



Do community seed banks contribute to socio-ecological resilience? The case of the Sierra de los Cuchumatanes, Guatemala

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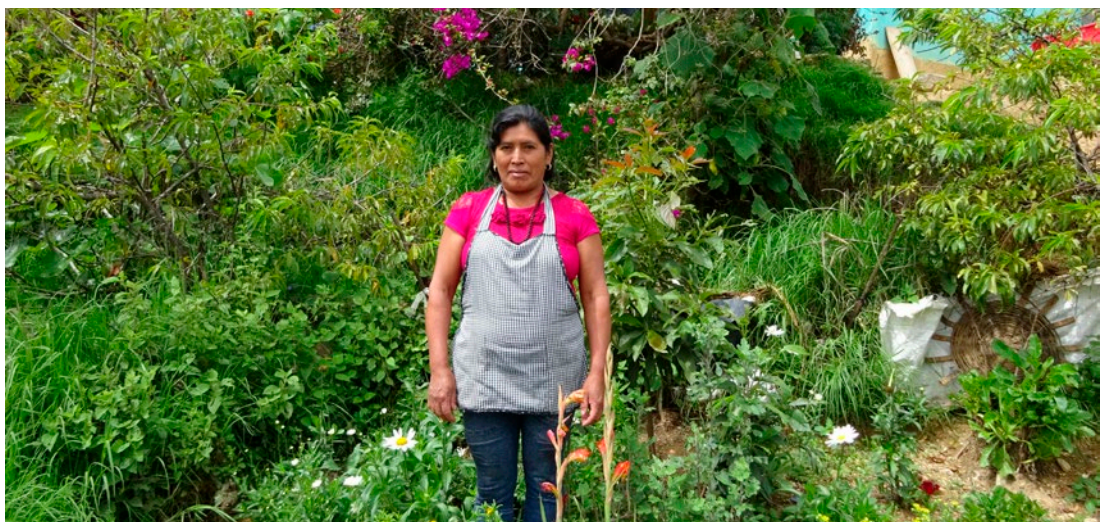
Top photo: Group of participants of the validation workshop in Com. Credit: Anna Porcuna Ferrer

Summary

A community seed bank is a locally governed and managed, mostly informal institution whose core function is to maintain seeds for local use, strengthen local seed systems and support on-farm agrobiodiversity conservation. The objective of this study was to explore, from a farmer's perspective, if and how community seed banks are supporting change towards a more resilient socio-ecological system. The research used a participatory case study approach and the methodology combined tools of participatory research and standard qualitative methods. Theories of socio-ecological resilience are used for

the analysis of change. Field work was conducted between March and July 2017 in the Sierra de los Cuchumatanes, Guatemala, in collaboration with Bioversity International and ASOCUCH, a Guatemalan association of agricultural cooperatives. Financial support was provided by the Seeds, Soil and Culture Fund of RSF Social Finance, a programme managed by the New Field Foundation. The research contributes to the CGIAR research program on Policies, Institutions and Markets led by IFPRI. The research will be used to write a Master thesis to complete the study program in Organic Farming Systems and Agroecology at the University of Natural Resources and Life Sciences of Vienna (BOKU).

Photo 1: Farmer from Quilinco community standing in her home garden. Credit: Anna Porcuna Ferrer



Research context

The Sierra de los Cuchumatanes is an important area of maize diversity located in the western part of Guatemala (see map). Due to its particular agro-ecological conditions, intensive cultivation is not possible. The area is characterized by subsistence-based smallholdings with low levels of production and challenges in terms of productivity. In the last decades, in the context of climate change, the area has been affected by extreme weather conditions, which have negatively affected the local production systems reducing crop productivity and causing seed losses. This, together with the socio-economic changes that are taking place in the region, contributes to the tendency among farmers to devalue and abandon local varieties and rely increasingly on commercial varieties. This results in weakening of the local seed system and a negative impact on on-farm conservation of plant genetic resources. It also triggers the loss of local traditional knowledge

compromising the short and long-term food and nutrition security of the region. It could have consequences for the capacity of the community to cope with adversity. In this context, community seed banks, locally known as seed reserves, are seen as a local solution to promote conservation and a better use of agrobiodiversity and enhance access to crop varieties important for smallholder food and nutrition security, livelihood resilience and climate change adaptation. ASOCUCH actively promotes the establishment of community seed banks and provides technical and financial support.

Research objectives

The main objective of this study was to explore if and how community seed banks are supporting change towards a more resilient socio-ecological system at community-level. Specific objectives were to: (i) explore how the community seed bank concept has been implemented in the local context and what roles community seed banks play in the local seed system;

(ii) explore the change that has taken place due to the establishment of the community seed banks and identify the main driving factors of this change; (iii) identify and analyze the possible connections between this change and the socio-ecological resilience of the local community.

Brief historical perspective of the community seed bank concept in the local context

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 masal seed selection. Using this method gradually improved the performance of local varieties. The first community seed bank founded was Quilenco with the objective **to conserve, manage and use the agrobiodiversity from the PPB activities** (long-term conservation). Quilenco community seed bank members have access to these improved maize and bean varieties through 'pase en cadena'. The Quilenco 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

Fig. 1: Location of Sierra de los Cuchumatanes (Guatemala in green).



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.

CSB	N° communities served	Year of establishment	Crops conserved	N° collections	Rescue of local varieties	Total CSB members	% Women	Functions & services
1. Climentoro	4	2011	Maize, bean (frijol), fava bean (haba), gourd (chilacayote), wheat, barley, mustard, coriander, "hierba blanca", chamomille.	Maize (110), beans (20), others (10)	3 (quicheño ramoso, imbrincados, sabor rojo)	31	23	(1) Conservation of private seeds; (2) Conservation, management and use of agrobiodiversity from PPB; (3) Seed for emergency situations
2. Quilenco	5	2009	Maize, bean, fava bean, gourd, wheat, barley, oats, chamomille	Maize (122), beans (10), others (12)	3 (maíz salpor, maíz uva, maíz negro)	96	57	(1); (2); (3)
3. Joya Grande	1	2016	Maize, bean, gourd	Maize (30), beans (6)	No	21	5	(1)
4. Chanchimil	2	2011	Maize, bean, gourd	Maize (21), beans (4)	No	23	9	(1)
5. Los Lucas	1	2010	Maize, bean, fava bean	Maize (28), beans (5)	No	14	0	(1)
6. Secheu	4	2011	Maize, bean, gourd, turnip, coriander, radish, carrot, cabbage, beetroot	Maize (43), beans (20)	2 (maíz pinto, maíz rojo)	44	41	(1)
7. San Francisco las Flores	1	2010	Maize, frijol	Maize (49), beans (7)	No	18	0	(1)
8. Paijalá	4	2015	Maize	Maize (42), beans (0)	No	37	86	(1)
9. Las Milpas	3	2012	Maize, bean, gourd	Maize (20), beans (2)	No	15	33	(1)
10. Todos Santos	5	2015	Maize, bean, gourd	Maize (34), beans (4), others (1)	No	34	62	(1)

Table 1: Characteristics of selected community seed banks in the moment of the first field visit (Phase I, March-April 2017).

Research process (three phases)

Phase I

10 community seed banks in the area of Sierra de los Cuchumatanes were visited (see Table 1 and Photos 2-4, 11). In each community seed bank a Focus Group Discussion of 2-3 hours with the management committee and the local technicians from ASOCUCH working in the area was carried out. The data collected gave an overview of how the community seed bank concept had been implemented in different contexts, main achievements and challenges faced. Elements of the implementation, performance and sustainability were documented and analyzed. After this initial phase, a pre-analysis of the data was made. The 10 cases were compared according to origins, governance and management, functions and services, membership, seed management and diversity, support and networking, and activities.

Phase II

Of the 10 community seed banks visited and in order to capture their diversity two were selected as case

studies for in-depth research: (i) **Quilinco**, the first to be established in the area of Cuchumatanes (2009) with the highest number of members and the highest number of accessions and biodiversity preserved, fulfilling the three functions and (ii) **Secheu**, established in 2010-2011 with few members, fulfilling only one function. Later on a third case study was added: **Com**, a community seed bank in progress of being built at an initial implementation phase. During the first research phase its members were still partially connected to the Secheu community seed bank. Because the Secheu community seed bank was located at some distance they decided to establish a community seed bank in their own community. The members of the group leading the implementation process are mostly those who were already beneficiaries of Secheu.

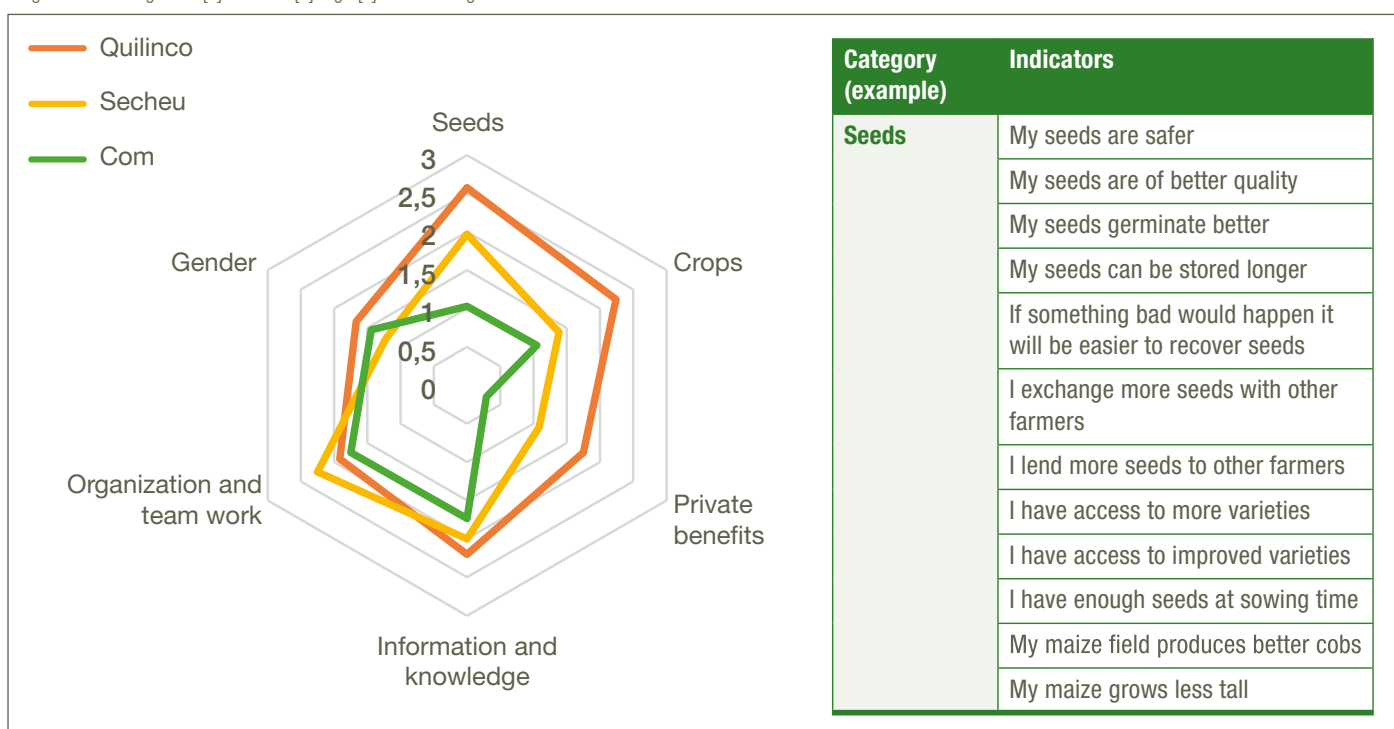
In this phase, a total of 86 farmers were interviewed, 20-30 farmers in each of the three communities (see Photos 5-7, 12). Purposive sampling was done trying to keep a balance between gender and beneficiaries/

non-beneficiaries. Key informant interviews with technicians from ASOCUCH, community leaders and old people from the communities were conducted to get an idea of the development of the community and its farming history and identify important turning points that might have affected community resilience.

Phase III

This phase had as main objective to validate the results that were obtained in Phases I and II. This was done through three participatory workshops (one in each of the studied communities) that were attended by 12-18 farmers/each (see Photos 8-10, 13). In the workshop farmers were asked to rank and score a total of 44 community seed bank performance indicators formulated with the information collected during Phases I and II. These 44 indicators were then grouped in six areas of change and a mean value per change area was calculated. Scores were presented by means of a spider diagram (see Figure 2 for an example).

Fig. 2: Spider diagram: comparison of the three different community seed banks according to areas of change based on the results obtained in the three participatory workshops (Phase III). Magnitude of change: low [1]-medium [2]-high [3]. 0: no-change.



Phase I



Photo 2: Focus group discussion with management committee in San Francisco las Flores.
Credit: Anna Porcuna Ferrer



Photo 3: Members of the management committee who attended the focus group discussion in Chanchimil.
Credit: Anna Porcuna Ferrer



Photo 4: Farmer bringing his private seeds for renewal in Climentoro.
Credit: Anna Porcuna Ferrer

Phase II



Photo 5: Individual interview in Quilenco community
Credit: Anna Porcuna Ferrer



Photo 6: Individual interview in Quilenco community
Credit: Anna Porcuna Ferrer



Photo 7: Individual interview in Quilenco community
Credit: Anna Porcuna Ferrer

Phase III



Photo 8: Sub-group of participants discussing how to rate the indicators in the validation workshop in Secheu.
Credit: Anna Porcuna Ferrer



Photo 9: Sub-group of participants discussing how to rate the indicators in the validation workshop in Com.
Credit: Anna Porcuna Ferrer



Photo 10: Group of participants of the validation workshop in Quilenco.
Credit: Anna Porcuna Ferrer

Changes brought about by the community seed banks

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 Quilenco 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 Quilenco 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 sub-groups. **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.

Photo 11: Members of the management committee who attended the focus group discussion in Pajjalá community seed bank. Credit: Anna Porcuna Ferrer





Photo 12: Farmer member of the Secheu community seed bank standing in front of her house. In the back, maize hanging “en mancuerna”, the traditional way of storing maize.
Credit: Anna Porcuna Ferrer

Changes and socio-ecological resilience

The concept of resilience was operationalized in relation to the general aspects of a resilience framework developed by Davoudi et al., 2013, complemented by a more specific set of indicators developed by Cabdell and Oelofse, 2012. This operationalization allows building connections between the concept of socio-ecological resilience and the functions and services provided by a community seed bank.

There are important changes occurring in the region, such as the abandonment of maize cultivation

and farming in general, a shift towards a more market-oriented agriculture and migration of young people to the USA. These changes are having an impact on the very foundation of agriculture (the seed and production systems) in the study area. Traditional factors shaping the socio-ecological resilience of the local communities are also changing. For example, being self-sufficient in maize production becomes less important. Nowadays farming households have more diverse incomes sources including cash income from remittances. They can buy low-priced maize on the local market. A community

seed bank can contribute to this newly emerging resilience through the strengthening of diverse management, technical and organizational capacities, and more dynamic and effective networking. This is happening more directly at the household than the community level. However, community seed banks also face challenges, such as weak involvement of youth and realizing untapped potential, such as broadening the crop base. These are important insights that ASOCUCH can act upon, refining or redefining its activities.

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Photo 13: Group of participants of the validation workshop in Secheu. Credit: Anna Porcuna Ferrer

