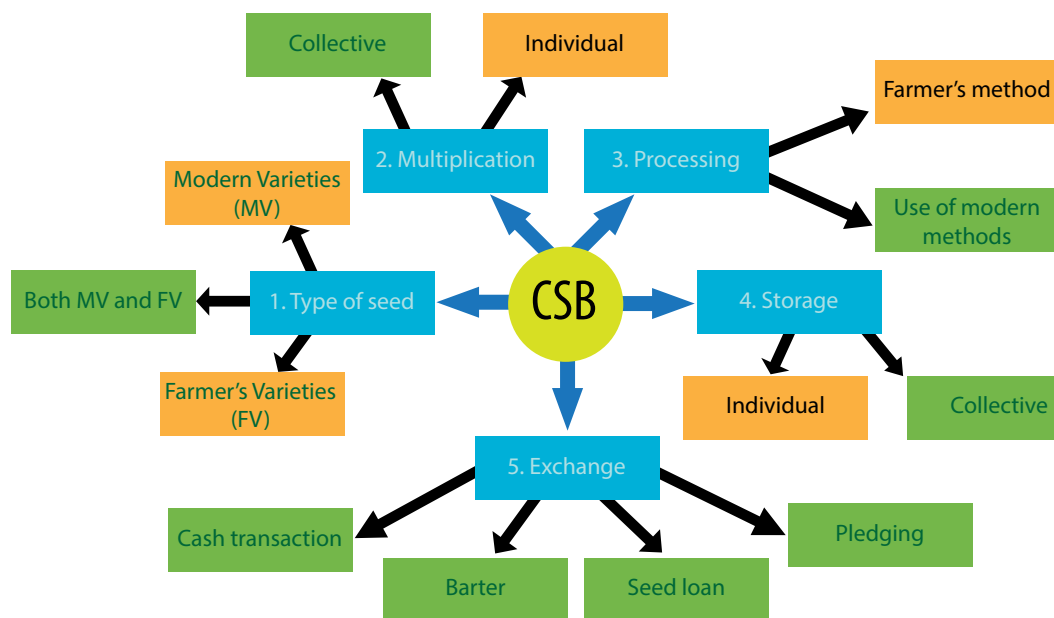


Figure 1: Modality for setting up a community seed bank (CDD, 2010/11)

community seed bank such as VDC and community selection, training to be provided, facilities to be developed, arrangements for seed multiplication, collection, cleaning, storage and exchange, including social mobilization.

Step 3: Selection of VDCs and Community for CSB

After the training, DADOs identified VDCs and communities for establishing CSB. Criteria set out in the strategy are used to identify VDCs and communities. Social inclusion is ensured during this stage by giving priority to socially marginalized groups.

Step 4: Formation of Community Seed Producer Groups (CSPG) and a Community Seed Bank Committee

A village level awareness raising workshop involving all potential beneficiaries is organized and the importance of seeds and CSBs discussed at local level. After this, CSPGs are organized at the village level, consisting of 20-25 members. From the representation of CSPGs, a CSB Committee is formed at the VDC level. The CSB-Committee will later be developed into a cooperative.

Step 5: Support and subsidies

Support for seed store house construction, seed processing equipment purchases and seed revolving funds are provided as provisioned in the CSB implementation guideline. The costs of the establishment and management are presented in Annex 1.

Step 6: Capacity building training to CSPG and CSB Committee

Capacity building training is provided to the members of CSPGs and the CSB Committee on the social and technical aspects of seed multiplication, collection, cleaning, storage, seed quality control and seed exchange.

Components of community seed banks

Seed and variety mapping

This exercise aims at identification of the locally important landraces and improved varieties that are suitable to local agroclimatic and socio-economic conditions. Participatory rural appraisal exercises are carried out to prepare a list of local and improved varieties.

Implementation of the Participatory Variety Selection (PVS)

To provide community an opportunity to select suitable varieties of their own preference and need, at least two PVS trails in each CSPG are implemented and local, released and promising varieties are displayed through PVS trials.

Implementation of seed multiplication

Seed multiplication is initiated after identification of the varieties suitable to local conditions. In the case of improved varieties, source seeds of the listed varieties are made available from Nepal Agricultural Research Council (NARC) and DoA farms.

Seed quality control

Seed quality control trainings are provided to the members of CSPGs and the CSB Committee to promote farmers as seed technicians who will be responsible for assisting members in seed production and quality control. In the meantime, seed technologists from Regional Seed Testing Laboratories (RSTLs) provide field inspection, seed testing and certifications to the CSPGs.

Seed collection or purchase

After the minimum field standards are met, seeds are collected by the CSB Committee from its members. Seed pledging is introduced, seed storage fees are decided and minimum seed prices for purchase are fixed by CSB Committee.

Seed processing and storage

A community store house is constructed under the ownership of CSB Committee. The CSB is supported with processing equipment as needed, including threshing, drying and cleaning floor. After collection from individual members, seeds are dried, cleaned, packaged and stored in the community storage house. Regular monitoring and seed treatment are carried out after seeds are stored. Seed samples are regularly sent to the RSTL for seed testing and analysis.

Seed exchange and distribution

Seed exchange is the most important function of CSB. Through seed exchange, seed security, or the on-going availability of seeds during planting time, drought, flooding, etc., is assured. Multiple approaches are introduced to facilitate seed exchange and ensure poor and marginalized farmers' access to quality seeds. Farmers can borrow good crop varieties from the seed bank, which they must repay. Seed barter involves the exchange of seed with the equal or additional amount of seed to be decided by the CSBC. Free distribution of seed may be provided as a government subsidized relief package. Lastly, seed may be purchased at prices determined by community members.

Biodiversity conservation

Study, research, selection and production of landraces are done in coordination and collaboration with the national genebank, NARC.

Training and workshops

Trainings on seed production, post harvesting and marketing are conducted to enhance farmers' capacity. In addition, workshops are also organized to increase knowledge, linkage, coordination and collaboration amongst CSB members and stakeholders.

Monitoring, evaluation and reporting

Arrangement of regular field monitoring and reporting by DADO and District Development office (DDC), Regional Agricultural Directorate (RAD), and DoA is done and a system of documentation of the monitoring reports is established at the central level.

Collaboration, partnership and linkages

The Community Seed Bank Guidelines identifies a total of 13 actors that have a role to play in the process, as detailed in the following table.

S.N.	Institution	Responsibilities
1.	Community seed producer groups	<ul style="list-style-type: none">• Seed production of suitable varieties• Provide produced seed to CSB for storage• Maintain seed quality
2.	Community seed bank committee	<ul style="list-style-type: none">• Help seed producing groups to make annual work plan• Monitoring and evaluation• Provide technical service to seed producing groups.• Invest a minimum 10% of the total cost of the programme

S.N.	Institution	Responsibilities
3.	District Agriculture Development Offices (DADO)	<ul style="list-style-type: none"> • Help in making work plan • Provide services to seed producing groups • Seed revolving fund mobilization • Reporting to the Crop Development Directorate (CDD) and related institutions • Technology transfer (training, demonstration, workshops, etc.) • Manage source seed • Record seed statistics of the districts • Coordination in marketing of seed • Monitoring and evaluation
4.	District Development Committee (DDC)/ Village Development Committee (VDC)	<ul style="list-style-type: none"> • Coordination • Monitoring and evaluation • Mobilization of fund and resources on the basis of the needs and priorities of the district
5.	Agrovets and private seed distributors	<ul style="list-style-type: none"> • Seed market management • Monitoring and evaluation as well as training management
6.	Regional Agriculture Directorate	<ul style="list-style-type: none"> • Monitoring and evaluation • Provide administrative services
7.	SQCC/ Central Seed Testing Laboratory/ RSTLs	<ul style="list-style-type: none"> • Field inspection and certification • Seed testing and reporting • Seed storage and processing inspection • Monitoring
8.	NGOs/INGOs	<ul style="list-style-type: none"> • Program execution on seed group formation and mobilization • Social mobilization
9.	NARC	<ul style="list-style-type: none"> • Provide source seed as per demand • Conduct participatory research • Testing and selecting local landraces • Monitoring and evaluation
10.	DoA/CDD	<ul style="list-style-type: none"> • Coordination at the central level • Program norms and guidelines preparation • Support in making annual program • Reporting to DoA and Ministry • Administrative support • Community institutions and NGO selection
12.	National Seed Board (NSB)	<ul style="list-style-type: none"> • Services related to seed policy • Seed balance sheet preparation and coordination for seed demand and supply • Monitoring and evaluation
13.	Ministry of Agriculture Development (MoD)	<ul style="list-style-type: none"> • Approve budget and program • Manage manpower • Monitoring and evaluation

Source: Community seed bank guidelines, 2008/09

Status of seed production and distribution

In 2010/11, 142 metric tons of seed were produced from 75 ha (table 1) in the three community seed banks of Dadeldhura, Okhaldhunga and Sindhupalchwok. Varieties of farmers' preferences were identified and market linkages were established. Information about quality seed was delivered using flash boards, booklets, pamphlets, and F.M radio. In 2010/11, training on seed production and marketing was given to 221 farmers (133 females and 88 males).

Table 1: Summary of seed production by community seed banks (2010/11)

District	Paddy		Wheat		Maize	
	Area (ha.)	Production (mt.)	Area (ha.)	Production (mt.)	Area (ha.)	Production (mt.)
Dadeldhura	8	15	8	14	8	11
Sindhupalchwok	9	20	9	19	9	18
Okhaldhunga	8	17	8	16	8	12
Total	25	52	25	49	25	41

Source: CDD, Annual report, 2067/68

Table 2: Summary of seed production by community seed banks

Name of Crop	Seed Production (mt.)	
	2009/10	2010/11
Paddy	49	52
Maize	42	41
Wheat	44	49
Total	135	142

Source: CDD, Annual report, 2067/068

Table 3: Summary of seed collection and marketing by community seed banks in 2010/11

Districts	Amount of seed (mt.) by crop			Total amount (mt.)	Seed purchased by
	Paddy	Wheat	Maize		
Dadeldhura	8	1.6	12	21.6	NGOs, DADO, farmers and agrovets
Sindhupalchwok	8.9	10.1	40	59	NGOs, DADOs, farmers and agrovets
Okhaldhunga	5	9	6	20	Other farmers from same and different VDCs
Total	21.9	20.7	58	99.6	

Note: The community seed banks of Dadeldhura and Sindhupalchwok distribute seed with bagging and tagging but the community seed bank Okhaldhunga does not use this practice, Source: CDD, Annual report, 2010/2011,

Biodiversity conservation

This program has been started in three community seed bank (Sindhupalchwok, Dadeldhura and Okhaldhunga), however, procedural improvement in collaboration with the national genebank is necessary. Up to now, 60 varieties of different crops (paddy-15, maize-6, pulses-7, buckwheat-2, sesame- 2, soybean-4, horsegram-3, millet-3, uwa-1 , barley-1 and kaguno-2) have been collected in CSB, Dadeldhura. Similarly, 80 varieties of different crops have been collected in Sindhupalchwok. Endangered varieties among the collected varieties will be handed over to the national genebank.

Beneficiaries of community seed banks

Poor, marginalized and subsistence farmers are the primary beneficiaries of this programme. All members of the CSPGs who are directly involving in seed production are direct beneficiaries (Table 4).

Table 4: Direct beneficiaries of the community seed bank Programme

District	Number of SPGs	Number of Members		
		Male	Female	Total
Dadeldhura	8	32	68	100
Sindhupalchwok	7	71	91	162
Okhaldhunga	5	73	55	128
Jajarkot	6	84	61	145
Gulmi	6	53	85	138
Total	32	313	360	673

Source: Records obtained from community seed banks through District Agriculture Development offices

The farmers using quality seed produced by the community seed bank are indirect beneficiaries. As they use quality seed of improved varieties, increases in crop yield can be expected.

Local institutional structure and members

Community Seed Producing Groups are organized at the village level, consisting of 20-25 members with the support of community seed bank. Community seed bank committees are formed by the representative of Community Seed Producing Groups at VDC level.

Sustaining mechanism

Using a large portion of the budget as a seed revolving fund can be an important factor for sustainability of seed production and distribution activities. Seed revolving funds can be used to purchase produced seed from farmers so that they will not use produced seed as

food. It can also be used to purchase source seed for the farmers under the condition that they have to return the amount after harvesting their crops.

Seed quality control (through truthful labelling) and linkage with the market are also activities in the Community Seed Bank Programme. Once a seed bank is linked up with the market with their quality labelled seeds, there is no problem in marketing of seeds and getting benefits so that they will never give up on seed production.

In the case of source seed production, community seed banks are provided a seed balance sheet prepared by the Seed Quality Control Centre (SQCC) so that they can enter into the seed demand supply channel. Demand and possible supply of seeds from different institutions are collected and included in the seed balance sheet. In 2013, the community seed bank of Sindhupalchok received a seed balance sheet for the demand and supply of source seed produced in farmers' fields.

The Community Seed Bank Programme is still in its infancy facing several challenges. A summary of weaknesses and threats is presented in Annex 2.

References

- CDD. 2009. Seed Replacement Rate. Annual report. Crop Development Directorate, Department of Agriculture, Lalitpur, Nepal, pp. 84.
- CDD. 2009. Community Seed Bank Guidelines. Crop Development Directorate, Department of Agriculture, Lalitpur, Nepal,
- CDD. 2011. Targeted Programs and Achievements. Annual report. Crop Development Directorate, Department of Agriculture, Lalitpur, Nepal, pp.26.

Annex 1: Cost of establishment and management (estimated)

S.N.	Activities	Cost (Rs.000)	Remarks
Fixed Costs			
1	Seed purchase collection		
1.1	Seed Revolving fund	1000	
1.2	Seed Store house (75% subsidy)	300	
1.3	Threshing floor (75% subsidy)	100	
1.4	Equipment –moisture meter, weighing balance, sewing machine etc. (100% subsidy)	50	
1.5	Seed processing machine- small scale (100% subsidy)	100	
Total		1550	
Variable costs			
2	Seed production		
2.1	50% subsidy in source seed (Tentative for 30 ha)	55.2	
2.2	50% subsidy in fertilizers		Not yet implemented
2.3	100% source seed transport subsidy (LS)	40	
2.4	Plant protection @ of NRs. 1000/ha.	20	
3	Seed/Varietal mapping	15	
4	PVS (Required amount of seed, fertilizers and pesticides for 15 m ²)	10	
5	Trainings and workshops (as per required)	85	
Sub Total		190.2	
Grand total		1775.2	

Source: Current running program of CDD

Annex 2: SWOT analysis of community seed bank programme

Strengths <ul style="list-style-type: none">• Farmers involved for their own sake to make seed available in their community• Seed revolving fund of the program is a major strength since it can decrease the use of produced seed as food and hence helps to maintain the seed cycle.	Weakness <ul style="list-style-type: none">• Inadequate market linkages• Inadequate knowledge and capacity in seed production and marketing• Lack of manpower• Sometimes insufficient source seed of required varieties• Highly dependent
Opportunities <ul style="list-style-type: none">• CSB can supply seed to neighbouring districts as well with their tagging and bagging• If there is a successful CSB in a district, there will be no more crisis in seed availability	Threats <ul style="list-style-type: none">• Sustainability of the seed bank when supports are withdrawn• Misuse of the seed revolving fund

The Story of Establishment and Management of the Sindhu Community Seed Bank in Thumpakhar Village of Sindhupalchok District³⁶

D.B. BHANDARI

Sindhu Community Seed Bank, Thumpakhar, Sindhupalchok



Photos: Sajal Sthapit

Summary

Seed production and marketing of maize was started in Thumpakhar village of Sindhupalchok with the support from the Hill Maize Research Programme of International Maize and Wheat Improvement Center (CIMMYT). It took three years to convince farmers to produce quality seeds and to create a market. In 2009, the Crop Development Directorate of the Department of Agriculture came up with the concept of a community seed bank and provided financial and technical support. Altogether, there are 14 seed producer farmers groups in 4 Village Development Committees, viz. Thumpakhar, Sunkhani, Yamunadanda and Phulpingdanda. A community seed bank management committee has been formed with representatives from each farmers' group. A cooperative and also a seed company have been registered to market the seeds.

The community seed bank conducts participatory variety selection to identify appropriate varieties for the locality to include in seed production activities. About 50 tons of seeds of rice, wheat and maize are produced and marketed each year. The community seed

³⁶ Author of this chapter represents Sindhu Community Seed Bank, which has been managing a community seed bank since 2009. To encourage and recognize them, this chapter has been presented in Nepali language except summary.

bank works with the District Agriculture Development Office to get source seeds both for participatory variety selection and seed production, as well as with the regional seed laboratory for seed certification. As the community seed bank organizes a number of discussions, trainings, workshops and visits, increased awareness on the production and use of quality seeds of improved varieties has not only contributed to increased income of seed producers, but also to the overall production of maize and rice.

सिन्धु सामुदायिक बीउ बैंक स्थापना तथा व्यवस्थापनसम्बन्धी समुदायको अनुभव

डी. बी. भण्डारी

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पृष्ठभूमि

हिमाल, पहाड, तराई, भित्री मधेश र मनोरम उपत्यकामा विभाजित नेपाल प्राकृतिक सुन्दरता अनि विविधतायुक्त हावापानीले गर्दा खाद्य तथा कृषिसँग सम्बन्धित अनेकौं वनस्पति तथा प्राणीहरूले भरिपूर्ण छ । स्थानीय कृषकहरूको अथाह ज्ञान, सीप तथा अनुभव र उपलब्ध कृषि प्रविधिहरूको सदुपयोगबाट दिगो आर्थिक विकास तथा खाद्यसुरक्षा सुनिश्चित गर्न सकिने प्रशस्त सम्भावना छ । एकातिर रासायनिक खेतीप्रणालीको वृद्धि, आयातीत वर्णसङ्कर बीउहरूको बढ्दो प्रयोग र उत्पादनका अधिकांश सामग्रीहरूमा परनिर्भरता बढ्दै गएको छ भने अर्कातिर बढ्दो शहरीकरण, जमिनको खण्डीकरण आदि कारणहरूले कृषि भूमिको ह्रास हुँदै गएको छ । त्यसै गरी कृषकहरूमा कृषि जैविक विविधताको महत्त्वबारेमा जानकारी नहुनु र जैविक विविधता संरक्षणमा सरोकार निकायको ध्यान कम जानुले हाम्रो कृषि क्षेत्र समस्याग्रस्त बन्दै गइरहेको देखाउँछ । जैविक विविधतामा नेपाल धनी भनिए तापनि यसको संरक्षण र प्रवर्द्धनबाट रोजगार सृजनागरी आर्थिक लाभ लिनेतर्फ अत्यन्त न्यून प्रयत्न भएका छन् । अर्कातर्फ उत्पादनवृद्धिका लागि गुणस्तरीय बीउको महत्त्वपूर्ण भूमिकाहुने भएता पनि यसतर्फ पनि उल्लेखनीय काम हुन सकेको छैन ।

सिन्धुपाल्चोक जिल्लामा उन्नत जातका मकैको बीउ-उत्पादनसम्बन्धी कार्यको थालनी पहाडी मकैबाली अनुसन्धान कार्यक्रमको सहयोगमा भएको हो तर स्थानीय स्तरमा उत्पादित उक्त बीउ गुणस्तरीय छ भनी समुदायमा विश्वास दिलाउन यस संस्थालाई भण्डै तीन वर्ष लाग्यो । अर्कातिर बीउ-सङ्कलन, भण्डारण र वितरणको व्यवस्था मिलाउनु पनि त्यत्तिकै चुनौतीपूर्ण रह्यो । सन् २००८ मा बीउ-उत्पादक कृषक समूहका सदस्यहरूको संलग्नतामा बीउ-सङ्कलन, भण्डारण तथा वितरणको उचित व्यवस्था गर्ने कामका साथै स्थानीय स्तरमा उत्पादित बीउको प्रभावकारी रूपमा बजारीकरणका लागि सहकारी संस्थाको स्थापना गरियो तर आवश्यक स्रोतसाधनको अभावले उक्त कार्यलाई प्रभावकारी रूपमा अघि बढाउन भने विभिन्न कठिनाइको सामना गर्नुपरेको । सन् २००९ देखि भने कृषि मन्त्रालयको बाली विकास निर्देशनालयद्वारा सामुदायिक बीउ बैंकको अवधारणा अघि सारियो र सिन्धुपाल्चोक जिल्लालाई पनि पहिलो चरणको कार्यक्रमका लागि छनोट गरियो । यस कार्यपत्रमा सिन्धुपाल्चोक जिल्लामा बाली विकास निर्देशनालयको आर्थिक तथा प्राविधिक सहयोगमा स्थापना भएको सामुदायिक बीउ बैंकका गतिविधिहरूका बारेमा चर्चा गरिएको छ ।

सामुदायिक बीउ बैंकको परिचय तथा उद्देश्य

नेपाल सरकारले ल्याएको सामुदायिक बीउ बैंकका अवधारणा अनुसार सिन्धु सामुदायिक बीउ बैंकको स्थापना वि.सं. २०६४ मा भएको हो । यसको कार्यालय सिन्धुपाल्चोक जिल्लाको थुम्पाखर गा.वि.स., वडा नं ९ मा अवस्थित छ । यस सामुदायिक बीउ बैंकका कार्यक्षेत्र थुम्पाखर, सुनखानी, यमुनाडाँडा र फुत्पिडाँडा गा.वि.स.हरू हुन् । यस सामुदायिक बीउ बैंकको सञ्चालन १४ वटा कृषक समूहहरू, एउटा बीउ-उत्पादक सहकारी र एउटा सामुदायिक बीउ बिजन कम्पनीले संयुक्त रूपमा गरिरहेका छन् । धान, मकै र गहुँ बालीहरूको उन्नत जातको बीउ-उत्पादन तथा विक्रीवितरणका अतिरिक्त कृषि जैविक विविधताको संरक्षणतर्फ पनि यो सामुदायिक बीउ बैंकले कार्यक्रम सञ्चालन गर्दछ । बीउ-उत्पादक सहकारी संस्थाले अन्नबाली र तरकारीबालीहरूको बीउ-उत्पादनको काम गर्दैआएको छ भने सामुदायिक बीउबिजन कम्पनीले स्थानीय स्तरमा उत्पादित बीउको बजारीकरण कार्यमा सहजीकरण गर्दै आएको छ । समग्रमा यस सामुदायिक बीउ बैंकका निम्न उद्देश्यहरू छन्:

- खाद्यान्न तथा तरकारी बालीहरूको जातीय परीक्षण प्रदर्शन गरी ठाउँ तथा हावापानी अनुसार सुहाउँदा जातहरूको छनौट गर्ने;
- खाद्यान्न तथा तरकारीबालीहरूका मूलबीउ, प्रमाणित बीउ र उन्नत बीउ-उत्पादन, सङ्कलन, प्रशोधन, भण्डारण, प्याकेजिङ र लेबलिङको काम गर्ने;
- बीउ-उत्पादक कृषक समूहगठन गरी समूहहरूलाई सीप, ज्ञान र उन्नत प्रविधिहरू उपलब्ध गराई उन्नत बीउ-उत्पादनका माध्यमबाट कृषकको आयवृद्धि गर्ने;
- यस सामुदायिक बीउ बैंकको कार्यक्षेत्रभित्र समग्र कृषि क्षेत्रको सुधार र विस्तारका लागि तालिम, गोष्ठी, बैठक, भेला र छलफलको आयोजना गरी ग्रामीण समुदायका किसानहरूको चेतना अभिवृद्धि गराई जैविक विविधताको पहिचान र लोप हुन लागेका जातहरूको संरक्षण गर्ने ।

सामुदायिक बीउबैंकको स्थापनाप्रक्रिया

सामुदायिक बीउ बैंकको स्थापनाको प्रारम्भिक चरणमा सर्वप्रथम थुम्पाखर गा.वि.स.का सबै टोलका कृषकहरूको भेला गराई जैविक विविधताको महत्त्व, उत्पादन वृद्धिका लागि गुणस्तरीय बीउको महत्त्व र भूमिकाबारेमा जानकारी गराइयो । त्यसपछि ७ वटा बीउ-उत्पादक कृषक समूहहरू गठन गरिए र ७ वटा समूहका एक-एक जना प्रतिनिधि छनोट गरी ७ सदस्यीय सामुदायिक बीउ बैंक सञ्चालक समितिको गठन गरियो । यी समूहका सदस्यहरू नियमित बैठक बस्ने, बचत सङ्कलन गर्ने र कार्ययोजना बनाई अन्नबालीहरूका उन्नत बीउ-उत्पादन गर्ने गर्दछन् । हालसम्म यस्ता बीउ-उत्पादक कृषक समूहहरूको सङ्ख्या १४ पुगेको छ । बीउ-उत्पादनका अतिरिक्त यी समूहहरू कृषि जैविक विविधताको विश्लेषण, मूल्याङ्कन, लोपोन्मुख स्थानीय जातहरूको सङ्कलन तथा उत्पादन जस्ता कार्यहरूमा पनि संलग्न छन् ।

सिन्धु सामुदायिक बीउ बैंकद्वारा सञ्चालित कार्यक्रमहरू र त्यसको प्रारम्भिक नतिजा

चेतना अभिवृद्धि

स्थानीय कृषकहरूसँगको छलफल तथा अन्तरक्रियापछि कृषकको चाहना अनुसार बीउ-उत्पादन कार्यक्रम सञ्चालनका लागि कृषक समूहहरू गठन भएका छन् । बीउ-उत्पादनका लागि कृषकहरूको क्षमता अभिवृद्धि

गर्न सञ्चालन गरिएका बैठक, भेला, गोष्ठी र तालिमहरूको नियमित सञ्चालनले समूहका सदस्यहरूमा क्रमिक रूपले ज्ञान, सीप, क्षमता र अनुभव बढ्दै गइरहेको छ । उनीहरूमा उत्पादन वृद्धिका लागि शुद्ध बीउको महत्त्व र स्थानीय जातका बालीहरूको संरक्षणको आवश्यकता महसुस भएको छ । कृषक समूहहरूले कार्यक्रमको दिगो विकासका लागि नियमित मासिक बचत गर्न थालेका छन् र सरकारी तथा गैरसरकारी सङ्घसंस्थाबीच सम्पर्क तथा समन्वय पनि बढ्दै गएको छ ।

जैविक विविधता संरक्षण

सामुदायिक बीउ बैंकसम्बन्धी कार्यक्रमले यस क्षेत्रका कृषक समुदायमा जैविक विविधताको महत्त्व र यसले निर्वाह गर्ने भूमिकाको बारेमा जानकारी बढ्दै गएको छ । लोपोन्मुख स्थानीय जातहरूको बीउ सङ्कलन गरी सामुदायिक बीउ बैंकमा प्रदर्शनमा राखिएका छन् र संरक्षणका लागि पुनः बीउ-उत्पादनको काम सुरु गरिएको छ ।

तालिका १: सिन्धु सामुदायिक बीउ बैंकको कार्यक्षेत्रबाट सङ्कलन गरी प्रदर्शनमा राखिएका स्थानीय जातहरू

बाली	प्रदर्शनमा राखिएका स्थानीय जातहरू
कोदो	लुर्के, मुङ्के, डल्ले सेतो, च्याल्टे, सिरूवारे, किर्ने, अरूणे, सिन्धुकोटे (८)
मकै	ठूलो पहेलो, मुरली, ठूलो चेप्टे सेतो, चेप्टे पहेली, सानो सेती, डिम्मुरे, करङ्गे, काँडे, चौकोटे, कालो मकै, सानो पहेलो मकै (११)
द ल ह न - बाली	कातिके बोडी, मकै बोडी, मस्याङ, रहर, गहत, कालो मास, चौमासे सिमी, घिउसिमी, मसुरो, काउसे सिमी, लोकल खैरो सिमी, रातो घिउसिमी, सेतो भटमास, कैलो भटमास, कालो मकै सिमी, खैरो मकै सिमी (१७)
धान	हेल्मुले, पोखेली, जोर्ती मसिनो, रातो अनदी, अनदी, कालो घैया, सेतो घैया, फिनुवा, मार्सी, दूधपोखेली, लोकल पहेली, लोकल तालागे, चरिनङ्ग्रे, (१२)
तरकारी	अकबरे खुर्सानी, रागे खुर्सानी, चिचिन्डो, तीतेकरेला, कालो तोरिया, सेतो तोरिया, काँडे स्कुस, कालो स्कुस, झ्याप्ले स्कुस, भुत्रे भ्याकुर, रातो तरूल, टमाटर, काउसे सिमी, हरियो काँत्रा, चुच्चे करेला, फलामे काँत्रा (१६)
अन्य	तीते फापर, मिठे फापर, जौ, भुसे तिल, (४)
जम्मा जात	६८

स्थानीय कृषकहरूको खाद्य सुरक्षा तथा आयमा वृद्धि

सामुदायिक बीउ बैंकको कार्यक्षेत्रमा बीउ-उत्पादनको काम एक भरपर्दो नगदे बालीका रूपमा विकसित भइरहेको छ । किनभने कृषकहरूमा उन्नत बीउ र प्रविधिको पहुँच तथा प्रयोग बढेको छ र त्यसबाट सरदर ४० प्रतिशत उत्पादन बढेको कुरा कृषकहरू बताउँछन् । ग्रामीण किसानहरूले सस्तो र सुलभ रूपमा, चाहेको समयमा गुणस्तरीय बीउ पाएका छन् । फलस्वरूप उत्पादनमा वृद्धि भई खाद्यसुरक्षा र वार्षिक आमदानीसमेत बढेको छ । तल तालिका-२ मा यस क्षेत्रमा सामुदायिक बीउ बैंक स्थापनापश्चात् उन्नत जातका मकै, धान र गहुँको बीउ प्रयोग गर्ने कृषकहरूको घरधुरीसङ्ख्या र त्यसले ढाकेको क्षेत्रफलको विवरण प्रस्तुत गरिएको छ ।

तालिका २: सिन्धु सामुदायिक बीउ बैंकको कार्यक्षेत्रमा उन्नत जातका मकै, धान र गहुँको बीउ प्रयोग गर्ने कृषकहरूको घरधुरीसङ्ख्या र त्यसले ढाकेको क्षेत्रफल

बाली	उन्नत जातको बीउ प्रयोग गर्ने कृषकहरूको घरधुरीसङ्ख्या (अनुमानित)	उन्नत जातका बीउले ढाकेको अनुमानित क्षेत्रफल (हेक्टर)
मकै	५०००	१२५०
धान	७००	२८००
गहुँ	५००	७५

तालिका ३: सिन्धु सामुदायिक बीउ बैंकको वार्षिक कारोबार विवरण

विवरण	बीउ खरिद (मेट्रिक टन)
मकैको स्रोत बीउ खरिद (प्रजनन र मूल बीउ)	०.९०
उत्पादित मकैको बीउ खरिद	२५.२
गहुँको स्रोत बीउ खरिद	१.१
उत्पादित गहुँको बीउ खरिद	१०.१
धानको स्रोत बीउ खरिद	०.९०
उत्पादित धानको बीउ खरिद	८.९
जम्मा	४७.१

स्थानीय हावापानी सुहाउँदा उन्नत जातहरू

सामुदायिक बीउ बैंकले उन्नत जातहरूको बीउ-उत्पादन शुरू गर्नुभन्दा पहिला सहभागितामूलक जातीय छनोटप्रक्रिया अपनाई स्थानीय हावापानी सुहाउँदा उन्नत जातहरूको छनोट गर्दछ । यसरी छनोट भएका जातहरूमात्र बीउ-उत्पादन कार्यक्रममा समावेश गरिन्छन् । यसबाटबढी उत्पादन दिन सक्ने उन्नत जातहरूको पहिचान र प्रचारप्रसार भएको छ । हालसम्म यसक्षेत्रमा मकैका ५, धानका ४ र गहुँका ३ वटा जात कृषकहरूले बढी मन पराएका छन् ।

तालिका ४: सहभागितामूलक जातीय छनोटप्रक्रियाबाट छनोट भएका धान, मकै र गहुँका जातहरू

बाली	छनोट भएका जातहरू
मकै	रामपुर कम्पोजिट, मनकामना-३, पोषिलो, देउती, अरूण-१
धान	खुमल-४, चाइनुन-२४२, मकवानपुर-१, खुमल-८
गहुँ	गौतम, पासाङ ल्हामु, डब्लु के १२०४

भौतिक संरचनाको विकास

सामुदायिक बीउ बैंकका गतिविधिहरू नियमित रूपमा सञ्चालनका लागि आवश्यक भौतिक संरचनाहरूको विकास भएको छ । जसमा बीउ भण्डारणका लागि गोदाम, कार्यालय भवन, तालिमहल साथै आवश्यक फर्निचरलगायतका सामानहरू निर्माण भएका छन् ।

निष्कर्ष

नेपालको कृषिक्षेत्रको सुधारका लागि सामुदायिक बीउ बैंक पद्धति एउटा राम्रो विकल्प हो भन्ने कुरा सिन्धु सामुदायिक बीउ बैंकले प्रमाणित गर्न खोजिरहेको अवस्था छ । विकट ग्रामीण क्षेत्रमा सामुदायिक बीउ बैंक कार्यक्रम सञ्चालनले धेरै महत्त्व राख्दछ । कार्यक्रममा संलग्न कृषकहरू माफ उपलब्ध उन्नत बीउ तथा प्रविधिहरूको विस्तार, शुद्ध बीउ-उत्पादन तथा प्रयोगसम्बन्धी ज्ञान, सीप र क्षमता अभिवृद्धि हुनु कार्यक्रमको एउटा पाटो हो भने त्यसबाट बाली-उत्पादनमा वृद्धि भई उनीहरूको वार्षिक आयमा समेत सकारात्मक प्रभाव पर्न थालेको छ । कार्यक्रममा प्रत्यक्ष संलग्न नभए तापनि अन्य स्थानीय कृषकहरूले सुलभ रूपमा र तुलनात्मक रूपमा कम मूल्यमा नै चाहेको समयमा शुद्ध बीउ पाएका छन् । यसबाट स्थानीय स्तरमा समग्र कृषि क्षेत्रमा नै सुधारको सङ्केत देखा परेको छ ।

सामुदायिक बीउ बैंकले स्थानीय जातहरू तथा त्यससँग सम्बन्धित परम्परागत ज्ञान तथा जानकारीहरूको खोजीनिती र त्यसको संरक्षणतर्फ धेरै काम गर्न बाँकी नै छ । सामुदायिक बीउ बैंक स्थापना तथा व्यवस्थापन आयमूलक मात्र नभई राष्ट्रहितका लागि गरिने सेवामूलक कार्य पनि हो । तसर्थ कृषि जैविक विविधता संरक्षणमा व्यापक चेतना जगाई त्यसको संरक्षणका लागि आवश्यक ज्ञान, सीप र क्षमता अभिवृद्धिका कार्यक्रमहरू सञ्चालन गर्नु अत्यावश्यक छ । सामुदायिक बीउ बैंक सफल रूपमा सञ्चालनका लागि बीउ-उत्पादनका लागि आवश्यक पर्ने स्रोत बीउ आपूर्तिको सुनिश्चितता, व्यवस्थापन समितिका सदस्यहरूको क्षमता अभिवृद्धि, शुद्ध बीउ-उत्पादनका लागि आवश्यक प्राविधिक सहयोगको उपलब्धता, बीउ प्रमाणीकरण, बीउ भण्डारण तथा प्रशोधनका लागि आवश्यक सामग्रीहरूको व्यवस्था र उत्पादित बीउ विक्रीवितरणका लागि जिल्ला कृषि विकास कार्यालयको सहयोग अपरिहार्य छ ।

आभार

सिन्धु सामुदायिक बीउ बैंक स्थापना तथा व्यवस्थापनमा सहयोग पुऱ्याउने कृषि विभाग, बाली विकास निर्देशनालय, बीउबिजन गुणस्तर नियन्त्रण केन्द्र, जिल्ला कृषि विकास कार्यालय सिन्धुपाल्चोक, राष्ट्रिय मकै बाली अनुसन्धान कार्यक्रम रामपुर, कृषि वनस्पति महाशाखा, खुमलटार, ललितपुर, अन्तर्राष्ट्रिय गहुँ तथा मकैबाली अनुसन्धान केन्द्रअन्तर्गतको पहाडी बाली अनुसन्धान कार्यक्रम र बीउ-उत्पादन कार्यमा संलग्न सम्पूर्ण कृषक समूहहरूप्रति हार्दिक कृतज्ञता व्यक्त गर्दछु ।

अनुसूची

अनुसूची १: सिन्धु सामुदायिक बीउ बैंकबाट आर्थिक वर्ष २०६८/०६९ मा सञ्चालन भएका बीउ-उत्पादनसम्बन्धी कार्यक्रमहरू

बाली	उत्पादित बीउको स्तर	जात	बीउ-उत्पादन क्षेत्र फल (हेक्टर)	सङ्कलन भएको बीउ (मेटन)
गहुँ	उन्नत	डब्लु. के. १२०४	९.८	७.०
		पासाङ ल्हामु	२.१	१.५
		गौतम	१.८	१.६
		जम्मा	१३.६	१०.१
		धान	उन्नत	खुमल-४
		चाइनुन-२४२	०.५	१.०
		मकवानपुर-१	१.५	१.४
		खुमल-८	२.५	२.४
		जम्मा	७.९	८.९
		मकै	उन्नत	रामपुर कम्पोजिट
		मनकामना-३	५.६	७.४
		पोषिलो	४.०	२.९
		देउती	६.०	६.७
		अरूण-१	३.०	१.८
		जम्मा	३८.६	२८.३
मकै	मूलबीउ	रामपुर कम्पोजिट	२.०	०.८
		मनकामना-३	५.०	०.२
		मनकामना-४	२.०	१.०
		देउती	९.०	०.८
		जम्मा	१८	२.८
कुल जम्मा			७८.१	५०.१

अनुसूची २: सिन्धु सामुदायिक बीउ बैंक समिति, सिन्धुपाल्चोकमा आबद्ध समूह तथा सदस्यहरू

क्र.सं.	समूहको नाम	ठेगाना	सदस्यसङ्ख्या		जम्मा
			महिला	पुरुष	
१.	हरियाली बीउ-उत्पादक कृषक समूह	थुम्पाखर-१, थुम्पाखर	५	११	१६
२.	कृषिसुधार समूह	थुम्पाखर-९, सिमलडाँडा	२२	०	२२
३.	वनकाली बीउ-उत्पादक समूह	थुम्पाखर-२, पाखरदोभान	१७	२	१९
४.	सेतीदेवी बीउ-उत्पादक समूह	थुम्पाखर-२, धुसिने	१९	१	२०
५.	सूर्योदय बीउ-उत्पादक समूह	थुम्पाखर-१, कल्लबारी	२०	६	२६
६.	प्रगतिशील बीउ-उत्पादक समूह	थुम्पाखर-५, काभ्रे	२४	०	२४
७.	हातेमालो बीउ-उत्पादक समूह	सुनखानी-२, भुजेलगाउँ	१६	९	२४
८.	सेतीदेवी बीउ-उत्पादक समूह	सुनखानी-३, काल्ले	१५	०	१५
९.	सेतीदेवी बीउ-उत्पादक समूह	यामुनाडाँडा-८, खोरंग	११	३	१४
१०.	कृषिसुधार बीउ-उत्पादक समूह	सुनखानी-७, रत्नकोट	६	१४	२०
११.	कालीपोखरी आमा समूह	यामुनाडाँडा-९, कालीपोखरी	१२	४	१६
१२.	नवबिहानी बीउ-उत्पादक समूह	यामुनाडाँडा-९, पैयूबोट	२१	४	२५
१३.	धिनिमिन्दो बीउ-उत्पादक समूह	सुनखानी-५, सुनखानी	१५	११	२६
१४.	कालीदेवी बीउ-उत्पादक समूह	फुल्पिडाँडा-६, चनौटे	१९	०	१९
	जम्मा		२४२	५५	२९७

The National Genebank, the Multilateral System and Community Seed Banks for the Conservation and Utilization of Agricultural Genetic Resources in Nepal

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Photos: NAGRC (left and top right),

Introduction

Importance of crop diversity: Globally, over 84% of human diet and nutrition comes from plants. In Asia and the Pacific, the Near East and Africa, plants provide around 90% of the average human diet. In Latin America and the Caribbean the figure is about 80% and in Europe and North America it tends towards 75% (FAO 2010). However, humanity has become dangerously reliant on only a few different crops. Out of the 10,000 to 12,000 known edible plant species, only 150 to 200 are used by humans and three of them alone—rice, wheat and maize—contribute nearly 60% of calories and proteins that humans obtain from plants (FAO 1997).

Plant genetic resources are crucial in feeding the global population. They are the raw materials for genetic improvement of food crop species by plant breeders and farmers and are essential in maintaining the sustainability of the global food production system (FAO 2002). The plant breeding process calls for a broad range of intracrop as well as intercrop genetic variability as essential inputs to develop a single successful new crop variety. To develop a new commercial variety, breeders may have to screen thousands of samples in search of a particular trait.

About half of the average global production increase in cereals that was achieved under the Green Revolution was attributable to plant breeding utilizing plant genetic resources (Hayward *et al.*, 1993). The other half came from altered agricultural practices such as the use of fertilizers, pesticides, irrigation and expansion of cultivated areas. Since the natural resource base, on which agriculture relies is finite and in some cases even declining, these agricultural practices cannot be sustained over the long run. This suggests that the role of crop diversity and plant breeding will become even more important in the near future for achieving food security in a sustainable way. Indeed, over 70% of the required production increases by 2050 will have to come from higher yield and less than 10% can be expected from an expansion in arable land (Hegwood 2009).

Loss of crop diversity: During the Green Revolution, many traditional crop varieties were replaced by modern improved varieties that significantly increased yields that were urgently needed to feed the growing population at that time. However, according to the Food and Agriculture Organization of the United Nations (FAO), more than 75% of global crop diversity has disappeared irrevocably over the 20th century (1900 to 2000). One of the most important reasons for the loss of traditional seeds, and thereby the loss of genetic diversity, is the replacement of genetically diverse farmers' varieties with modern varieties. In South Korea, for example, 74% of the most common crop varieties in 1985 had been replaced by 1993, and of the 10 000 wheat varieties in use in China in 1949, only 1000 were still being used in the 1970s (FAO 2011).

A large number of wild relatives of important food crops are also likely to disappear over the next decades due to climate change. At the same time, crops that have historically been cultivated especially well in a given region may no longer be of use and will have to be substituted by other crops. For example, in Sub-Saharan Africa, where maize is a major staple food crop at present, the land may no longer be suitable for its cultivation by 2050 (FAO 2009a). Similarly, in South Asia, climate change induced temperature rise may reduce wheat and rice productivity by 30% by the year 2030 (Maize and Wheat CRP Meeting 2012). From the above examples, it becomes clear that crop diversity, food security and climate change are closely linked in diverse and complex ways.

Countries' interdependence on agricultural crop varieties

It is a global fact that there is global interdependency on plant genetic resources for food and agriculture since all countries largely depend on plant genetic resources for food and agriculture (PGRFA) that originate elsewhere. No country in the world is self-sufficient in PGRFA for their food security (IPGRI 1996, 2000). The degree of dependence on the major food crops is over 50% for most world regions (FAO 2010).

Agricultural crops have been freely and widely exchanged across the world for centuries. For example, potatoes originated in the Andes in Latin America and are now staple crops in Europe and elsewhere in the world; barley and wheat were first domesticated in the Near East; rice originated in Southeast Asia (FAO 2001). Similarly, eggplant has its centre of significant diversity in the Indo-Myanmar region, while its major *ex situ* collections are

in AVRDC, Taiwan, and India; the major producing collections are in China, India, Egypt, Turkey and Indonesia; major breeding work is concentrated in AVRDC and India; the major consuming countries are African countries, China, India, Indonesia, Malaysia, Nepal, Pakistan and Sri Lanka and major product importing countries are France, Germany, Iraq, United Kingdom and USA (FAO 2010).

The multilateral system

Access to genetic resources and benefit sharing became an international issue during the early 1980s, leading to the inclusion of conservation, management and equitable benefit sharing of PGR in the agenda of the Convention on Biological Diversity (CBD) in 1992. The CBD vests sovereignty over biological resources and traditional knowledge in nation states. The ownership of biological resources is determined by the state through national law. The future of agriculture depends on international cooperation and the free exchange of plant genetic resources for food and agriculture. The adoption of the CBD in 1992 called for a revision of the International Undertaking in order to ensure the mutual harmony of the two instruments. After long negotiations, this revision took place within the FAO Commission on Genetic Resources for Food and Agriculture and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) was adopted by the conference of FAO of the United Nations in 2001 and entered into force in 2004. Nepal ratified the ITPGRFA on 2 January 2007 and became party to it on 19 October 2009.

ITPGRFA has a provision of a Multilateral System that includes all plant genetic resources for food and agriculture listed in the Annex 1 to the ITPGRFA (FAO 2009b) that are under the management and control of the contracting parties and in the public domain.

Benefits of the multilateral system

Monetary benefits:

- Recipients pay an equitable share of financial benefits into the Treaty's Benefit-sharing Fund whenever a commercialized product resulting from material obtained from the Multilateral System is not freely available for further research and breeding.
- These funds are complemented with voluntary contributions from countries, international foundations and the private sector.
- The funds that accumulate in the Benefit-sharing Fund flow primarily to farmers in developing countries who use and conserve crop diversity.

Non-monetary benefits:

Exchange of information: Making available information such as catalogues and inventories of crop diversity and results of technical, scientific and socio-economic research, for example, research related to characterization, evaluation and utilization of agricultural crops.

Technology transfer: Facilitating access by developing countries to technologies for the conservation, characterization, evaluation and use of crop diversity under the Multilateral System. The Treaty encourages all types of partnerships in research and development and in commercial joint ventures, especially relating to the material received, to human resource development, and to effective access to research facilities.

Capacity building through:

- Programs for scientific and technical education and training
- Research facilities in developing countries
- Scientific research in developing countries in cooperation with national institutions

National Agriculture Genetic Resources Centre, the National Genebank

Nepal is rich in biodiversity evolved and maintained mainly due to diverse agro-climatic environments with complex and varied farming systems, a broad mixture of ethnicity and races, varied socio-economic settings, large differences in altitude and complex topography. The three physiographic zones of Nepal, the Terai, Hills and Mountains experience a wide range of climate from tropical to temperate to arctic. The prevailing six seasons in Nepal indicate its unique climatic variation. Due to these variations across the country, diverse forms of genetic resources are being maintained by local farming communities.

Although the nation holds less than 0.1% of earth's land mass, it supports 2.2% of flowering plants, 1.4% of reptiles, 2.2% of fish, 8.5% of birds, 4.2% of butterflies and 4% of all mammals. The Biodiversity Profiles Project (1995) ranked Nepal as having the tenth richest flowering plant diversity in Asia. On a world scale Nepal is placed 31st. Diversity in edible genetic resources indicates availability of more than 500 species, of which nearly 200 species are under cultivation.

A large number of wild relatives of important food crops are also likely to disappear over the next decades due to climate change. At the same time crops that have historically been cultivated especially well in a given region may no longer be of use and will have to be substituted by other crops.

Realizing the significance of conservation and sustainable use of agrobiodiversity in national development, and to meet the national obligation of implementing international agreements (CBD and ITPGRFA), the Government of Nepal and Nepal Agricultural Research Council have established the National Agriculture Genetic Resources Centre (NAGRC) in 2010 with the mission of conservation and sustainable use of agricultural genetic resources for sustained agricultural growth and livelihood.

Objectives

- To explore, collect and conserve agricultural genetic resources for promoting sustainable use.
- To manage and handle the agricultural genetic resources scientifically in the country according to the rules and regulations of the genetic resources movement.
- To identify the endangered, rare and unique genetic resources and give emphasis to conserve them.
- To locate the centre of diversity of all economical crop species in the country.
- To characterize and evaluate genetic resources and make them available to researchers, academicians, farmers, entrepreneurs and related stakeholders.
- To screen genetic resources and identify markers associated with particular traits, and to develop elite lines through pre-breeding.
- To manage a database associated with each accession including passport, characterization, evaluation and traditional knowledge.

Facilities available in the national genebank

- **Short-term storage:** A cold store room is functional and is suitable for storing about 50 000 accessions for five to ten years.
- **Seed processing lab:** Facilities are available for seed drying, cleaning, characterizing and evaluating.
- **In-vitro culture room:** Tissue culture room as well as in-vitro cold storage facilities are available.
- **Molecular lab:** Molecular based research can now be carried out independently.
- **Field genebank:** A separate plot is allocated for a field genebank. It will be extended along the road and around the office buildings and premises.
- **Experimental plot:** The field is available for diversity blocks, rejuvenation, multiplication, characterization and evaluation.
- **Database management:** Documentation facilities are available for passport, management, characterization, evaluation, and pre-breeding and utilization data.

Conservation strategies

Different conservation strategies should be considered in regards to the way they complement each other and help to conserve maximum diversity. *In situ* conservation is useful to conserve wild species and their relatives. On farm conservation, which is also called dynamic conservation, complements *ex situ* conservation by continued cultivation of locally available crop varieties. *Ex situ* conservation preserves the genetic resources that have orthodox seeds in static condition. Genetic resources that are being considered for conservation are landraces, modern varieties, obsolete varieties, breeding lines, recombinant inbred lines, genetic stocks, non-recombinant inbred lines, differential lines, exotic genetic resources, wild and wild relatives and wild edible plants. The national genebank has the following conservation strategies.

- *Ex situ* conservation
 - Seed conservation
 - In-vitro conservation
 - Cryopreservation
 - Cold storage
 - Field genebank
- On farm conservation
- *In situ* conservation

Along with these strategies, the national genebank will focus on effective collaboration and utilization of genetic resources. A multidisciplinary approach is an effective way to manage agrobiodiversity. Therefore, collaboration with different stakeholders will be established for exploration and collection, regeneration and multiplication, characterization and evaluation, *in situ* conservation, field genebank management, on farm conservation and safety duplication. For efficient utilization, an effective distribution system for genetic resources will be developed as proposed in Figure 1.

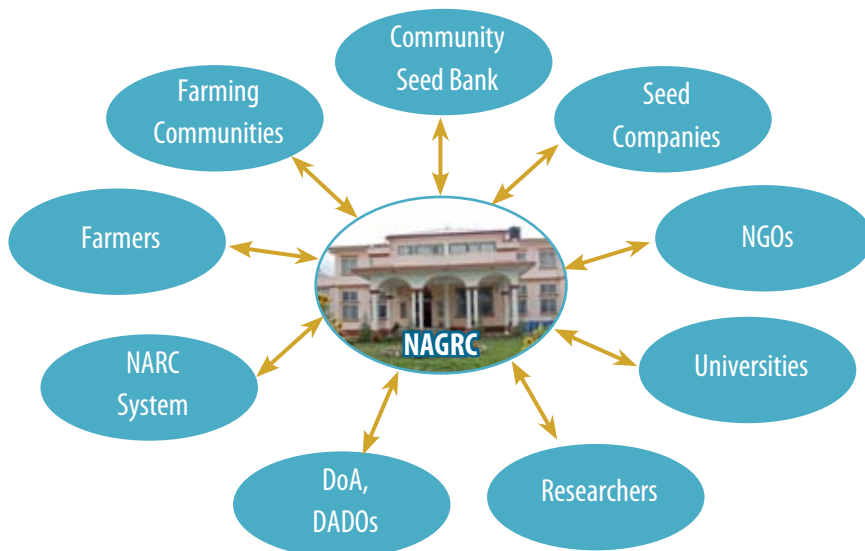


Figure 1: Proposed germplasm exchange system in country.

Passport, characterization, screening and evaluation data will be made available to researchers, farmers and other interested persons, so that they can identify suitable germplasm. Online database management will provide everyone with access to the national genebank data. Pre-breeding works, e.g., screening, tagging of markers linked to important traits, elite line development and collaborative marker assisted selection, will strengthen the utilization aspect. Diversity blocks and participatory landrace enhancement, particularly involving CSBs, contributes to dynamic conservation through utilization.

Plant genetic resource exchange mechanisms in Nepal

There was almost free exchange of plant genetic resources for breeding crop varieties among countries before the Convention on Biological Diversity (CBD). Nepal had a SAARC germplasm exchange program during the 1980s. Nepal Agricultural Research Council (NARC), in collaboration with International Maize and Wheat Research Center (CIMMYT), had an Indo-Gangetic Plains (IGPs) collaborative wheat breeding program with Bangladesh and India during the 1990s, but with the adoption of CBD and ITPGRFA, it became non-functional.

NARC has been exchanging different plant genetic materials with the Consultative Group of International Agricultural Research (CGIAR) centres e.g. International Rice Research Institute (IRRI), CIMMYT, and International Center for Agricultural Research in the Dry Areas (ICARDA), International Crops Research Institute for the Semi-Arid-Tropics (ICRISAT), International Potato Center (CIP), etc. since 1960s. There is free exchange of germplasm and related knowledge for breeding crop varieties. As a public institution, NARC has been involved in developing new crop varieties and making them freely accessible to everyone within the country, as well as contributing to the Multilateral System (Figure 2). Since there is no strong legislation for germplasm access in the country, every organization (GOs, Universities, NGOs, CBOs and private seed companies) may have germplasm access from multilateral system (MLS) through the Standard Material Transfer Agreement (SMTA).

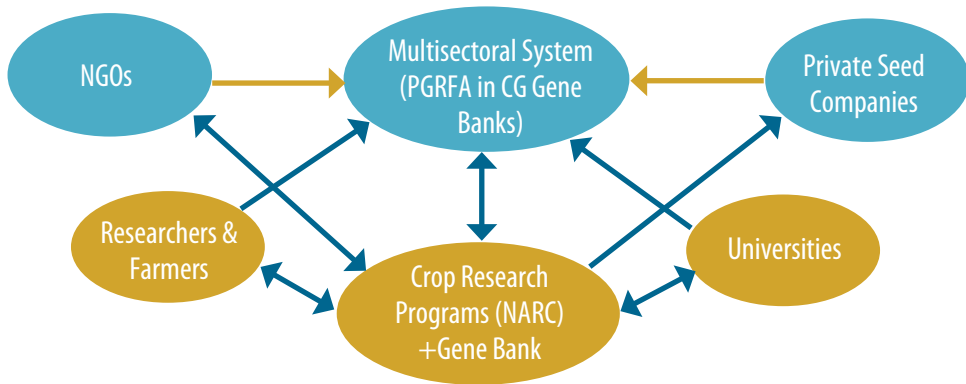


Figure 2: Existing system of MLS access of plant genetic resources in Nepal.

In country flow of genetic resources: As shown in Figure 1, NAGRC will work as a national depository centre for all PGRFA available in the country and a two way access mechanism needs to be developed through effective and nationally acceptable norms.

Mechanism of Multilateral System: A one window system for the movement of genetic resources will be established (Figure 3). All the genetic resources inside and outside the country will go through the one window i.e., the national genebank. Rules and regulations including a quarantine system will be developed. The national genebank will collaborate with offices of NARC and DoA, NGOs, community seed banks located in different sites across the country for quarantine.

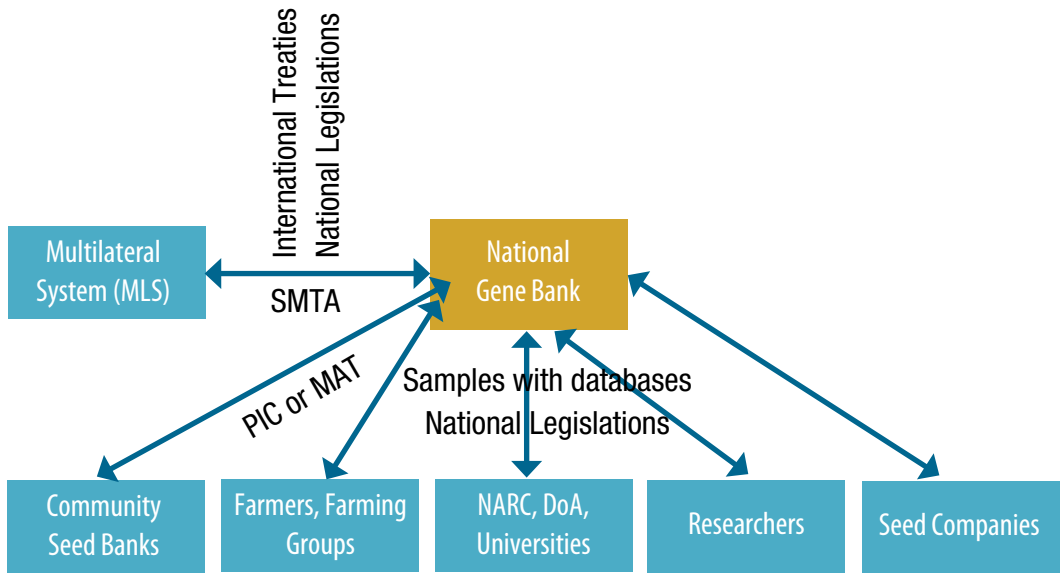


Figure 3: Proposed one window system of movement of genetic resources in the country.

Community seed banks

Plant genetic materials for food and agriculture are valuable resources for any country for present and future food security. These need to be conserved at different levels including national, international and local communities. Community seed banks are the collections of seeds that are maintained and administered by the local communities themselves. Seeds can be stored by a community either in a large quantity to ensure that planting materials are available, or in small samples to ensure that genetic materials are available. Therefore, community seed banks could be for local seed security as well as for the conservation of locally available endangered crop species and/or for producing large quantity of seeds of both improved crop varieties as well as farmers’ local varieties.

Programs for strengthening community seed banks (CSBs)

Farmers are the key players for sustaining agricultural diversity. NARC, in collaboration with NGOs and farming communities, has been supporting on farm conservation since 1997 by involving farmers and their genetic resources in field studies. This resulted in the establishment of CSBs in Kachorwa, Bara (2003) and Simariya, Sunsari (2011). A CSB represents a system of conservation and utilization of local genetic resources, operated at local levels and run by the community. The CSB ultimately helps to conserve genetic resources in an evolutionary way, along with associated traditional knowledge. The options of planting materials provided by CSB to the farmers are considered important to increase total production at the household level. Diversity fairs and diversity blocks are the major activities to collect and maintain varieties in a CSB. These are also the experimental

units where selection can take place to identify the better genotypes. CSB is considered an economical way of conserving genetic resources; therefore, the national genebank has the following programs to strengthen CSBs in Nepal.

Survey of existing CSBs in the country: A survey will be conducted to know the state of art of the CSBs in the country. The survey results will be used to identify which CSBs NAGRC is going to support. Priority will be given to CSBs that represent highly diverse agroecological systems.

Accessing and safety duplication: All collections will be registered in the national genebank and an accession number will be provided to CSBs, so that they can handle their samples with this number. One set of their samples will be conserved in the national genebank as a safety duplication. The concerned CSB will have access to these safety duplications at any time.

Characterization and evaluation: The collections in the CSBs will be phenotypically and genotypically characterized and evaluated. These data will be provided to the community.

Further exploration and passport data: For further collection along with passport data, diversity fairs as well as field visits will be conducted under the leadership of CSBs. Genebank will support technical and financial aspects of the activities.

Documentation of traditional knowledge related to storage systems and upgrading storage systems: The national genebank will facilitate the documentation of the associated traditional knowledge of collections. Support will also be provided to display all kinds of traditional storage systems. Traditional and modern storage systems will be compared and local storage systems will be upgraded if required.

Capacity building on maintenance of seeds and crop breeding: The national genebank will organize trainings and visits for the members of CSBs to empower them on management of CSBs, maintenance and conservation of seeds and crop improvement.

Making access to PGRFA from MLS at all levels: The national genebank can work as a facilitator for PGR access from MLS for institutions (GOs, NGOs, CSBs, Private seed companies, farming communities and individual farmers) interested in research and development.

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Banking Seeds by Smallholders in Nepal: Workshop Synthesis

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Photos: Mahesh Shrestha

Introduction

Conserving plant genetic resources (PGRs), both wild relatives of crops and those maintained on farm, is key to securing food and nutrition, enhancing incomes and building community resilience to climate change (Frankel *et al.* 1995; Jarvis *et al.* 1998). PGRs form the basis for developing new varieties that farmers, traders dealing with farm products, and consumers or end users aspire to get for the benefit of their families and society, both for the current generation and for posterity (FAO 2010). Conservation, management and sustainable use of an array of PGRs, which is also the main goal of CBD (CBD 1992), in the past happened through gene flow from one location to another and from one farmer to another (Hardon 1997; Subedi *et al.* 2003). Apart from the natural process of flows, the informal seed supply system based on farmer-to-farmer exchange, has for many generations played a pivotal role in seed exchange and the creation of the precious agrobiodiversity that exists in farmers' fields today (Jarvis *et al.* 1998; Sthapit and Jarvis 1999). This is especially true for resource-poor farmers cultivating marginal and unproductive agricultural lands and lacking access to modern variety seeds and associated technologies.

Access to seeds and planting materials through the informal seed system is critical for maintaining PGRs and improving food security worldwide. Although the informal seed system accounts for about 80% of total seed supply globally, it is increasingly becoming vulnerable due to the strong push of modern variety seeds of major staple crops by

government extension service providers, private companies and some development NGOs. The introduction of modern varieties is not only replacing local variety seeds, but also shutting down the opportunity for developing locally viable, economically beneficial and ecologically resilient varieties. Such replacement has a disruptive impact on the evolutionary process. This is a grave concern as the loss of varieties may lead to growing food insecurity, which could have subsequent negative social and political consequences.

In response to this alarming trend, the concept and practice of the Community Seed Bank (CSB) has evolved as an approach to protecting, maintaining and continuously making available locally valuable PGRs to needy farmers. First established in the USA and Australia in the mid-1980s, so-called seed savers networks inspired the establishment of CSBs. Since the beginning, the concept and working approach have evolved differently in different regions of the world (Vernooy in chapter 1), as a function of social, economic, institutional and political dynamics of local communities, their countries, as well as interactions with international agencies. Due to a lack of harmony among practitioners as well as clarity about efficient modes of operation, the scaling out of the approach has not made much progress, although in some countries, including Nepal, there are now hundreds of CSBs.

In Nepal, the first initiative to establish a community seed bank was taken by USC Canada in Dalchoki, Lalitpur. However, practitioners could not give continuity to that seed bank due to lack of a clear vision, funds to support the initiative, and close monitoring and supervision by the support institution (Joshi in Chapter 3). A more robust, viable and sustainable CSB was established by LI-BIRD in Bara in 2003 (Shrestha in Chapter 5), which is still in effective and efficient operation. There are several other CSBs supported and operated by various institutions—both GOs and NGOs (Joshi in Chapter 3). Annex 1 presents an overview of the current status of CSBs. However, there is general inconsistency and poor common understanding in terms of definition, goals, objectives, and working approaches among practitioners and CSB groups. The approach is practiced differently in different countries and in different regions even within a country, as the Nepal case demonstrates. The practices followed by different organizations also vary significantly. As a result, developing national strategies, let alone international programs, to support CSBs has been difficult. There is a need to bring consistency in the understanding of all CSB groups, practitioners, policy makers and donors.

In light of the above mentioned challenge and opportunity, LI-BIRD, together with its national and international partners, organized a two-day workshop in Pokhara, Nepal in June 2012. The objective of the workshop was to seek answers to the following questions:

- How do we define CSB?
- What are the key components, main characteristics, principles, approaches and working modalities of CSB?
- What are emerging typologies used for CSB?
- What policies are required to promote and sustain the role of farmers as custodians of agrobiodiversity?
- What are key challenges and opportunities?
- How can we make CSB a sustainable approach to conservation?

While the main points of individual presenters are separately included as chapters in this proceedings, this chapter intends to synthesize the presentations and discussions made by the participants during the workshop. This chapter also offers a deeper analysis of the CSB approach based on information shared by workshop participants and complemented by some insights for future research on CSBs as well as on the development of principles and practices to promote the approach in the long run for continuous conservation and promotion of PGR for food, nutrition, income and resilience.

Convergence in definitions

Different institutions or individuals understand CSB in different ways and consequently they follow different trajectories or pathways, often contradicting with one another. Based on the workshop presentations, the following definitions emerged.

CSB is “a community mechanism/institution or seed repository with specialized functions (to collect, store, multiply and distribute seeds). A CSB functions like a financial bank as a transaction of seeds (deposition and lending) is made by farmers in the former and transaction of money is done in financial banks.”

It is “a community-led seed management approach which involves production, collection, processing, storage, distribution (exchange, loan, grant, selling) and marketing of local as well as improved varieties.”

It is “a community-operated gene bank that provides farmers with access to seeds of local crop varieties and performs the function of community level backup for genetic resources, a repository of associated knowledge, and an institution to organize, mobilize and respond to the farmers’ interests, and it promotes social learning and networks.”

From the above definitions, it is evident that CSBs have the following elements, among others: (a) inclusion of local and improved varieties, (b) conservation, production and distribution of seeds, (c) conservation of quality seeds based on agreed standards, (d) community ownership on or control over PGR (local governance and management rights), (e) recognition of legal and community rights, and (f) providing a platform for social learning and other community actions.

Objectives of CSB targeted by practitioners

The definitions above clearly show that CSBs are meant for fostering conservation and the sustainable use of local varieties of traditional crops. However, a CSB may also deal with improved varieties depending on its major goal—conservation versus improving food security and livelihoods of farmers. CSB increases access of farmers to quality seeds and empowers communities to appropriately use their rights to save, share and sustainably use important genetic resources. It creates an environment to multiply rare and endangered varieties and improve local resilience to climate change; provides an opportunity for *ex situ*

and *in situ* linkages; and offers potential for linking with participatory breeding activities. It also offers a platform for knowledge sharing and social learning and contributes to improved social capital. Objectives of CSB as defined by different organizations participating in the workshop are presented in Annex 2.

Typologies and modes of operation

From the presentations and discussions among the participants, it can be inferred that the practitioners in Nepal are following one or the other of three modes of operation, which are described below and summarized in table 1.

PGR-based: PGR-based CSBs include only local landraces of native crops in the seed banks. This is possible in the villages where local germplasm is still abundant but under potential threat and people are aware of and interested in conserving such important PGRs. Germplasms may have remained extant in the villages due to poor access to technology and unfavorable agroecological conditions for adoption of high yielding or modern varieties. Hence, this type of CSB is feasible in low production potential areas where access to market and improved technologies is poor. This approach is practiced by LI-BIRD in some of its working villages, especially in hills and mountain regions, where the reach of technological intervention is poor, and thus local landraces are ‘a compulsion, not a choice’. This type of CSB can be established only in selected locations to represent/cover local varieties of native crops of the region, to avoid duplication and redundancy and to make conservation efforts cost effective. The seeds saved in the CSBs can be used for grassroots breeding to improve the yield or productivity of landraces, making them resilient to changing micro- and macro-climatic conditions. These CSBs can also serve as ‘mini national gene banks’ or ‘reservoirs’ and could benefit from support by the national gene bank and the government.

PGR-focused: In this mode of operation, the main emphasis is given to the conservation of PGR, but at the same time, CSBs include some modern variety seeds to fulfill demand of members for high yielding varieties. However, the quantity of modern varieties is kept at minimum scale to the extent possible so that the conservation goal is not obscured. This is appropriate in regions where technological intervention is moderate, replacement rate of local landraces is medium to high, and agroecological conditions are moderately befitting for modern varieties. The CSBs could be appropriately linked with Participatory Plant Breeding (PPB) work so that rare, endangered but locally desired genes can be preserved by transferring them into new varieties through a PPB approach. Some varieties that were already lost from the region can also be introduced from the national gene bank.

Modern variety-focused: The modern variety-focused approach is the one in which CSBs deal with a high volume of modern varieties, but still keep local variety seeds in the seed bank to contribute to conservation as a secondary goal. Here, the main focus is given to high yielding varieties, but at the same time farmers are advised to plant local landraces even if it is in a small fraction of land. This may be appropriate in high production potential areas where farmers adopt high yielding varieties at the cost of local landraces, as modern

agricultural technologies are easily accessible and lands are suitable for adopting modern varieties. Seeds of both extant and extinct landraces can be collected from around the villages and the national gene bank and efforts could be made to revive them in the natural production system. Varieties saved in CSBs can be used for PPB and Participatory Variety Selection (PVS).

Table 1: Characteristic features of CSBs following different modes of operation

Criteria used	PGR-based	PGR-focused	MV-focused
Primary goal	Conservation	Conservation	Food security
Focus species	Native crops	Native and modern	Modern
Varieties included	Local landrace	Local landraces	Modern variety
Access to technology	Low	Low to medium	High
Production system	LPP	LMPP	HPP
Quantity of transaction	Low	Medium	High
Linkage with breeding	Grassroots breeding	PPB	PPB and PVS

Note:- LPP: Low Production Potential; LMPP: Low to Medium Production Potential; HPPS: High Production Potential

In addition to this classification system, CSBs can be classified on the basis of type of seeds or varieties included, their role in multiplication, processing methods, storage methods, modes of seed exchange, gender roles, and scale of operation. Details are presented below in table 2. The classifications raise some important questions: Is conservation an option or a choice? Is it a compulsion, compensation, compromise, or insurance? What incentives do CSBs give to smallholder farmers? How can CSB integrate dual goals of conservation and livelihood development? How can local landraces and modern varieties be effectively and efficiently included in CSBs to avoid tradeoff between conservation and food security? Is there a need for a CSB in every single village to make farmers self-sufficient? Do different production systems require different types of operating mechanisms? How can CSBs be linked to participatory breeding approaches and national gene banks? These are just some examples that emerged from the analysis of the information gathered during the workshop.

Table 2: Classification of community seed banks using various factors

Comparison tools	Features/type/methods
Type of seeds	LR vs. MVs
Multiplication	Collective vs. individual
Processing	Farmers' traditional vs. modern
Storage	Individual vs. collective; traditional vs. modern
Modes of seed exchange	Cash, barter, loan, exchange
Gender role	Men vs. women vs. both
Scale	Small vs. large
Coverage	Village vs. national
Coverage of crops	Selected vs. all available
Scope	Seed bank in a community vs. community as a seed bank

Steps followed in CSB implementation

Although major elements are common among the practitioners, steps followed by them differ. The steps that most institutions follow is presented in annex III and a commonly workable, a simplified step-by-step procedure of CSB is depicted in figure 1.

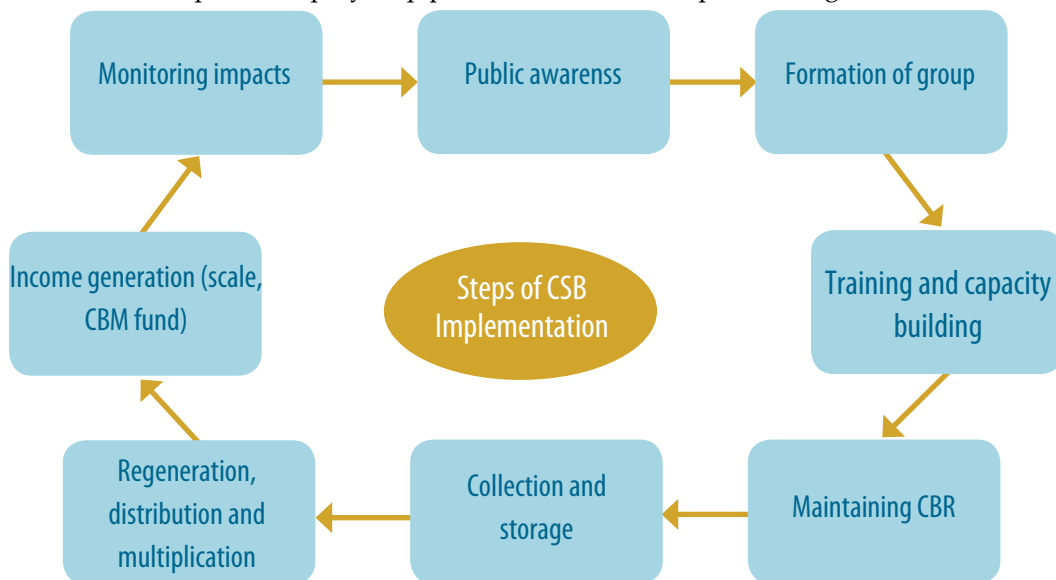


Figure 1: Steps followed in CSB formation and implementation

Challenges in implementing CSB

While CSBs are gaining ground in different geographic regions of the country, communities maintaining them face a multitude of problems. The problems observed and documented by the institutions supporting CSBs, as presented and discussed during the workshop, can be grouped into: (a) lack of clarity on concepts, objectives, goals; (b) lack of awareness, recognition and policy support; (c) poor integration of goals, themes and disciplines; (d) poor knowledge of CSB groups on hardcore science, especially in plant breeding; (e) difficulties in managing seeds and funds; (f) leadership, management and coordination; and (g) inadequate facilities and infrastructure.

There is a lack of clarity on the concept and objectives of CSB as well as a poor level of awareness on its approach among CSB groups, practitioners, policy makers, conservationists and development workers. As a result, CSBs receive poor policy support, and consequently integration of this approach into government systems is not happening at the desired pace. CSB groups and practitioners do not have adequate knowledge on advanced breeding science (e.g. genetics, molecular techniques) and thus there is poor technical integrity in management, handling, and maintenance of CSBs, which results in a high level of dependency on GOs and a handful of NGOs. For certain crops, especially those that are cross-pollinated, farmers face difficulty in maintaining pure seeds due to inadequate breeding knowledge. Due to lack of

proper training, CSB groups have poor knowledge for efficiently managing seeds and the fund and ensuring equity in burden and benefit sharing. Youth are losing interest in farming in general and local varieties in particular, resulting in their poor involvement, which is not well addressed by many CSBs. In many of the CSBs, there is a need to train dynamic leaders who have a long-term vision, proper management capacities and leadership skills. The linkage of CSBs with research and extension services offered by the government and NGOs has also not been receiving due attention.

Road to sustainability

One time investment and commitment of farmers or CSB groups is not enough to conserve their traditional varieties for a longer time. It is important to ensure they continuously engage in collection, regeneration and multiplication of seeds, especially of rare, endemic, and endangered crop varieties that are more vulnerable than common and widespread ones. The participants discussed a variety of tools, techniques, methods, strategies and policy issues related to sustainability.

To foster sustainability, it is important to combine conservation and livelihood goals and to set clear goals, objectives and pathways, taking into account local production systems, access to technologies and markets, and policy leverage. While local varieties are given priority, the adoption of modern varieties in regions where food security cannot be achieved only by maintaining local varieties should not be excluded beforehand. Even in high production systems, seeds of some rare, endangered and lost varieties could be preserved by collecting them from nearby the villages and borrowing from the national gene bank.

A CSB cannot sustain itself without the support of strong and well-governed local institutions that are vigilant to day-to-day activities and avoid unnecessary mishandling and conflict among members and with non-members. Collective effort is a must. Transparency, accountability and equitable burden and benefit sharing are all important factors to efficiently manage CSBs. A CBM fund can give impetus to a CSB group to become united and receive incentives while they maintain or promote local varieties.

It is important that the government and its line agencies working in the districts internalize integrate and institutionalize the CSB approach in their minds, programs, and practices. This requires appropriate policy and legal support from the central level. Proper incentive mechanisms should also be developed to promote CSBs and encourage practitioners and CSB groups to continue operating. There should be a clear policy on recognizing CSBs and farmers managing rich agrobiodiversity on farm and linking them with *ex situ* or the national gene bank. Current efforts are not linked to participatory breeding approaches despite the potential for conserving local biodiversity and developing locally viable, economically beneficial and ecologically resilient varieties. CSBs can be strengthened through linkages and coordination of farmers with national and international like-minded institutions, including private agencies, working in the field of agrobiodiversity conservation and food security.

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Annex 1: Status of CSB supported by different organizations

Organization	Year started	# of CSB	# of districts	Crop species	Variety
LI-BIRD	2003	15	12	Many	More than 1200 accession collected and conserved
Oxfam	2009	90	2 (14 VDCs)		
Parivartan Nepal	2006	1	1	43	
DoA	2009	5	5+2		

Annex 2: Objectives or functions of CSB

DoA	LI-BIRD	Oxfam	PARIVARTAN	Bioversity
Easy <u>access</u> of quality seeds and associated technologies <u>Conservation & utilization</u> of local landraces Develop as resource center <u>Empower community</u> and increase social cohesiveness	Conserve local varieties Improve farmers access to local crop diversity Deposit and share rare and threatened local varieties <u>Platform</u> to share knowledge and materials Provide strategic <u>seed reserve for adversity</u> Entry point for community based on farm management Platform for <u>social learning</u> Create a link between the communities and National Gene Bank	Easy access of quality seeds and associated technologies Conservation of LRs <u>Develop as resource center</u> Empower community and increase <u>social cohesiveness</u>	Conserve local seeds (emphasis on <u>threatened</u>) Provide quality seeds (mainly of vegetables) in all seasons <u>Increase income</u> Promote <u>organic agriculture</u>	Preserve, collect, <u>characterize</u> local seed <u>Multiply rare seed in situ</u> Improve access of seed and knowledge Place for social learning Multiply seed of PPB products <u>Ex situ - in situ linkages</u> Platform for <u>CBM</u> to realize on farm conservation

Note: Texts underlined and bolded are major objectives reported at least by one institute

Annex 3: Steps followed in CSB

LI-BIRD	DoA	Oxfam	PARIVARTAN
<u>Community sensitization</u> Establish and strengthen <u>local institutions</u> Development of <u>local rules and regulations</u> Construction of <u>CSB structure</u> <u>Collection</u> of local seeds Seed <u>distribution, regeneration and multiplication</u> Develop options for <u>livelihoods enhancement and income generation</u>	<u>Sharing</u> of CSB operational guidelines with the stakeholders <u>Orientation Training</u> for the DADOs on the procedures of establishing CSB Selection of VDCs and Community for CSB Formation of Community Seed Producer Groups (CSPGs) and Community Seed Bank Committee (CSB-C) <u>Supports and subsidy</u> Capacity building training to CSPG and CSB-C	Orientation and Community sensitization Development of community seed farmers Establish Seed management committee Capacity building of the SMC members <u>Registration to DADO</u> and formulation of operating guidelines Formulation of Quality assurance sub-committee Construction of community seed bank structure Equipping the structure Collection of quality seeds Documentation of deposits and withdrawals Linkages and collaboration Affiliation with existing or newly formed cooperative <u>Monitoring impacts</u>	Seed related training Quality control Local crop and variety identification <u>CBR (828 sps)</u> <u>Sharing in workshop</u> Brainstorming Infrastructure and support Capacity building Technical support

Note: Texts underlined and bolded are key steps reported by at least one institute

Appendix

National Workshop on Community Seed Banks: Workshop Summary Report

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Introduction

A community seed bank is an example of a local institution dedicated to the management of plant genetic resources of importance to farming communities. The first community seed bank (labeled as such) emerged in the middle of the 1980s in a number of countries around the world. Different forms of community seed banking practices are being promoted by different actors both within and between different countries. Some community seed banks are highly specialized in terms of the collection, regeneration, distribution and maintenance of local crop diversity and documentation of associated information and traditional knowledge, while others are engaged in production and marketing of seeds of improved varieties. In Nepal, since 1996, different organizations have been implementing and supporting community seed banks in a variety of ways and in different regions of the country. Currently, there are more than 100 self-proclaimed community seed banks in Nepal. This is most likely the highest number of any country in the world.

A first national workshop on community seed banks was organized by Local Initiatives for Biodiversity, Research and Development (LI-BIRD) from 14 to 15 June 2012, with the aim to bring community seed bank practitioners together to develop a common understanding on the concept (and practices), elaborate a typology in the Nepalese context, and identify future activities. Other specific objectives were: to review the working modalities of community seed banks in Nepal, to explore *ex situ* and *in situ* links and related policy issues, to identify challenges and opportunities of community seed banks, and to promote future collaboration and networking among relevant organizations in Nepal.

The workshop brought together around 40 participants from farming community, NGO/INGO, high level government officials and scientists from the national genebank, LI-BIRD, USC Canada Asia, Oxfam and Bioversity International. In the workshop, community seed bank practitioners shared their experiences and lessons learned. This report summarizes the main issues discussed. Workshop organizers are planning a workshop proceeding publication that will include several of the detailed presentations made during the workshop.

Partners and participants¹

Local Initiatives for Biodiversity, Research and Development (LI-BIRD) organized the workshop with financial support from Bioversity International, USC Canada Asia and Oxfam Nepal. LI-BIRD also contributed financially from Community-based Bioversity Management South Asia programme and Neglected and Underutilized Species Phase III projects supported by The Development Fund, Norway and IFAD respectively.

About forty people working on community seed banks, with experiences ranging from over one and half decades to a few years, representing farming communities, government agencies, NGO/INGOs, the Nepal Agricultural Research Council (NARC) and Bioversity International participated in the workshop. Among them were farmers, researchers, community seed bank practitioners, extension workers and national policy makers. In addition, there were scientists and policy experts from Bioversity International, LI-BIRD and USC Canada Asia. From the Government of Nepal, the Chief of National Agriculture Genetic Resources, the Chief of the Outreach Research Division, NARC the Director of the Crop Development Directorate from the Department of Agriculture and the Chief of the District Agriculture Development Offices of Kaski and Dadeldhura were present.

Organization of the workshop programme

The two-day workshop was divided into five sessions. The first session offered a global overview and conceptual understanding of community seed banks. The objective of this session was to share the historical processes, key concepts and typologies of community seed banks at the global level. There were three presentations in this session. The first by Ronnie Vernooy from Bioversity International was a global review of community seed banks. The other two papers were presented by Bhuwon Sthapit from Bioversity International and Pratap Shrestha from USC Canada Asia. These two conceptual papers were focused on community seed banks in the Nepalese context.

In the second session, national experiences on community seed banks were shared by LI-BIRD, Oxfam, Crop Development Directorate, and Parivartan Nepal, representing the main organizations that put community seed banks in motion in the country.

The final session of day one was on linking community seed banks with the national genebank. The presenter was the chief of the national genebank, Madan Bhatta.

The first session of the second day was allocated to representatives from farming communities who are operating community seed banks to share their experiences. There were three presentations from community seed banks of Bara, Lalitpur and Sindhupalchok districts followed by personal stories and reflections of three farmers from Dang, Sindhuli and Dadeldhura.

¹ See the list of participants in Appendix.

The rest of the workshop was dedicated to group work on four themes and specific tasks were given to each group separately. Group work themes were; i) development of a common definition of community seed banks, identifying and defining typologies and terminologies, ii) identification of emerging issues and challenges and suggesting possible ways to address those issues and challenges, iii) identification of policy gaps and a mechanism to develop linkages between community seed banks and the national genebank, and iv) identification of technical and management related problems and possible options to address those problems, including a mechanism for sustaining community seed banks when there is no support from external agencies. The outputs of the group discussion have been presented in the group work and recommendations section of this report.

Presentation highlights

- The concept of the community seed bank evolved in the 1980s and now more than 40 countries from around the world have implemented different forms of community seed banks.
- Despite its significant contribution to food and agriculture, until now, in most cases, this approach is being supported and promoted by aid agencies and civil society organizations. Formal recognition of community seed banks at national and international levels is largely missing. It is striking that the FAO's 2nd State of the World Plant Genetic Resources for Food and Agriculture (2010) makes no mention of community seed banks.
- Community seed banks fulfill several functions but the major focus has been on the conservation of local varieties, restoration of 'lost' varieties, crop and variety management in response to crisis/disaster, improvement of availability and accessibility, offering seeds at low costs or according to traditional system, sharing knowledge and expertise, helping poor/marginalized/women farmers and seed multiplication of participatory plant breeding varieties.
- In Nepal, the concept was first introduced in the late 1990s by USC Canada Asia in the central hills. In 2003, with some new innovations, LI-BIRD started community seed banks in the central terai area and from there has promoted community seed banks in 15 localities from the terai to the high hill areas. The Government of Nepal developed guidelines and piloted its 'own' community seed banks in 5 cases and planning to scale up in other 12 districts. Oxfam Nepal has supported the establishment of more than 90 community seed banks in 2 western hill districts namely Dailekh and Dadelhdhura in the last few years. The main goal of the community seed banks, supported by LI-BIRD and USC Canada Asia, is to promote plant genetic resources conservation whilst the goal of government and Oxfam promoted community seed banks are to increase production through increased seed replacement rates and increase availability of farmer preferred varieties. In practice, many of the community seed banks combine two or more objectives in a diversity of operations.
- The importance of linkages between community seed banks and the national genebank has been realized, but a clear mechanism for cooperation has yet to be developed.

- Despite many challenges, farming communities are managing community seed banks with minimal external support. On the other hand, farmers have realized the urgent need for policy and legislations to create a more enabling environment and for deploying efforts to strengthen community seed banks and guarantee their sustainability.

Group work and recommendations

Definition/conceptual clarity

Group 1 came up with basic elements for a working definition of community seed banks; conservation of plant genetic resources, community ownership/control of plant genetic resources, community governed and managed, recognition (legal and/or community-based), quality seeds based on agreed standard, seed production and distribution, providing platform for other community actions, are the basic elements for a definition. Community seed banks aim to promote the conservation and sustainable use of both local and improved varieties for food security and to improve the livelihoods of farmers. The group also agreed that the term 'community seed bank' should not be used if there is no plant genetic resources conservation activity.

Practical challenges

Group 2 identified gaps and challenges of community seed banks and suggested ways to address them. They are lack of policy, lack of common understanding of community seed banks, low coverage, more resources demanding, a need for greater capacity building effort, purity maintenance of seed, replacement of local varieties by hybrids and modern varieties, declining interest from farmers, limited scientific knowledge, focus may get diluted when combining plant genetic resources conservation and seed production of modern varieties. This group suggested to address the gaps by strengthening local institutions, improving information systems, mainstreaming community seed banks into the national system, formation of policy and legal mechanisms, establishing a seed revolving fund, linking with market and private agencies, developing a mechanism for providing subsidies and registration of community seed banks in the government system.

Linking community seed banks with the national genebank

The task of group 3 was to identify policy gaps and develop a possible mechanism to link community seed banks with the national genebank. Major policy gaps are limited focus on plant genetic resources conservation in general, a gap in linking existing community seed banks with the government seed production programme, no national level database on community seed banks, lack of information and material sharing among different agencies, community seed banks are not recognized by national policies (draft access to and benefit sharing bill, agrobiodiversity policy 2007, draft plant variety protection and

farmers rights act, agriculture development policies, seed policy and seed acts), no policy on linking community seed banks with the national genebank, lack of policies in defining and regulating community seed banks. The team suggested a revision of existing national policies and legislations to include community seed banks in draft bills, development of a comprehensive policy guidelines for community seed banks operations, a survey (review) of community seed banks and their modality across the country to develop an inventory of community seed banks in the country, and defined roles and responsibilities of the national genebank and other stakeholders for linking the various actors.

Group 3 also identified some activities for immediate action. It was proposed that the national genebank should develop a simple but concise plant genetic resource characterization form to be used by community seed banks, as well as a standard material transfer agreement (SMTA), prior informed consent (PIC), mutually agreed terms (MAT) system for safety duplication of community seed banks materials; prepare a certificate for community seed banks to recognize farmer's contributions to the national genebank collection; develop and make available technical/procedural guidelines for seed acquisition; develop a format and guidelines for seed delivery on request for community seed banks within the country; and provide technical support and training to community seed banks by 2012. For community seed banks, it was proposed that they collect seeds from local areas with standard information (passport data); update passport data of community seed banks collections; and support joint explorations for germplasm collection. The tasks suggested for facilitating organizations that provide support to establish community seed banks include providing financial and technical support to community seed banks, working jointly with the national genebank and community seed banks in developing the guidelines and regulations proposed, supporting to develop an inventory and passport data generation, facilitation of seed acquisition and delivery to the national seed repository for safety back-up, and involvement in joint explorations for germplasm collection.

Management of community seed banks

The fourth group was represented by farmers and they discussed problems and challenges faced by farmer groups, as well as suggestions to improve the management of community seed banks. They emphasized the existence of a policy challenge in the sense of lack of support and clear rules and regulations. Other problems identified, were: the lack of enough financial resources, less interest of farmers in local varieties, problems in marketing seeds, lack of physical infrastructure, lack of technical knowledge in managing seeds and regeneration of collected seeds. Their suggestions to overcome the issues were a supportive policy and if necessary, legal act on community seed banks; that the District Agriculture Development Office, Village Development Committee and District Development Committee should include community seed banks in their regular annual plans: that subsidies being provided by government programme should not be limited only to government supported community seed banks; development of rules to register the best local varieties; subsidies related to seed equipment; provision of incentives to custodian farmers and inclusion of the topic of agro- biodiversity in the school curriculum.

Lessons learned

Learning from cases

Workshop participants learned from each others' presentations and the discussions about the concept, typologies, status and implementation modalities of community seed banks, in Nepal to a large extent and around the globe to some extent. There is no single type of community seed bank, but a number of core elements can be identified.

Conceptual clarity among workshop participants

Different organizations have different understandings of community seed banks and are using the term in their own way. The workshop developed a generic definition of community seed banks and concluded that plant genetic resources conservation is a central function of community seed banks. Farmers groups that deal in essence mostly with the production of seeds of improved varieties could best be labeled as a seed enterprise.

Identification of gaps both in policies and practices

Based on more than 15 years of experience in the country, several gaps and challenges were identified covering organizational, technical, and policy/legal aspects. This kind of analysis gives clear direction to community seed banks actors about where their efforts are needed. In particular, policy gaps and linkages between community seed banks and the national genebank were well discussed. A suggestion was made to start working on a 'national genebanking system' that would combine *in-situ* and *ex-situ* conservation and serve local and national needs and interests. This suggestion was well received by the participants.

Short term action plan developed for linking community seed banks with the national genebank

Community seed banks and the national gene bank can play complementary roles in managing plant genetic resources, but until now very little interaction has taken place. This workshop has done something concrete to work on this issue. The chief of the national genebank readily agreed to take some concrete steps, such as the development of contractual arrangements (SMTA/PIC/MAT) and a guide for collecting passport data in community seed banks by 2012.

Initiation of a platform for collective action

Different NGOs and the government are working on community seed banks but they had never met to exchange experiences and develop a common agenda. This workshop brought many of the key actors together to discuss issues of common interest. The Crop Development Directorate of the Department of Agriculture wishes to work together with NGOs and, vice versa, NGOs aim to collaborate with the government and the national genebank. It is the beginning of a shared undertaking towards the strengthening of community seed banks in Nepal.

The road ahead

Proceeding publication

Given the richness of experiences and lessons learned that have global relevance, it has been proposed to work on a workshop proceeding publication (in English). The proceeding would be structured according to the workshop programme and presentations. LI-BIRD will take the lead in the workshop proceeding publication.

Global proposal

Several important issues have emerged from the workshop on which different partners can work together. Bioversity International and LI-BIRD will work together to develop a global proposal and other partners will be invited at an appropriate stage.

National and international links

The workshop generated some concrete ideas to start linking community seed banks to the national genebank, and, potentially, through the national genebank to the international genebank system. The organizers of the workshop agreed to work together to move the policy/legal agenda in support of community seed banks forward. A concrete first step is the collaboration between the community seed banks and the national genebank towards the development of a national genebanking system for Nepal.

Evaluation of the workshop

At the end of the workshop, participants were asked to provide feedback in two ways; the positive aspects of the workshop and suggestions for the organizer. Most of the workshop participants clearly expressed that the workshop was well organized with good structure and time management and conducive environment was created for learning, sharing and discussions. Many of them also mentioned that the workshop was inclusive and represented multi-sectoral stakeholders and the forum given to farmers was well appreciated, while the Academia was conspicuous in their absence. They found the content very relevant and the workshop created a platform for a common understanding of community seed banks and further action plans.

In terms of suggestions, they pointed out that more participation of farmers especially women and representation from local government, Ministry of Agriculture Development and other practitioners of community seed banks would have made it better. Similarly, they have suggested to organize such workshop on a regular basis to bring experiences together. As most of the power point presentations were in English, farmers have suggested to address language barrier by having bi-lingual presentations and distribution of handouts. They also have suggested to do prompt follow up of the actions identified at the workshop.

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