Field Guide Module

for Community Seed Banks

Foreword

This Field Guide module has been developed drawing from a wide range of sources and experiences, from within the SD=HS programme and from various other organizations, and has benefited in particular from the longstanding efforts of Bioversity International in this field.

The Guide is intended to be used in the context of farmer field schools. It is modest in size, involving a series of six sessions in total, and you may opt which sessions to make use of. It complements the work and Field Guides on Participatory Plant Breeding and Nutrition within the SD=HS programme, as well as its efforts in the area of Farmer Seed Enterprise.

Contents

1. Introduction

1.1. Farmers' seed systems

Seed systems describe the ways in which crop seeds are developed, produced, stored and exchanged or sold. They also describe which actors are involved and which roles they play. Three different types of seed systems are often distinguished.

The oldest system is the farmers' seed system, also called the informal seed system. Worldwide, farmers provide the large majority of seed until today. Approximately 80 to 90 % of the world's seed stocks are provided through these "informal" systems. They are locally organised and based on the ways farmers produce, disseminate and procure seeds through on-farm saving and exchange with other farmers. This seed system is integrated in the local food system and food culture, where a large number of farmer-selected species and varieties are being developed and used in fields, gardens and households.

Local seed supplies are crucial. Seeds are related to food, culture, religion and local traditions. Taking care of quality seeds has always been a core task for farmers and farmers are constantly on the outlook for seeds that will give them the best harvest. Many farmers particularly in developing countries still maintain seed diversity on their farms, where seeds may have been selected and conserved through generations, depending on individual farmers' skills. In many cultures, women play a prominent role in seed management.

In addition to the farmers' seed system, in the previous century a formal seed system developed. The formal seed system involves a chain of activities leading to genetically improved products: certified seed of registered varieties. The chain starts with plant breeding or a variety development program that includes a formal release and maintenance system. Both public sector breeding institutions and private sector breeding companies form part of the formal sector. The private sector tends to focus on a few profitable seed crops such as calorie-rich cereals and vegetable seed, leaving most legumes, including beans, largely by the wayside.

More recently, an integrated seed system has been coined out of the realization, that the farmers' seed system and the formal system co-exist and cannot be separated. Farmers may usually produce and maintain their own seeds, but for some crops and in some years decide to buy formally released seed.

Seed systems and the conservation of genetic resources. Seeds produce the plants that produce our foods. They contain the genes that determine the traits of our crops. This is embodied in the term genetic resources for food and agriculture. Our crops and thus the seeds from which they are grown have changed over place and time since the beginning of agriculture. Over the last century, many local varieties and the traits incorporated in such varieties have been lost due to the industrialisation of agriculture. This process is called genetic erosion. To stop genetic erosion, conservation of our plant genetic resources has become a major goal of the international community. Two strategies have been promoted over the last decades to conserve plant genetic resources for food and agriculture, called *ex situ* conservation and *in situ* management of plant genetic resources. *In situ* means in the regular place ("site"), whereas *ex situ* means out of its regular place. These terms signify the *ex situ* conservation of plant genetic resources in genebanks in the public sector (often in breeding institutions or universities), and the *in situ* management of plant genetic resources in farmers' fields an under farmer management. Community seed banks sit on the interface between *ex situ* and *in situ* approaches.

1.2. Community Seed Banks

In a number of countries, community seed banks support farmers' seed saving and exchanging. Community seed banks are collections of seeds that are maintained and administered by the communities themselves. Seeds can be stored by a community either in large quantities to ensure that all planting material needed is available, or in small samples to ensure that genetic material is available over time should varieties become endangered. Facilities can vary widely, from simple to elaborate constructions; they can even function as "virtual" seed banks, meaning that individual farmers store the agreed seeds in their own houses or premises, but this decentralized system of storing (and re-using) is still discussed, agreed and formalized and between the farmers in the community, and their work is documented to facilitate the maintenance of the varieties and the use of the seeds.[1]

Over time the following goals have emerged, all in the context of strengthening community-based on-farm management of agricultural biodiversity:

- To conserve and revive traditional crop varieties and document traditional knowledge
- To provide access to required quality and quantity of seeds of locally adapted crops and varieties, particularly of plants with important economic, cultural and nutritional importance
- To strengthen the multiple functions of the farmers' seed system and crop improvement
- To manage the community seed diversity locally and under the control of the farming community
- To empower farmer organizations and supporting local governance
- To provide a platform for social learning and collective action

Vernooy noticed that community seed banks may fulfil any of the following roles, to:

- Conserve local varieties (food, fodder, herbs and medicines, religious uses)
- Restore "lost" varieties (for example, due to natural disasters)
- Provide crisis/disaster/shortage responsiveness and insurance
- Improve accessibility of seeds at the community level (traditional and modern varieties)
- Secure storage of seeds in areas affected by unrest
- Offer seeds at low(er) costs (than the commercial sector)
- Facilitate seed swaps
- Guarantee seed sovereignty
- Help particular groups to obtain seeds
- Ensure seed multiplication, including of participatory bred varieties
- Provide income through the sales of seeds
- Share agricultural biodiversity knowledge and expertise
- Create a platform for community-based biodiversity management
- Link *in situ* and *ex situ* conservation
- Contribute to green or ecological agriculture, or to food sovereignty movement

[1] Whereas the concept of virtual seed banks is not further elaborated in this module, many elements in this module equally apply to efforts in relation to such virtual seed banks, with the exception of the chapter devoted to the facility. Virtual seed banks may fit certain farming systems and local cultures, where a community seed bank making use of a separate facility is not preferred.

1.3. Genetic erosion

In all countries and in all farming systems the genetic composition (the traits) of crops and varieties keeps changing, and new crops and varieties arrive whereas some crops and varieties disappear. Over time and across the globe, by this process farmers created an enormous diversity in crops and varieties, adapted to their farms and environments and to local preferences and cultures. Over the last decades a large part of this diversity has disappeared or has become rare, due to the rise of the formal sector that created more uniformity and to globalization that resulted in a more uniform global diet, as well as more recently as a result of climate change. The loss of crop diversity (between crops and by trait within crops) is called genetic erosion. Genetic erosion is a negative development because the diversity in farmers' fields is the basis for the selection of new diversity (through breeding, both by professionals and by farmers), and because the lack of crop diversity also means the loss of food diversity and of food culture. Genetic erosion is accompanied by the lack of traditional knowledge regarding the diversity that is lost: a crop or food plant unrecognized is also a crop or local food plant not valued and underutilised. As much as women often play a central role in the management of seed they also maintain most of the traditional knowledge on local crops and food plants. It is a challenge to keep the traditional knowledge alive and to pass this knowledge on to younger generations in order to keep it alive. This is also part of the community seed bank agenda.

1.4. Climate change impact

Unfortunately, climate change is here to stay. Weather patterns have changed and in many countries this change has impacted on crop production. For example, growing seasons have shortened or shifted to later periods in the year, or weather events have become more extreme (both droughts and heavy rainfall). New pests and diseases have arrived as a result of changing weather conditions. Not all crops and varieties can be grown effectively anymore. Growing seasons might have become too short for certain varieties and drought might kill certain crops in some years. Whereas climate and weather patterns have always changed over time, nowadays these changes occur so fast, that the crops cannot adapt, and farmers are unable to select those crop plants in the field that can better cope with the changes. Climate has outpaced the capacity of the crops and varieties to adapt naturally. As a result, farmers are forced to search for a new diversity in new crops and varieties that is better adapted to the current circumstances, and that also provides all nutrients necessary. In many countries farmers need to look beyond their own region, or even beyond their own country, and they need help to do this. Supportive breeders in the formal sector might help out, by providing new varieties or by providing breeding materials from which farmers themselves can select new and better adapted varieties, as through participatory plant breeding. Community seed banks may be used to store and distribute both the traditional and the newly selected varieties.

1.5. Conservation approaches

In response to genetic erosion and more recently to climate change impact, conservation efforts have been undertaken, in both the formal sector and in the farmers' seed system. Some farmers have deliberately taken the effort to maintain threatened crops and varieties that are no longer widely grown and appreciated. They grow these (almost) forgotten crops and varieties often on small plots and in home gardens, because they appreciate this diversity. This has been called on-

farm management and conservation, to signify that the farmers concerned may also change the diversity they deliberately maintain over the years: it is actively managed in the field in order to conserve it. In addition, the formal sector has developed an approach which is called *ex situ* conservation. *Ex situ* is Latin language, meaning out of its ordinary place. The seeds are not conserved by growing them each year in farmers' field but they are stored in special facilities, called genebanks, in which the seeds are maintained under low humidity and at low temperatures, as low as -20˚ C. Specialists called curators maintain the exact identity of the entered varieties. The diversity in these varieties is frozen, both literally and genetically.

For a long time the proponents of these two approached quarreled but nowadays it is accepted that we need both. Community seed banks try to combine some of the positive traits of both approaches: the seeds are maintained by farmers and in their control, they are often regrown (and slowly adapted) in their fields, but the storage conditions and the way the stored seed is managed (entered and distributed) has improved compared to storage in farmer homes.

1.6. How to use this module

This module is devoted to community seed banks: how to establish and manage community seed banks in a sustainable way that is affordable and beneficial to the community. It can be used by communities that are planning to develop a community seed bank, but also by communities that have already done so, and wish to discuss and improve its functioning. It can be integrated into Farmer Field Schools in Participatory Plant Breeding or into Nutrition, but also be used as a stand-alone activity. Like in any regular Farmer Field School it is best to organize interested farmers in the community into a group, discuss the objectives of the exercise and plan the activities.

The module builds on experiences with Community Seed Banks worldwide and focuses on ways to make the Community Seed Bank operations sustainable over time: which are the desired community seed bank functions, what can farmers expect from the community seed bank, how can we ensure that the investments pay off and the results of the work undertaken are lasting. It also deals with ways to link the local community seed bank to a network of seed banks and with the national genebank. The module contains a number of core exercises that can help communities to develop and manage their community seed bank. These can be undertaken in a small number of sessions, focusing on diagnosis (1), planning (2), seed bank design (3), community seed bank management (4), uptake and distribution of seed (5), and integration in community activities (6), approximately six half-day sessions in total. A list of questions provided below on each of these items may guide the discussions. The chapter on further reading is of relevance to the trainers. Trainers are advised to read that text in advance of the training.

Session	**Topic**	**(Sub)chapter this module**
1	Diagnosis	2.1 – 2.3
2	Planning	2.4
3	Seed bank design	3
4	Seed bank management	4.1 – 4.5
5	Uptake and distribution of seeds	4.6
6	Integration in community activities	5

2. Diagnosis and planning

2.1. Mapping crop and variety and food plant diversity

A first exercise in the diagnostic phase is devoted to a discussion on current crop and variety diversity available in the community. This can be undertaken in the form of the Diversity Wheel exercise. Farmers who participated in a Farmer Field School on Participatory Plant Breeding or on Nutrition may have undertaken such exercise already. For them, this is a repeat benchmark activity, be it that the exercise will explicitly include attention to cultivated field crops as well as smaller home garden crops and collected food plants (semi-domesticated and wild plants). The Community Seed Bank may contain all these types of crops and other food plants. Note that the exercise has a dual nature: first it is performed at the crop level, and subsequently at the variety level.

Objectives

To map the crops and varieties as well as additional semi-domesticated and wild food plants used in the community

Recommended duration

2 hours. The entire duration of the exercise should be twice one hour, for the crop and for the variety levels respectively. This exercise can be combined with the next one in a single session.

Materials required

Sheets of paper, writing materials, (stones and twigs for outside layout of the diversity wheel)

Description

The Diversity Wheel is depicted as a circle divided into five segments (Figure 1). Each segment corresponds with a category:

1. Crops cultivated by many farmers on larger plots of their land. These are staple crops that are most important in fulfilling farmers' food security needs.

2. Crops cultivated by many farmers on smaller plots, e.g. in home gardens. These are crops with specific uses that are not needed in very large quantities, but that might be important to (improve) diet and nutrition. Such crops may include semi-domesticated plants.

3. Crops cultivated by few farmers on larger plots. Often these are crops grown for sale in commercial markets (e.g. under contract with a trader).

4. Crops cultivated or local food plants maintained by few farmers on small plots. These crops are at risk of being lost. They are maintained because of specific traits or uses that are of value to the people growing them. In some cases, these are also newly introduced crops that are being tested by farmers.

5. Crops and other food plants that are no longer cultivated by the villagers, representing lost but known diversity. These are crops and food plants that have been considered as being no longer useful to the community or simply forgotten, or that have been inadvertently lost due to weather conditions or other events, but that have remained in farmers' memories.

Farmers are now to perform the same exercise with the same five categories, but this time focusing on varieties within each crop mentioned. In contrast with the exercise in the FFS on PPB, the intention is not to select one or few crops and varieties only, but to include all crops and varieties. Moreover, the scope of the analysis is expanded since it can also address semi-domesticated and wild food plants. The group is asked to keep the results of the two exercises for later discussion.

A full description of the exercise can be found under chapter 4.2 of the SD=HS Field Guide on Participatory Plant Breeding.

2.2. Mapping farmer seed sources

In an a second and complementary exercise participants are asked to discuss and list their seed sources, per individual crop and variety, building on the results of the first exercise.

Objectives

To map the various farmer seed sources, including cultivated crops and varieties as well as local food plants, and different informal and public/private sources

Recommended duration

1 hour. This exercise can be combined with the previous and the next one in a single session.

Materials required

Sheets of paper, writing materials

Description

The following seed sources can be distinguished

A. Farmer varieties/traditional varieties
    1. Farm-saved seed, from own farm
    2. Farm-saved seed, obtained from other farmers in the community
    3. Seed bought in farmer seed markets, provided by farmers from own and other communities

B. Formally released varieties (private and public sector varieties)
    1. Farm-saved seed, from own farm
    2. Farm-saved seed, obtained from other farmers in the community
    3. Seed bought in farmer seed markets, provided by other communities
    4. Seed bought from registered seed sellers or seed companies

C. Local food plants
    1. Semi-domesticated, grown in home gardens or supported/allowed inn farmers' fields
    2. Wild food plants, collected from river beds, road margins, forests, etc.

A separate table can be elaborated, as per the structure above, and all known crop varieties listed in this table. Alternatively, special pencil colours can be used to mark the entries saved from the Diversity Wheel exercise above in the Diversity Wheel format.

2.3. Current seed storage in the community

As a third component of the diagnosis participants are asked how each of the listed crops and varieties are stored in the community. The entire FFS group may best be split up in sub-groups, including female-only groups.

Objectives

To list and evaluate the different ways and sites where and by whom seed is stored in the community

Recommended duration

1 hour. This exercise can be combined with the previous two exercises in a single session, and completes a first session.

Materials required

Sheets of paper, writing materials

Description

The following storage types can be distinguished:

1. Seed stored in/next to the individual farm house, by most farmers
2. Seed stored in/next to the individual farm house, by some (specialized) farmers
3. Seed not stored regularly in the community

For each entry the following questions may be discussed:

1. Why do farmers store their own seeds?
2. Which types of seed do farmers store (local, modern)?
3. How and by whom is seed selected for storage?
4. How is the seed cleaned and dried?

These questions prepare for the later sessions dealing with community seed bank lay-out and seed intake, and storage conditions.

Participants are asked to evaluate storage conditions, and the main challenges they are faced with. They should discuss for which crops and varieties current storage conditions in the community are satisfactory, acceptable or poor.

The three exercises provide the basket from which crops and varieties as well as local food plants should be selected for inclusion in the community seed bank. They should help farmers in prioritising crops and varieties as well as local food plants for inclusion of seed samples in the community seed bank.

2.4 Setting targets for uptake of seed lots in the community seed bank

In a second session, the participants in the FFS module on Community Seed Banks will be asked to set targets for the development of the Community Seed Bank. (This may also take the form of a virtual seed bank, in which the various seed lots are stored in farmers' properties, see chapter 1.2.) In case a new facility is developed and will be populated with seed lots, the information gathered in the first session (the three exercises described above) suffices. In case the participants already manage a Community Seed Bank and seed lots have already been stored, an overview of the current deposits will be needed as input for the discussions.

Sub-groups may be formed including women-only groups, to allow for a process in which all views and interests are taken on board.

Objectives

To agree on the objectives for which a Community Seed Bank is to be established.

Recommended duration

This exercise may need a full FFS session. The questions in this exercise will need careful attention, and wide agreement in the community in order for the Community Seed Bank to answer expectations, to warrant efforts of the community and to become a sustainable effort.

Materials required

Sheets of paper, writing materials

Description

The following questions need to be addressed.

- For which purposes is the Community Seed Bank established?

Different motives for establishing a Community Seed Bank can be distinguished, and these are not mutually exclusive and all may be relevant. The following questions may be asked to the participants:

- Why do you want to have a Community Seed Bank: is it to rescue all crop diversity in the community that is under threat of being lost, or is it to serve as a centralised seed storage facility that can provide farmers with sufficient quantities of seed of their crops and varieties of choice at the start of the growing season?
- Is it also needed to cope with calamities and emergencies?

The answers to the question on which type of Community Seed Bank as elaborated above will also direct the answers to the following questions.

- Which crops and food plants to target?
- Does the diversity of selected crops and other food plants listed for inclusion in the Community Seed Bank ensure the presence of different food groups (e.g. cereals, tubers and roots, vegetables, fruits, legumes, nuts and seeds, spices)?

If conservation of local crop diversity is the major aim, is there any limitation for uptake at all? How to deal with lots from different farmers for the same varieties? Can it be agreed at the start of a growing season who will provide seed lots for which varieties? If seed security is the major driver

and larger quantities need to be stored, which crops and varieties may be most important for the community?

- Which seed volumes?

If seed security if the major driver, is it left to the seed providers how much is being taken up at the end of the growing season, or are intake targets set by the joint community members at the beginning of the season?

- Who will be providers?

Should agreements be made on who will deliver how much seed for which variety? Or is that not feasible implying that if volumes are insufficient to serve community needs, then other seed sources will have to complement what cannot be provided by the Community Seed Bank in the locality?

- Who will be users?

Can only providers have access to their own stocks? Can other members in the community also get access to seed stored? Can farmers from other communities have access to surplus seed? How do they pay?

Below facilitators will find some further information based on experiences globally.

A. Community Seed Banks may focus on conservation of local crop genetic diversity, and therefore include only local landraces of native crops in the storage facilities. This may be the goal in communities where local germplasm is still abundant but is under potential threat, and farmers are aware and wish to secure survival of their local crop diversity. In more remote areas in particular, where access to markets is poor, this may be the major reason for establishing the Community Seed Bank. In this context, storing of smaller quantities of all crop varieties remaining in the community for several years (as long as seed germination rates remain satisfactory) is the prime practice. Since this type of Community Seed Bank is to cover local varieties of native crops adapted to the region, it is only needed in one site in the region. In such agro-ecosystem a duplication of efforts by establishing several Community Seed Banks with more or less the same holdings needs to be avoided in favour of a single well managed facility for that entire region. The seeds saved in this type of Community Seed Banks can be used for Participatory Plant Breeding, in particular for adaptation to changing climatic conditions and other changes in the agro-ecosystems, and for re-selection of most valued properties. Such Community Seed Banks clearly fulfil a role as local genebanks and could benefit from close collaboration with a national genebank and from governmental support.
B. Alternatively, a Community Seed Bank might be established to guarantee access to sufficient quantities of seed to all farmers in the community of all crops grown in the community for which seed is not preferably purchased from external sources. The seed lots in storage are produced in the community. In this set-up, the Community Seed Bank replaces or completes seed storage on the farm by individual households in the community. Such option might be attractive to communities where seed storage facilities are poor or prone to damage because of weather events, or where protection against certain pests and diseases appears a major challenge. This type of Community Seed Bank might also help households in the community that have no or limited options to produce and effectively store sufficient amounts of seeds and may help farmers in the community who wish to experiment with crops and varieties that are grown by other farmers in the community but not yet by them. In some cases, farmers from other (neighbouring) communities are also allowed to buy stocks from such Community Seed Banks. The varieties included for storage may include

both (local) farmers' varieties and registered varieties obtained from the private or public sector. Seed volumes are rather high since they need to serve the entire community.

Percuna Ferrer. 2018 Do community seed banks contribute to socio-ecological resilience? The case of the Sierra de los Cuchumatanes, Guatemala. Bioversity International.

The seed reserves in the Sierra de los Cuchumatanes were established in the context of the Collaborative Program of Participatory Plant Breeding (PPB) in Mesoamerica that started working in the area at the end of the 1990s in a collaboration between FUNDIT (Fundación para la Innovación Tecnológica, Agropecuaria y Forestal), ICTA (Instituto de Ciencia y Tecnología Agrícola) and ASOCUCH. Through this PPB program, the local agrobiodiversity, including 'teocintles' (wild relatives of maize) and rare varieties, was collected and characterized. Besides, farmers were trained in stratified mass seed selection. Using this method gradually improved the performance of local varieties. The first community seed bank founded was Quilinco with the objective *to conserve, manage and use the agrobiodiversity from the PPB activities* (long-term conservation). Quilinco community seed bank members have access to these improved maize and bean varieties through 'pase en cadena'. The Quilinco experience was later replicated in other communities. 'Pase en cadena' or pass it on along the chain, is a technique whereby each farmer is given a certain amount of seed before planting time with the condition that the same amount of seed is given back after harvest. The returned seeds are given under the same conditions to other farmers who plant them in the next cropping season. In this way, new seed varieties are disseminated within the community. In the years following the establishment of the first community seed banks ASOCUCH broadened and reshaped the concept by adding two more functions:

1. Conservation of private seeds

(short-term, seed renewal every crop cycle). Through this service, the farmers have the possibility to use the physical space of the community seed bank where temperature and humidity are controlled and seed quality regularly monitored to store their private seed. In case an emergency affects seed production, farmers can take out 75% of the stored seed leaving the remaining 25% for the next planting season. In this way, family seed supply is ensured also in emergency situations.

2. Provision of seed in emergency situations

Community seed banks are equipped with large silos containing locally adapted good-quality seeds. This allows to react quickly when an extreme event occurs ensuring the continuity of the production activities without compromising the conservation of the local agrobiodiversity and the local food and nutrition security. A farmer who is a member of a community seed bank is also a member of the ASOCUCH group of farmers. This gives access to projects, technologies and incentives that ASOCUCH manages. ASOCUCH provides them a broad-range of trainings that cover aspects such as agrobiodiversity characterization and management, seed selection and management, sustainable crop management practices, farmers' rights, and gender equity. ASOCUCH also offers general trainings on how to organize and share the responsibilities within a group to efficiently and sustainably manage a community seed bank.

The magnitude of change experienced by the farmers for being member of a community seed bank resulted closely related to the degree of community seed bank implementation. Farmers perceived greater changes in Quilinco where there has been full implementation and a longer period of time than in Secheu or Com where the implementation is partial (Secheu) or the community seed bank is still in an incipient phase (Com). The degree of implementation not only depends on the time a community seed bank has been running, as is the case of Com, but also relates to aspects of the social organization/network of the local communities, how empowered the management committee is (and thus, its leadership capacity) and to the level of community ownership of the project. Another factor explaining the difference in the magnitude of change is the base-line situation in the

community at the time of establishment of the community seed bank. For example, in Quilinco the magnitude of change regarding organization and team work is less pronounced because there was already a strong social organization when the community seed bank was established compared to other remoter communities, such as Secheu or Com. Regarding how frequently each change was mentioned, change categories were divided in two subgroups.

Group 1 includes seed and crop related changes which were mentioned by most of the farmers during the individual interviews. They received higher scores in the final workshops. Seed-related changes include increase in seed security; increase of seed storage time; better seed access and availability in case of extreme climatic events; more access to improved seeds; higher seed quality and increase in seed exchange. Crop-related changes include increase in agrobiodiversity; introduction of new varieties and recovery of local varieties (all of them referring only to maize and beans).

Group 2 includes those categories of change that were only mentioned by few of the interviewed farmers. All of these changes were corroborated in the final workshops, but received lower scores than the ones included in Group 1. This is the case of the categories “private benefits”, “information and knowledge”, “organization and team work” and “gender”. Private benefits include increase in maize and beans yield, and increase in the nutrition of the family. In none of the three in-depth studied communities farmers experienced an increase in income or better market access. Information and knowledge include better access to seed-related information; more information exchange among farmers; more knowledge sharing among farmers; higher level of experimentation with crops and varieties; learning of new methods and techniques of both farm management and seed selection. Organization and team work include more capacity to work in a group and learning the responsibilities, and tasks associated with each role. Gender includes changes such as greater participation of women in responsibility positions, in seed-related activities, and in farming-related activities.

Storage in a community seed bank in Zimbabwe

3. Designing optimal community seed bank facility

In general, community seed bank facilities have taken many sizes and designs, depending on local needs, opportunities and available finance and materials.

Objectives

To agree on the physical functions that the Community Seed Bank is to provide.

Recommended duration

This exercise will need a full FFS session, since for many participants designing is not an issue to which they are very familiar.

Materials required

Sheets of paper, writing materials. The sheets of paper should serve to experiment with the lay-out of the facility.

Description

The following aspects can be discussed, asking the participants to discuss the following questions one by one.

- How much space is needed to store the expected seed lots and volumes?
- Which rooms should a community seed bank contain for which purposes?
- Which building materials might be available that offer best protection to external threats?
- Which seed containers might be available that best fit the plans of the community seed bank?
- How could documentation be organized?
- Which location might become available and how could availability of the site be realized?

3.1. Size

The surface size of the community seed bank depends on estimated seed demands, financial options and location. Most community seed banks range in size from 25 to 100 square meters.

Examples of existing genebank lay-outs and outlooks established by various partners have been included below.

A Community Seed Bank in Guatemala, los Cuchumatanes

3.2. Subdivisions

Most community seed banks provide subdivisions. Some genebanks have separate rooms for short-term (season-to-season) and longer term (several seasons) storage, or for small sample and larger sample seed lots, alternatively for seed that is owned by the community seed banks or seed lots that are still owned by the providers, who in fact hire safe storing space. Many facilities contain a room for the community seed bank managers, and many contain space for community member meetings, either connected to the community seed bank activities or not. Furthermore, the premises may also allow for seed sales and seed fairs, if the opportunities allow. Various spaces also allow that some rooms are locked and only allow entrance of qualified visitors and users.

3.3. Protection against water, high temperatures, birds and pests

Community seed banks need to offer safe and secured space. Seeds in storage need to be protected in order to keep good germination rates and seed health. Major threats come from moist and from high temperatures, as well as from fungi and animals. Therefore, roofs need to be sturdy and to resist high winds, and only brick walls protect against high temperature and can protect the seed against the entry of rats, mice and birds. Small openings between the walls and the roof need to be closed. High trees may protect against high temperatures, and may be planted if not around. The site should also be safe against flooding.

3.4. Type of furniture and seed containers

Many community seed banks contain wooden or metal racks on which the containers can be placed.

Containers can be manifold. Many community seed banks store the seed in glass jars, plastic containers or metal tins that can be firmly closed, for example with rubber rings on the lids. Zeolite beads can be used to keep moisture levels low. Most important is that the jars can be well sealed to avoid repeated exposure to oxygen and to keep humidity low. All containers should have proper labels to identify the contents of the jar. Temperature and humidity in the facility should ideally be monitored, and readings should be documented, preferably on a daily basis. More information on seed storage is offered in the following booklet issued by Bioversity International: How to develop and manage your own community seed bank farmers' handbook (updated version), Technical Issues. Ronnie Vernooy, Guy Bessette, Bhuwon Sthapit with Arnab Gupta. 2020[2]

In the management space, tables and an office locker for storing the seed books and other relevant information may be important. If possible, depending on electricity, a desk top or lap top computer can be used for documentation, and simple software as Excel will be sufficient to store relevant data.

[2] It is available online using one of the following links:

https://www.bioversityinternational.org/seedbanks/ or
https://cgspace.cgiar.org/bitstream/handle/10568/92001/Technical_Vernooy_2020.pdf?sequence=4&isAllowed=y

Seed storage equipment in a Community Seed Bank in Laos

3.5. Location

The availability of proper locations will depend on conditions of land ownership in the community. A community seed bank might be established on communal land or on land that is private property but is being made available on a permanent basis for the purpose. Since the Community Seed Bank facility is a long-term investment, make sure that no disputes about the use of the site can develop.

Within this context, the location of the community seed bank facility should be carefully chosen, taking into consideration that the site and facility might fulfil other purposes, such as trainings, seed markets and food fairs, which may contribute to the sustainability of the community seed bank. Proximity to other social hubs might increase the numbers of visitors and help to remind the members of the community of the community seed bank. Safety against theft may also factored in.

4. Community seed bank management

A community seed bank, by terminology itself, is a community-managed approach that expands and transfers local practices from the household seed store to the community level through collective actions. 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 previous sessions, FFS participants discussed the needs of the community and the resulting objectives of the Community Seed Bank. This session focuses on the management of the Community Seed Bank in order that it can ensure its expected functions, i.e. to properly store seeds given in stock and to hand out seeds of appropriate crops and varieties as well as local food plants to farmers.

Objectives

To agree on the management of the community seed bank, including its membership, financial resources, community contributions, composition and functioning of a seed bank committee, documenting the seed lots in stock, formalization of the seed bank, and the uptake and distribution of seeds.

Recommended duration

This exercise will need one or two FFS sessions: proper management of the Community Seed Bank will determine its success and sustainability. The session is subdivided in a number of smaller issues.

Materials required

Sheets of paper, writing materials. One of the participants may volunteer to take notes, and document the agreements.

Description

In the paragraphs below distinct management aspects are discussed.

4.1. Establishing membership of the seed bank

All farmers in the community or communities served by the community seed bank can become members of the community seed bank. In promoting membership, the participation of women and youth in particular should be promoted. Members are supposed to provide seed lots to the community seed bank at a regular and agreed basis, for example each growing season a certain amount of seed of specified varieties. In the box you find an example of the rules by which the community seed bank membership may operate, stemming from ASOCUCH in Guatemala.

Seed management
At the community level, potential farmer members or seed suppliers whose land offers high seed variability and quality, preferably obtained through a stratified mass selection process, are identified. The seed has to meet such quality standards as: well cleaned grain, germination above 85-90%, high vigor, uniform grain size, and stored at no higher than 13% humidity.

The seed must be renewed each production cycle in a way that provides a high availability year after year, ensuring adequate family supply and safeguarding sufficient seeds for emergency situations. When seeds enter the bank, they will preferably be treated with organic products (ash, lime, insecticidal plants, medicinal plants, etc.) to prevent the spread of warehouse pests.

There will be a record of the materials entered into the bank, which will provide such basic information as: owner's name, place of origin of the seed and unique characteristics of each material. The seeds will be stored under controlled humidity and temperature conditions that will be regularly monitored.

Questions:

- Who will qualify for membership?
- How are members of the community approached to become members?
- How can the participation of women (maintaining much of the traditional knowledge on seed management in the community) and youth (offering future sustainability to the Community Seed Bank) be promoted?

4.2. Sourcing funds and community contributions to facility establishment

Obviously, substantial costs are involved in the establishment of a facility, and these costs can only be partly met by contributions from the community. Hence, it is important to find and secure external financial sources, either from government schemes or from financial support by farmers' organisations or NGOs.

In many instances, a contribution from the community is also requested. First, a piece of land needs to be identified where the facility can be established and a contract should specify either the ownership of the land by the community seed bank, or the right to permanently use or lease the land. Also, communities may contribute by providing the building materials (bricks and roof) and by providing workforce to build the facility. Such approach also ensures that the community is really committed to the establishment and use of the facility.

Questions:

- Which funding opportunities can be identified? Who will follow up such opportunities?
- Which capacity does (do) the community (communities) have to contribute to the establishment of the facility, either by providing building materials or workforce?
- Can a suitable piece of land be obtained? Under which conditions?

4.3. Seed bank committee

Once a facility has been constructed the community seed bank can start to operate. Operations need the establishment of a community seed bank committee that oversees the activities of the community seed bank and that is responsible for proper entry, storage, return and distribution of the seed stocks, as well as for external communications and relationships, such as with government authorities, breeding organisations, other community seed banks and public sector genebanks. The committee is elected from the members of the community seed bank, i.e. all farmers that provide seed stocks to the community seed bank.

One or more dedicated FFS sessions might be needed to agree on the way that the community seed bank is managed and governed.

Questions:

- How can a community seed bank committee be established/elected? What should the membership look like? For how long will the members be elected?
- When/how often do meetings of all members of the community seed bank take place?
- What are the responsibilities of the members of the community seed bank committee?
- Under which rules will all members of the community seed bank (i.e. not only the committee) provide seeds to the community seed bank?
- Which are the options for the committee to provide seeds to non-members, if any?

The box below, again from ASOCUCH in Guatemala, lists the operating principles of the community seed banks in their region, by way of example.

Operational principles

• Members of the seed committee at the bank level must participate in trainings and attend meetings regarding bank operations.

• The bank committee must link together and coordinate activities for the sustainability and operation of the bank, while partnering with organizations of producers, NGOs, local development councils, and municipalities.

• The committee will keep a record book containing each product's entrance and exit for the purpose of controlling renewal dates for each seed during planting season.

• The bank's partners and beneficiaries will be responsible for renewing the seeds in each production cycle, delivering a minimum quantity of 5 pounds of corn seed, beans, or any other seed material to the bank committee, which is paramount for the community's food security. Chilacayote seeds, ayote, herbs, and medicinal plants may enter the bank at a minimum amount of 2 ounces.

• The committee will check the status of the bank once a month, or as otherwise required, to keep track of environmental conditions (temperature and humidity), guaranteeing conservation of the seed.

• The seed entered into the bank will preferably originate from a process of stratified mass selection, in which materials are locally adapted and improved. This applies mainly to maize.

• Maize, beans, or other materials may only requested back from the bank by the owner of the seed at seed renewal time or when there is a natural phenomenon that affects production.

• If a threat arises due to natural phenomena that may affect grain production, the bank partners can withdraw 75% of the stored seed, leaving a 25% bank behind for future planting.

• The seed bank must count and distribute corn seed during emergencies, considering the local or preferred materials of each zone. The emergency seed supply will be distributed to the communities in the event of climate disaster or shortages.

• If a seed shortage occurs outside the bank's jurisdiction, the committee and partners will agree to the conditions of sale or donation of seed with local leaders, local development councils or stakeholders from affected communities.

• The community seed bank can provide such services as: a) sale of seed, as long as it complies with basic quality and physiological/genetic health requirements; b) loan of seeds in a 1:1 relationship, which, when returned, must be sold as grain.

In the subchapters below further specific activities under the control of the community seed bank are singled out to discuss in some more detail.

4.4. Documentation

The following data should be documented in the Community Seed Bank seed book. They are shown in a simple format that can be easily reproduced in Excel or a similar software application, but a hard copy is fine as well. Make sure that you can always identify which entry corresponds to which container(s). If you wish you can add columns that register when, by whom and how much seed has been removed after entry of the seed (this may be part of the total amount stored and be done for multiple purposes, e.g. for return to the owner, for distribution to third persons, for seed testing).

Entry number	Crop name	Variety name	Name provider	Date of entry	Owner	Weight of seed lot at first storage	Germination rate	Storage place in seed bank	Special remarks

4.5. Formalization of the seed bank

It may be needed to agree with the authorities about the status of the community seed bank and about the fact that the community seed bank committee can act on behalf of all members of the community seed bank. Such agreement can take the form of any legal document recognized by national legislation. For example, it may involve a decision by the community council, or a written recognition by the government representative for the region in which the community is situated. Formal recognition may also add to the status of the community seed bank and may be instrumental in seeking support from government offices for the community seed bank operations, or to obtain bank loans.

4.6. Uptake and distribution of seed lots

As stated in the box providing the Operating principles of the community seed banks supported by ASOCUCH, it is important to clearly define the rights and responsibilities of the community seed bank membership, and in particular to agree on

- how much seed of which crops and varieties, and when, will or may be provided for storage by the bank members
- who has the ownership of the seed lots in storage
- to whom and when the seeds stored are returned
- under which conditions part of the seed stocks can be used to provide seed in case of emergencies (no seed germination as a result of drought, misharvests, destroyed fields) to either the members of the community seed bank, or other community members or even neighbouring communities
- under which conditions part of the seed stocks can be sold and to whom
- under which conditions part of the seed stocks can be provided to or exchanged with other community seed banks
- if seed stored for conservation purposes needs a safety deposit in another community seed bank or in a national genebank.

Answering these questions can be addressed in the same FFS session in which the establishment of the community seed bank committee is discussed, or in a follow-up session.

Documentation in a Community Seed Bank in Guatemala, los Cuchimatanes

5. Other functions of a community seed bank facility

Nowadays, in many countries community seed banks have been established. The functioning of these community seed banks differs from country to country, between communities within a country and between cultures. Proper functioning of the community seed bank is essential for its long-term survival, i.e. its sustainability. Proper functioning means that the community seed banks fulfils a lasting function to the farmers in the community, that farmers recognize this function, and that they are willing to invest time in its functioning and to provide seeds for storage in the facility. An empty facility that is no longer used is a waste for all.

A seed bank is not a stand-alone operation. A seed bank can only be meaningful to the farmers engaged and sustainable in a particular community if it is integrated into other community activities to which it contributes, such as farmer field schools on participatory plant breeding and on nutrition and local food plants, local food and seed fairs, regular seed markets, community trainings, etc. The Community Seed Bank should be integrated in such community activities.

Below some of these complementary activities are elaborated. The participants in the FFS are invited to consider the situation in their own community and to evaluate how the community seed bank operations can best be integrated in order to enhance the community seed bank's success and sustainability.

Objectives

To identify and evaluate complementing activities that can contribute to the sustainability of seed bank operations.

Recommended duration

This last exercise will need a full FFS session, and its essential for the survival of the community seed bank in the longer term.

Materials required

Sheets of paper, writing materials.

Description

Below some aspects of the operational environment of the community seed bank are discussed. The facilitator is encouraged to pose open questions to the FFS participants in order to help them to make an inventory of wider community efforts and operations in which the management of a community seed bank may well fit.

5.1. Relation with farmer breeding efforts (PPB) and nutrition security activities

There is growing evidence that community seed banks can become more sustainable if linked with or integrated into other community activities, such as in the area of participatory plant breeding and improved nutrition. Such activities might result in spontaneous interest from the community in improved seed storing options, and in turn a community seed bank might support activities in PPB and in reviving interest in crop diversity for nutrition purposes since it offers a facility for storing crops and varieties that form the subject in these activities. In case such community activities that

address local crop diversity are not undertaken already, establishment of the community seed bank might offer the opportunity to start such work, which may then in turn integrate the community seed bank in wider farmer efforts to manage their crop diversity. See for more information on farmer breeding and on nutrition and food diversity the Field Guides on Participatory Plant Breeding and on Nutrition and Local Food Plants the hyperlinks below. [3]

5.2. Community seed and produce markets

Community seed banks may also support farmer groups that produce and sell seed of locally adapted crops and varieties, be it staple crops or smaller local food crops including neglected and underutilised species. Experience shows however, that it is better not to fully integrate the two activities, and keep the farmer seed producer groups and the community seed bank committee separate entities, since they serve different goals. In case a community develops self-managed seed production, the produced seed and/or the seed for the next season might be stored in the community seed bank facility in agreement with the community seed bank committee and the operating procedures. The site of the community seed bank might also offer opportunities to offer locally produced seed and the produce of such local crops and varieties for sale.

5.3. Food and seed fairs

Seed Fairs play a key role in the creation, maintenance and promotion of crop genetic diversity. As CTDT in Zimbabwe puts it, they help to "keep alive a technology - based on collective ownership and communal knowledge - which is appropriate and sustainable to poor and marginal farmers, unlike some of the expensive, patented and commercially driven seed and biotech products". Seed fairs and food fairs are closely linked with local food culture and with pride on local products. They also help to promote interest in local and traditional food items, and to spread local knowledge for the preparation of these items. Food and seed fairs also attract local authorities, traditional leaders, academics and policy makers who may be offered a guided tour and invited to play specific roles in the community sed bank operations. Once more, the site of the community seed bank might offer opportunities to organize such fairs at the local or district level.

5.4. Community meetings and trainings

If feasible the community seed bank facility may encompass a meeting room, where for example community meetings of various kinds and farmer field school trainings can take place. This is another way by which the community seed bank can develop into a social hub in the community.

The community seed bank could be utilized for conducting different types of trainings not only related to seed storage and management, but for example also to agronomic practices and healthy diets. The community seed bank site could be a place for knowledge exchange, i.e. where intergenerational knowledge exchange dialogues occur as a way of including and motivating youth to stay or become involved in agriculture. When linked to the objective of improving nutrition, the community seed bank could be a place where information on traditional and new recipes is

[3] https://www.sdhsprogram.org/publications/field-guide-farmer-field-schools-nutrition-local-food-plants/ ; https://www.sdhsprogram.org/tool/facilitators-field-guide-and-training-of-trainers-manual/

documented and shared, and such activities could be linked to cooking and food preservation demonstrations (if facilities allow).

5.5. Seed exchange networks

The community seed bank may also be integrated into a network of different community seed banks, situated in different localities within the country, or even into networks operating at the international level. Such networks may facilitate the exchange of seed lots, assisting communities to better cope with climate change through experimentation with alternative crops and varieties that are better adapted to recently developed local conditions and stem from other regions or countries. Often, these networks include national genebanks that may act as a safety duplicate facility for the seed stocks in the community seed bank or as providers of traditional varieties that have been lost to the community. These networks may also offer a platform by which supportive government policies for community seed bank functioning can be promoted and implemented.

Community house with wider functions also hosting the community seed bank in Laos

6. Policy issues related to Community Seed Bank operations

Community Seed Banks manage seed and the management of seed is regulated by national policy and law. The two most important are the national seed law and the legislation on Intellectual Property Rights. Depending on the activities undertaken and the type of seed stored by the Community Seed Bank a review of the FFS on the potential impact of these laws a policy session can be a useful element of this Community Seed Bank FFS module.

Seed laws have been established in almost all countries to regulate the seed market. A major motive for the introduction of seed laws has been to protect the farmer/buyer from poor quality seeds and seed identity fraud. Problems with seed identity and quality occur since often these two properties cannot be very well judged from the outside of the seed by the buyer. Therefore, seed laws often contain requirements regarding the seed producer, the facilities used for processing and storage of the seed, the properties of the variety produced, and the quality of individual seed lots. If a Community Seed Bank engages in seed distribution and marketing beyond its membership, provisions of the national seed law might apply.

Intellectual Property Rights (IPRs) regard certain rights that by law are provided to a person or entity (often a commercial breeding company and sometimes a public breeding institution) that has developed a new crop variety, in order to protect the ownership on the variety or its traits. Two major types of IPR legislation have been introduced in many countries, i.e. plant breeders' rights and patent rights. These two legal systems provide very different levels of protection to the developer. Plant breeders' rights only restrict the right to market the protected crop variety to the owner of the breeders' right, but do allow any third person to use the variety for further selection and breeding, including farmer breeders. Patent rights may restrict both the marketing and the use in breeding and selection of protected traits (and in few countries varieties containing such traits).

In this chapter we suggest how a Farmer Field School group may discuss the impact of these laws on Community Seed Bank operations.

Objectives

To discuss the implications of seed and IPR legislation on the functioning of Community Seed Banks.

Recommended duration

This extra exercise will need a full FFS session, since for many participants law will be a new topic.

Materials required

Sheets of paper, writing materials. It may be useful to have a legal expert present or at least prepare the session with a legal expert and have a copy of the national seed law and the plant breeders' rights law at hand during the session.

Description

Below a way to facilitate discussion amongst FFS participants of applicable law in a plenary session is presented from the perspective of proper Community Seed Bank operations. Through a number of questions and answers, the exercise may help participants to understand what they should know about these laws that might interact with the operation of a Community Seed Bank.

- Are Community Seed Bank seed storage and provision services restricted to its members, or does the Community Seed Bank also provide services to non-members in the same or in other communities?

  If the latter is not the case, seed and IPR legislation is not likely to apply. You may wish to cross-check with local authorities or extension service agents for further advice.

<u>On distribution and selling of seeds</u>

- If seed is made available to non-members in larger than handful volumes, are payments made or do other conditions (e.g. providing new seed lots at the end of the growing season in return) apply? If payments against provision of larger seed volumes are made, are such services regular or exceptional services only made available in case of calamities?

  If exceptional, seed and IPR legislation is not likely to apply. You may wish to cross-check with local authorities or extension service agents for further advice.

- If larger volume seed sales are a regular activity, have all seed lots that are offered for sale been certified by the national seed certification agency?

  If not, it is advised to contact the national seed certification agency to discuss modalities allowing the Community Seed Bank to sell the seed involved. Such modalities might involve certain requirements concerning the seed producer.

<u>On the origin of the varieties stored in the Community Seed Bank</u>

- Does the Community Seed Bank only store farmers' varieties or also commercial varieties that have originally been purchased in the market or been otherwise provided by the developer of the variety, whether a commercial breeding company or a public breeding institute or a seed agent? If purchased, did the package contain information about any restrictions on use?

  If only farmers' varieties are managed by the Community Seed Bank, the plant breeders' rights law and the patent law are unlikely to apply. You may wish to cross-check with local authorities or extension service agents for further advice.

- Does the Community Seed Bank also store varieties purchased in the market and did the package contain information regarding restrictions on use (e.g. commercialisation of new seed lots produced from the purchased seed as under plant breeders' rights), or is it likely that such restrictions apply anyway?

  The Community Seed Bank should not sell such seed lots, but only return them to the original provider member and provide them to other FFS members under non-commercial conditions (no payments in money). If a request by non-members and/or by other communities for larger seed volumes against payment is made, do consult the authorities overseeing the implementation of the plant breeders' rights law.

- Does the Community Seed Bank store commercial varieties with new biotechnological traits that may be protected by patents and are these used by its own members or transferred to non-members of the Community Seed Bank?

  Whereas this is still a very exceptional situation, such incidences may increase in the future. In case highly innovative traits (such as new insect resistance or herbicide tolerance) are

present in the commercial variety, do consider the possibility that a patent may apply. You may wish to consult the original provider for more information and abstain from sales of larger volumes to non-members of the Community Seed Bank awaiting further information.

- What is the view of the CSB membership on the nature and severity of restrictions of seed laws and/or IPR laws on the proper functioning of the Community Seed Bank?

  If you feel that impacts are serious, please discuss with the SD=HS partner organisation or other appropriate NGOs or farmer organisations, which actions can be undertaken to change existing national laws and regulations in such a way that the functioning of the Community Seed Bank would be no longer hampered.

- What is your view on the usefulness of this exercise?

  Please discuss ways to improve this session and exercise. The facilitator is asked to report this to the SD=HS partner organisation.

Further reading

Extracts taken from Community Seed Banks in Nepal Past, present, future Proceedings of a National Workshop, 14-15 June 2012, Pokhara, Nepal, published by Li-Bird (2013).[4]

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 seeds
- 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

When community seed banks try to function in (..) 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.

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 information 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, simply because of poor access to information, weak social networks, social exclusion, and weak institutional mechanisms. 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. Such assumptions are often wrong because of weak social connections, farmers' decisions on land allocation to local varieties and farmers' aspiration of increased income through commercialization. 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 the variety in small areas. This information is validated by inter-village diversity fairs to check the real availability of seed locally. Situations that relate to (ii) and (iii) are critical indicators of genetic erosion of the community landscape. Having deeper understanding on

[4] The text can be accessed in full through https://www.researchgate.net/profile/Pitambar_Shrestha/publication/272509825_Community_Seed_Banks_in_Nepal_Past_Present_Future/links/54e82e820cf2f7aa4d4f7605/Community-Seed-Banks-in-Nepal-Past-Present-Future.pdf#page=26.

how to maintain, monitor, and propagate seed exchange structures will help to use and reintroduce varieties where 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 banks, 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.

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 organiser 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 agroecosystems 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).

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).

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.