

Towards a better understanding of custodian farmers and their roles: insights from a case study in Cachilaya, Bolivia

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The actions of PROINPA have positive effects on food security, poverty reduction, job creation, income generation and efficiency of target groups by working towards alliances, environmental capacity building, transparency, adaptation to climate change, efficiency, and environmental sustainability. www.proinpa.org

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Cover Photo

Custodian farmer Doña Viviana Herrera rescues potatoes from flooding along Lake Titicaca (G. Baldinelli 2012)

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Foreword

This publication is the result of a research collaboration between Bioversity International and the *Fundación para la Promoción e Investigación de Productos Andinos* (PROINPA). It deals with issues regarding on-farm conservation of agrobiodiversity, which is a poorly addressed field of research in spite of its pivotal role in the maintenance of global crop diversity. Today, even though great progress has been made in *ex situ* conservation (some 1740 gene banks maintain more than 7 million samples altogether) we can say that, by and large, most agricultural biodiversity is conserved in farmers' fields through their continued cultivation. On-farm conservation allows for the conservation of species whose seeds cannot be maintained in genebanks (the so called 'recalcitrant' species) and permits the evolution of crops through natural and human-driven selection, an essential process in building greater adaptation and resilience in production systems. Furthermore, on-farm conservation maintains traditional knowledge, which is linked to the appreciation of crop diversity, cultivation and use-related practices that are transmitted by farmers to future generations. Pillars of on-farm conservation are those farmers who, for various reasons, distinguish themselves from others by their contribution to conserving crop diversity. We will use the term 'custodian farmers', even though the terminology may not be suitable to all social contexts. Understanding who these custodian farmers are, their presence over the territory, the types of crops they maintain, why and how, as well as gaining insights on the cultural, social and economic drivers behind their efforts is, for scientists, a very important step in devising effective on-farm conservation strategies. This work carried out by Helga Gruberg and PROINPA's technical team in Cachilaya, Bolivia is a contribution in that direction. The open-ended interviews and participant observation methodologies are helpful in guiding future methodological approaches and advancing our understanding of how the roles of custodian farmers can be better recognized, harnessed and supported by society. This work has been carried out in the framework of a major global UN Project supported by IFAD and the European Commission, which is focusing on the development of innovative participatory approaches for the conservation of neglected and underutilized species (NUS) on farm.

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Introduction

The Problem of Declining Global Crop Diversity

There has been a dramatic erosion of crop diversity over the last century. Although it is difficult to quantify the exact level of loss, some estimates give hints about the seriousness of the issue at a global scale. For instance, the Food and Agriculture Organization of the United Nations estimates that 75% of the world's crop genetic diversity has been lost (FAO 1999). Humans have been known to cultivate and harvest over 4,000 plant species (Proches, Wilson, et al. 2008), as well as countless varieties and landraces within crop species. However currently just 20 crops occupy over 82% of the world's cultivated area (Schmidt, Lam, et al. 2010) and four crops (maize, wheat, rice, and potato) cover over 60% of humankind's daily requirement of calories (FAO 2013). The factors driving the loss of crop diversity are diverse, ranging from the adoption of modern high-yielding varieties, which have displaced traditional crops and varieties, to changes in consumer demand for more convenient and easy-to-prepare food. Other influencing factors are fragmentation of agricultural areas, climate change, deforestation, unstable land tenure, cultural erosion, and decline in the farming population (Altieri, Anderson et al. 1987; FAO 1999; Kruijssen, Sudha et al. 2008; Wynberg, Van Niekerk et al. 2012).

Loss of crop diversity has grave repercussions for ecological and socio-cultural systems. It makes ecosystems more vulnerable to environmental stressors, which reduces the stability of food production and people's livelihoods (Meinzen-Dick and Di Gregorio 2004; Danial, Parlevliet et al. 2007; Wynberg, van Niekerk et al. 2012). Crop diversity also has vast potential to improve livelihoods and quality of life of the rural poor through improved nutrition, market opportunities, and decreased dependence on external inputs (Frison, Smith, et al., 2006; Smith 1982; Jaenicke and Höschle-Zeledon 2006; Padulosi, Mal, et al. 2009; Rojas, Valdivia et al. 2009; Ravi, Hrideek, et al. 2010; Jarvis, Hodgkin et al. 2011). This potential is being lost, however, along with crop diversity. In the face of global climate change, the role of crop diversity as a source of adaptation and resistance is becoming an issue of worldwide concern. The conservation and sustainable use of plant genetic resources is called for by several international conventions and agreements, including the Convention on Biological Diversity (CBD 1992)⁴, the International Treaty for Plant Genetic Resources for Food and Agriculture (PGRFA) (2004)⁵, and the Global Plan of Action for PGRFA (1996, 2011)⁶. The conservation and re-valorisation of local crops and varieties and the promotion of diverse agroecosystems are recognized as vital pursuits, critical to the sustainability of humankind today and in the future.

Conservation of Crop Diversity

Much of the world's remaining crop diversity is conserved in traditional smallholder farming systems where farmers cultivate and select their crops year after year to maintain livelihoods matched to their local environment and culture. The continued cultivation of traditional crops and landraces on farm is critical to ensure their conservation. However, this outcome depends on farmers' planting preferences, which are influenced by a complex assortment of economic, environmental, social and personal factors (Brush 1991). Thus

⁴ <http://www.cbd.int>

⁵ <http://www.planttreaty.org>

⁶ <http://www.globalplanofaction.org>

while farmers are central actors in maintaining global crop diversity, on-farm conservation is truly a society-wide challenge that depends on actors and influences all along the value chain.

Conservation of crop diversity in genebanks (*ex situ*) is an important and complementary strategy to on-farm (*in situ*) conservation but it has a number of limitations that mean it cannot stand alone as a conservation strategy (Dulloo, Hunter, et al. 2010). More than 1,740 genebanks have been established around the world where scientists safeguard in total over 7.4 million crop samples (FAO 2010). Yet, despite this impressive effort, these samples represent only a small portion of global crop diversity consisting primarily of staple and commodity crops and some of their wild relatives (Padulosi 2012; Crop Wild Relatives and Climate Change 2013). It is consequently on-farm where the bulk of diversity of the earlier-cited 4,000 crop species is maintained. Moreover, on-farm conservation enables the preservation of knowledge associated with the crops, cultural valorisation of the resources, and the continuation of dynamic processes of crop adaptation to changes in climate, crop pests, disease, and socio-cultural context, which are not possible under *ex situ* genebank conditions (Altieri, Anderson et al. 1987; Salick, Cellinese et al. 1997; Brown 2000; Jarvis and Hodgkin 2000; Caillon and Degeorges 2007).



A selection of crop diversity in Cachilaya, Bolivia (H. Gruberg 2012)

The role of farmers is thus highly strategic for the conservation of global crop diversity and farmers can be seen to play just as important or an even more important role than that played by scientists (Brush 1991 p. 159). Unfortunately, however, this contribution remains largely in the shadows and is too-often seen as ancillary to the work of researchers (Padulosi 2012; Ruiz and Vernooy 2012). As compared to *ex situ* conservation, on-farm conservation is poorly addressed by research and development and is weakly integrated into national conservation strategies. Greater attention is urgently needed to recognize farmer's contribution to on-farm conservation and to develop methods and approaches to support their efforts.

A number of community-based strategies for on-farm conservation have been developed that focus on documenting local diversity, raising awareness of its status, improving its

performance through participatory breeding and selection, and increasing its value through market-based interventions (e.g. Sthapit, Shrestha et al. 2006; Jarvis, Hodgkin et al. 2011). Another way to strengthen on-farm conservation is to recognize and support individual farmers who make exceptional contributions to on-farm conservation.

Custodian Farmer Concept

All farmers are *de facto* conservationists of crop diversity because the selection and conservation of seeds and planting material are essential aspects of agrarian life (Brush 1991). Yet, certain farmers often stand out in their communities for their dedication in growing extraordinary levels of crop diversity, including rare and endangered varieties, as well as holding extensive traditional knowledge associated with the plants (Altieri, Anderson et al. 1987; Sperling & Berkowitz 1994; Lilja, Ashby et al. 2001; Jarvis, Hodgkin et al. 2011, Sthapit, Lamers et al. 2013). These exceptional farmers have been given many names including: barefoot botanists, seed experts, nodal farmers, seed curators, *curiosos*, conservationists, innovators, seed keepers, and custodian farmers, as we shall refer to them in this document (e.g. Brush 1991; Lilja, Ashby et al. 2001; Ortega Dueñas 2006; Misiko 2010; Jarvis, Hodgkin et al. 2011).



Farmers prepare manure compost to enhance soil fertility (H. Gruberg 2012).

Several researchers have highlighted that the success and efficiency of on-farm conservation initiatives could be increased by targeting such ‘pro-diversity’ custodian farmers because their intrinsic interest in the preservation of their traditional crops and varieties can facilitate productive and harmonious collaborations (e.g. Mooney 1983; Sperling & Berkowitz 1994; Wale 2011). Additionally, gaining understanding of what motivates custodian farmers to conserve crop diversity can lend insight into how to work hand in hand with farmers to conserve crop diversity in times when it faces so many challenges (Williams & Haq 2002; Subedi, Chaudhary et al. 2003; Perrault-Archambault 2005; Thijssen, Bishaw et al. 2008).

Recognizing the great benefits arising from the work of custodian farmers, several formal and informal institutions around the world have directed their efforts to support and

encourage these actors in the conservation of crop diversity and the pursuit of sustainable food security (e.g. Seed Savers Exchange (USA)⁷, ARAWIRA (Peru), Seed Freedom/Navdanya (India)⁸, Native Seeds/SEARCH (USA)⁹, Civiltà Contadina (Italy)¹⁰, Pro Specie Rara (Switzerland)¹¹, and Peliti (Greece)¹²). Bioversity International is among those research organizations, involved in strengthening the work of custodian farmers through a scientific approach (e.g. Jarvis, Hodgkin, et al. 2011; Padulosi, Bergamini, et al. 2012).

As many organizations seek to work with custodian farmers, a better understanding of their attributes, roles and responsibilities is required to help identify and support them consistently. Approaches for both identifying and supporting these actors require investigation and discussion, as they have been relatively unexplored to this point. Developing these methods is not as easy a task as it may appear. For instance, whereas maintaining high diversity could be considered the fundamental characteristic of a custodian farmer, other characteristics could be equally important in effecting their ultimate conservation role, such as level of knowledge on cultivation and use, openness to sharing material or networking ability.

We have addressed these aspects through a case study in a rural community of the Bolivian Andes through a collaborative project involving Bioversity International and the Foundation for the Promotion and Research of Andean Products (PROINPA). A group of custodian farmers was identified in the target community through a consultative process with the local farmers' association. We spent time getting to know the custodian farmers to learn about their stories and characteristics. We also interviewed them and PROINPA technical staff on what they considered to be the attributes, roles, and responsibilities of custodian farmers in general. This paper describes the results of this experience and discusses the merits and pitfalls of the methodology. We hope that this account will be useful to workers interested in developing strategies to support custodian farmers and contribute towards more sustainable on-farm conservation practices.

Study Methods

Location

This study took place in the small rural community of Cachilaya, located in the Municipality of Puerto Perez, La Paz, Plurinational State of Bolivia (16° 20' 0" S, 68° 37' 0" W). This high altitude (3839 m) Andean community is located on the southern banks of Lake Titicaca, a deep blue lake dotted with fishing boats, *titora* (native aquatic vegetation) and small islands. Cachilaya is not a common community. It has been recognized by the Municipality of Puerto Perez and the Governor of the Department of La Paz as a micro-centre of biodiversity and as an "ancestral and cultural legacy for Bolivia" because of the extraordinary number of native crop species and varieties cultivated by its people. Indeed, the Lake Titicaca area is considered by scientists to be the centre of origin of quinoa and cañahua, where a great diversity of both wild and cultivated diversity is found (Rojas, Soto, et al. 2010).

⁷ <http://www.seedsavers.org>

⁸ <http://seedfreedom.in>

⁹ <http://www.nativeseeds.org>

¹⁰ <http://www.civiltaccontadina.it>

¹¹ <http://www.prospecierara.ch/de/home>

¹² <http://www.peliti.gr>



The location of Cachilaya on the southern shores of Lake Titicaca (map from nona.net).

Cachilaya maintains traditional territorial organization customs wherein the territory is divided in three production systems: *aynoqas*, *kjochi iranas* and *sayañas*. The *aynoqas* are managed as a commons with a rotational system in time and space, such that crops are interspersed with fallow periods to permit soil recovery. Each year the community members decide which crops will be cultivated where, defining the quantity and characteristics of local crop diversity. In this community, *aynoqas* are devoted to the cultivation of potato, quinoa and forage. The *kjochi irana* is the flooding territory of the banks of the Lake Titicaca, where agricultural production benefits from the moisture and richness of the lake sediments. The *kjochi irana* in this community is devoted to the production of early varieties of potatoes, beans, quinoa, and forage. The third production system *sayaña*, corresponds to the individual plots of the families. Usually, these plots are adjacent to the family homes and are multi-functional places for intensive farming, livestock breeding, and social events. These plots are planted to a variety of crops such as potatoes, beans, oca, barley, quinoa, maize, pea, and cañahua, among others.

In the communities near Lake Titicaca, land is inherited and divided into progressively smaller plots. Land holdings are smaller on average compared to other regions of Bolivia (Tapia 2006). Villagers say that Cachilaya has gone from the problem of the “small land holding” to the problem of “fallow land holding”, wherein their agricultural production is no longer based on plots but on a few furrows. In this sense, the villagers face severe limitations to secure their livelihoods. Yields from their small landholdings are not sufficient to meet their needs and the farmers also do not have enough land in which to invest their labour (Tapia 2006). As a result, many community members are driven to seek economic alternatives outside their plots, leading to a strong phenomenon of temporary and, in many cases, permanent migration (Tapia 2006). The villagers also face a number of environmental and socio-economic problems, including climate change, which has resulted in unpredictable and intense rains (PROINPA unpublished data). In the year preceding the

study, numerous quinoa plots were flooded leaving many families without seeds for the subsequent agricultural season. The fish of Lake Titicaca, which used to be an important part of their basic diet, have also virtually disappeared. It is in this setting of lush Andean beauty and difficulties where the stories of Cachilaya's outstanding custodian farmers occur.



The landscape around Cachilaya, Bolivia (H. Gruberg 2012).

Custodian Farmers in Cachilaya

As mentioned previously, research on custodian farmers is still at an early stage and methods to identify these actors in the field are still being refined through studies such as this one. There are several possible approaches to identify custodian farmers, one of which would include surveying the entire community to assess who maintains the highest crop diversity. This would be, however, a very slow and detailed process which may not always be practical and which does not elicit strong community engagement. A more participatory approach, in which the community is consulted on who they consider to be a custodian farmer, is preferred to identify farmers who maintain high crop diversity (e.g. Subedi, Chaudhary et al. 2003; Perrault-Archambault 2005,). In this case study, such a participatory approach was taken to identify custodian farmers.

Four custodian farmers were identified in Cachilaya in August 2012 in a general meeting of the local farmer's association: the Association of Producers and Conservationists of Andean Crops of Cachilaya (APROCA)¹³. In this meeting, a field technician from PROINPA facilitated a discussion on the important role that custodian farmers play in on-farm conservation and proposed to identify a group of custodian farmers in Cachilaya. The technician suggested three criteria for the selection of custodian farmers in the community: they must 1) have a large number of species and varieties, 2) maintain an agricultural

¹³ APROCA was formed on April 18, 2007 as an initiative by PROINPA to incentivize the conservation and commercialization of native crops

vocation, and 3) be recognized and respected by the community in their conservation role. With these criteria in mind, the community selected four farmers that met these criteria according to their views. The selected farmers were hitherto recognized as '*custodians of agricultural biodiversity*', which is how we shall refer to them in this article.

The *custodians of agricultural biodiversity*, who were recognized and validated by the community for their contribution to conserving crop diversity, were the focus of this study. There was one exception, however, in that one of the farmers nominated by the community stepped down after one of the first meetings because he found the activities were too much of a time commitment. At this time, another farmer (Don Ricardo Vargas) volunteered to replace him in the *custodian of agricultural biodiversity* role. The perspectives and attributes of this farmer were included in this study and he was considered equally as a *custodian of agricultural biodiversity*.

An ethnographic approach was taken to investigate the attributes and motivations of the *custodians of agricultural biodiversity* in Cachilaya. Through weekly visits to the community in September and October 2012, the lead author spent time getting to know the *custodians of agricultural biodiversity*, gaining their trust, and learning about their stories and perceptions through open-ended interview questions. The characteristics of the *custodians of agricultural biodiversity* were considered, as well as their perspectives and PROINPA technician perspectives on what they considered to be the attributes, roles and responsibilities of custodian farmers in general. A focus group discussion with three *custodians of agricultural biodiversity* (Don Elias Vargas, Don Ricardo Vargas, and Don Rene Huallpa), an individual interview with another *custodian of agricultural biodiversity* (Doña Viviana Herrera), and individual interviews with three PROINPA staff (Juana Flores, Milton Pinto, and Wilfredo Rojas), who work closely alongside farmers in Bolivia, informed the study. The questions and hypotheses discussed during these interviews are presented in Appendix A and B. Observations were also gained by working alongside farmers and PROINPA technicians in their daily activities and by informal discussions throughout the experience. Furthermore, documentation from local Agricultural Biodiversity Fairs¹⁴ and surveys carried out by PROINPA provided a broader picture of the distribution of crop diversity within the community to complement the discussion.

Three Custodian Farmer Stories

The first time we visited Cachilaya together with PROINPA's technical team, we met with the whole APROCA organization. It was a large group of men and women waiting for us outside the social centre of the community. Within this group, it was evident that there were a few farmers who were treated differently by their fellow companions. These farmers welcomed us and sat in front of the rest of the crowd. Among them was an imposing woman. They were APROCA's board of directors and, incidentally, three of them were *custodians of agricultural biodiversity*: Doña Viviana Herrera, Don Elias Vargas, and Don Ricardo Vargas. This study built upon the stories of these three¹⁵ farmers who are described in the following paragraphs.

¹⁴ Agricultural Biodiversity Fairs are organized by PROINPA in various communities in Bolivia as part of working projects, including the IFAD NUS project under which this study was carried out. In many cases, the communities and municipalities have continued to organize and support these events after the initial project action.

¹⁵ The fourth *custodian of agricultural biodiversity* (Don Rene Huallpa) was included in the discussions, so his attributes and perceptions have informed the study. His story is not highlighted, however, because his attributes and motivations were represented in the other farmers' stories.

Doña Viviana Herrera

Doña Viviana is tall, dark-skinned, and wears her long black hair in two braids. She dresses like a typical *cholita*¹⁶ from La Paz with a long skirt, several petticoats, long sleeve shirt, woollen blanket on the shoulders, and round hat. She is a single mother in her 40s. She comes from a large family with which she shares four hectares for agricultural production. This is a very small quantity of land but she manages to meet the needs of her family by practicing the custom of "breaking the land", in which she shares someone else's land in exchange for her labour. She also earns some income by taking care of the property of a family that often migrates away from the community.

Doña Viviana was identified as a *custodian of agricultural biodiversity* because of the large number of species and varieties that she conserves, making her a yearly winner of various Agricultural Biodiversity Fairs in the region. At the 2012 Agricultural Biodiversity Fair in Cachilaya, she held a total of 120 varieties, including 90 varieties of potato, 11 varieties of quinoa, 12 bean varieties, and some cañahua (2), barley (1), oat (2), and wheat (2) varieties. At the time of the interview, she had increased her collection of potatoes to 105 unique varieties. This great collection began as an inheritance from her grandfather, who gave her 30 potato varieties wrapped in an *aguayo* (native woollen cloth). To this day, she keeps her seeds in his *aguayo* for safekeeping. The Agricultural Biodiversity Fairs are a great incentive for Doña Viviana to maintain and increase the size of her collection. She explains with pride that she enjoys participating in the fairs for the prizes that she wins. In addition to the Agricultural Biodiversity Fairs, Doña Viviana shares her wealth of crop diversity with other farmers at the Community Seed Bank, which was recently established in Cachilaya.



Doña Viviana Herrera, *Custodian of Agricultural Biodiversity* (H. Gruberg 2012).

Doña Viviana is a natural leader. She is the only woman director on the board of APROCA, currently acting as the Finance Secretary. In the Bolivian highlands, men and women usually perform activities separately according to their gender, even though they may be performing the same task. During meetings men usually occupy the front positions and sit in chairs, while women keep their distance and often sit on the floor in small groups, weaving and spinning wool. Doña Viviana, by contrast, participates in meetings and activities alongside the men. Her opinion is requested and noted carefully. She speaks with reassurance and at the same authoritarian level as men; she even shares jokes with the men. In addition to her role at APROCA, she is part of the School Board and she wants to

¹⁶ Refers to women from Bolivia wearing traditional clothes with Spanish influence from the colony period.

be part of the Bartolinas¹⁷ but her father will not allow her to pursue this career because it is much more demanding and can be dangerous during political disruptions.

As a result of her public involvement, Doña Viviana has learned to read and write in Aymará. She has also learned to speak in Spanish (which is not often spoken by women in the area) through her trips to other rural and urban areas of Bolivia. She has participated in several farmer exchanges and promoted agricultural biodiversity in different communities as a part of work carried out by PROINPA. She explains that she loves to travel because she is curious and likes to learn about world. It is on these trips where she buys and exchanges seeds. Besides traveling, she has a special fondness for traditional medicine based on herbs. She applies her knowledge of these plants in her daily life and is keen to expand her knowledge of this ancient practice.

Don Elias Vargas

Don Elias is a man in his 50s with a small stature but a big presence. He has four children with his wife, Doña Gregoria. Together they take care of their own land and the land of his brother who migrated long ago from Cachilaya. Their total landholding is only two hectares.



Don Elias Vargas, *Custodian of Agricultural Biodiversity* (H. Gruberg 2012).

In the previous Agricultural Biodiversity Fair, Don Elias presented a total of 57 varieties, including potato (38), quinoa (6), cañahua (3) and oca (9). He cultivated 30 of these varieties in the previous agricultural season. He and his wife started this collection when they got married. The family has since produced some of its own seed and obtained some from markets and through barter.

Don Elias does not maintain the highest number of varieties in the community. He stands out, however, as a custodian of crop diversity by his commitment to improve the quality of life of his family and his whole community. He encourages the participation of other members of APROCA in a number of different activities, including those related to on-farm conservation. Don Elias is the President of APROCA and his leadership is evident. He directs all meetings, attendance calls, and takes notes of what is discussed.

He is responsible for receiving different organizations and working with them. He even offers free accommodation to PROINPA's field staff in his home. In fact, we benefited from his hospitality and kindness during the fieldwork in Cachilaya. The members of the association show him respect and often expect his approval to carry out certain activities. He is also secretary of the School Board. He assumes these positions in the community on a voluntary basis without remuneration, even investing his own money and valuable time to perform his duties.

¹⁷ National Federation of Peasant Women, Indigenous and Native of Bolivia "Bartolina Sisa".

Beyond his strong leadership, perhaps the greatest contribution made by Don Elias is his knowledge on the species and varieties that he conserves. There is no use in conserving a lot of genetic material without the accompanying knowledge to handle and use it. He explains that "some varieties are more productive and give bigger potatoes, some others are smaller but are better for preparing potato flour". From his point of view, it is important to conserve native varieties because of the different uses they can provide.

While Don Elias certainly holds great knowledge on crop diversity, during the study we discovered that the greater knowledge is actually held by his wife, Doña Gregoria, who is a very shy woman. Her shyness is reflected in her appearance and behaviour. She is small and very thin. She usually does not participate in meetings and when she does, she sits quietly on the side lines. She only speaks Aymará in a soft tone, hiding her face while she giggles. Don Elias represents and transmits her knowledge to the community and in reverse flow, Don Elias transmits what he learns during the various workshops and meetings to his wife.

Don Ricardo Vargas

Don Ricardo Vargas is the uncle of Don Elias. He is an Aymaran grandfather in his late 60s. He is small and thin, but strong despite his age, probably as a result of his constant physical effort in the fields. He wears a beige jacket with striped *aguayo* and a colourful woollen cap. Don Ricardo is always accompanied by his wife Doña Francisca who is a joyful and active woman. Although she does not speak Spanish, she finds the way to get a laugh out of visitors.

Don Ricardo conserves a total of 24 varieties, including potato (15), oca (6), quinoa (1), barley (1) and forage (1). This is the smallest amount of species and varieties among the *custodians of agricultural biodiversity* in Cachilaya and is in fact lower than the community average of 44¹⁸ varieties. Indeed, Don Ricardo was not nominated by the community for being a *custodian of agricultural biodiversity*, rather he volunteered for the role when one of the elected *custodians of agricultural biodiversity* stepped down from the responsibility. His willingness to participate, however, reveals his strong dedication to conservation activities. He participates in all activities organized by PROINPA, even in those that are physically demanding.



Don Ricardo Vargas, *Custodian of Agricultural Biodiversity* (H. Gruberg 2012).

While not maintaining the highest crop diversity, this elder possesses great knowledge on agricultural biodiversity. His wife is also known for her deep knowledge on selecting wild quinoa seeds for use in times of drought and environmental stress. This knowledge was conveyed to her by her mother.

¹⁸ Based on the registries of the 2012 Agricultural Biodiversity Fair.

Discussion

Custodian Farmer Attributes

Each *custodian of agricultural biodiversity* in Cachilaya was unique. However, they shared some commonalities that united them as group. The attributes recognized in these farmers are discussed in the following paragraphs. Insights gained through interviews regarding what the *custodians of agricultural biodiversity* and PROINPA staff considered to be the attributes of custodian farmers in general are also integrated into the discussion.



Custodian of Agricultural Biodiversity Doña Viviana rescues potatoes from flooding along the banks of Lake Titicaca (G. Baldinelli 2012).

One important attribute of the *custodians of agricultural biodiversity* in Cachilaya was their vast knowledge about crop diversity. All of the *custodians of agricultural biodiversity* were highly knowledgeable about crop diversity and were keen to expand upon this knowledge, designating part of their time to these types of activities. Doña Viviana for instance was knowledgeable on the medicinal uses of plants and Don Elias was highly knowledgeable on the uses of different potato varieties. From Doña Viviana's point of view, if custodian farmers did not conserve their traditional varieties they would disappear because the rest of the community members do not know how to conserve them. This suggests that custodian farmers maintain essential knowledge required to cultivate and validate traditional crop diversity. In particular, knowledge about crop uses was identified by various interviewees as a crucial factor to assure the socio-economic, ecological and cultural sustainability of conservation. Use may imply food, medicine, handicrafts, fuel, selling and buying, among other possibilities.

The *custodians of agricultural biodiversity* in Cachilaya were all innovative, experimental and open to change. These adjectives came out in different interviews and meetings in Bolivia

with the technical staff. Most agreed that custodian farmers seek out new seeds and test them. Doña Viviana for instance has built up her collection of potatoes through her travels to other communities and regions. The farmers engagement with APROCA and PROINPA further highlights their interest in exploring new farming practices and approaches to conserve their traditional crops and improve their livelihoods.

Indeed, these actors' willingness to engage with Research for Development organizations such as PROINPA is also an important element for the success of the on-farm conservation initiative. In this study we saw that farmers who maintain high diversity may not be interested or able to engage with extension programs because of the time and effort required. Some farmers describe these activities as a "waste of time" because they need to attend meetings, travel and receive visitors, which diverts time from their farming activities (Huallpa 2012). Although he did not have very high crop diversity, Don Ricardo volunteered to replace one of the farmers who stepped down as a *custodian of agricultural biodiversity* because of his strong commitment to the cause and his eagerness to participate. Farmer participation thus represents a practical constraint for selecting and supporting custodian farmers, in that to effectively support these actors they must be willing to engage.



Custodian of Agricultural Biodiversity Don Elias sits in the centre of a group of farmers taking notes on the activities (H. Gruberg 2012).

Beyond simply engaging with on-farm conservation activities, the *custodians of agricultural biodiversity* were actually all strong leaders in the community, in particular with respect to agricultural activities. Most of them sat on the Board of Directors for APROCA and they assumed their leadership roles on a voluntary basis. Their leadership positions reflect their commitment to the community and also increase the potential for their conservation work to be recognized and shared with a greater number of people. While there are advantages in custodian farmers holding leadership positions, it is important to consider that the

methodology used to select the *custodians of agricultural biodiversity* could have increased the likelihood that leader farmers were selected. This issue is discussed further in the methodological notes below.

Closely related to the concept of engagement with on-farm conservation activities is that *custodians of agricultural biodiversity* in Cachilaya were all eager to share their planting material and knowledge, at least with the members of their association. For instance, all of them gave material to the community seed bank that was recently established in Cachilaya with the help of PROINPA. According to the interviewees, the amount of diversity conserved is not the principal attribute of custodian farmers. Instead, it is their willingness to share their planting material and knowledge. In the words of Don Elias, to be a custodian means "conserving seeds and sharing them with others".

Sharing promotes the continued cultivation of varieties and allows the benefits of the diversity and knowledge to reach other community members. In a similar sense as described for engagement, sharing could be considered as a more important attribute for custodian farmers than the level of crop diversity maintained because farmers with the most diversity do not necessarily share their knowledge and resources (Perrault-Archambault 2005). For example, in Cariquina Grande (a community north of Lake Titicaca), there is a farmer named Doña Nieves who has received many awards during Agricultural Biodiversity Fairs in recognition of her outstanding conservation role. One such award consisted of a food processing plant donated by the National Program Bio-Cultura to the community where Doña Nieves lives. Doña Nieves, however, did not want to give the building key to the community because she argued that she had done all the conservation work herself: "I carried all those potato seeds on my back, this house should be mine" (Flores 2012).

In addition to facilitating the benefits of diversity to reach the community, sharing reinforces the maintenance of diversity by providing access to new materials. In this sense, sharing has been seen to correlate with crop diversity held by farmers in Nepal, the Catalan Pyrenees and the Peruvian Amazon (Subedi, Chaudhary et al. 2003; Perrault-Archambault 2005; Calvet-Mir, Calvet-Mir et al. 2012). Custodian farmers thus could be seen, less as those farmers who maintain the absolute highest levels of crop diversity¹⁹ but more as those farmers who maintain and share relevant traditional crop diversity and knowledge, which they adapt through their engagement with community members and outreach organizations.

Socio-Economic Characteristics of Custodian Farmers

Formally, in Cachilaya most of the *custodians of agricultural biodiversity* were men. However, this does not exclude women's participation in conservation. Most interviewees from PROINPA considered that both men and women can be custodian farmers and that there is no general trend. However, in discussing further about this issue, it came out that women tend to be more related to traditional crop diversity because they are engaged with smaller plots for consumption where they produce different varieties for a diverse range of uses. Women focus on flavours, colours, and nutritional contribution, and look for special

¹⁹ Doña Viviana had the most varieties among the *custodians of agricultural biodiversity* but she held only the second highest level of crop diversity in Cachilaya, as determined by the results of the 2012 Agricultural Biodiversity Fair. The other *custodians of agricultural biodiversity* held average or below average levels of crop diversity

varieties to produce *chuño* and *tunta*²⁰ (Herrera 2012; Flores 2012). Men, on the other hand, are more engaged with larger plots and tend to choose a few high yielding varieties whose harvest is mainly for the market. Interestingly, in the Agricultural Biodiversity Fair held in 2012 in Cachilaya, 18 out of 24 participants were women – a fact that highlights the important contribution made by women to on-farm conservation in this region.

This study underlines the important role that women play in conserving crop diversity but also recognizes that husband and wife in a household may often have a shared custodianship of crop diversity as they carry out different roles and responsibilities necessary for on-farm conservation. Don Elias for instance was identified as the *custodian of agricultural biodiversity* because he participates in meetings and activities with the community. It was, however, his wife who was the most knowledgeable person in the household with regard to crop diversity and uses. In this case, both husband and wife participated in the process of diversity and knowledge conservation and transfer. Doña Gregoria generated and enhanced her knowledge and materials in the field, while Don Elias shared it with the exterior world. Both roles may be seen as equally important to the custodianship. Further supporting this concept of shared custodianship, Mr Milton Pinto, PROINPA's expert on genetic resources of the Altiplano region, explains that husband and wife share the responsibility of managing the crops, cultivating, harvesting, and storing them (Pinto 2012). This concept of shared custodianship, as well as the observed discrepancy in recognition by the community versus actual work carried out, raise important questions regarding the methodology of identifying and supporting custodian farmers as we discuss in the methodological notes below.



A woman and child rest after collecting water (H. Gruberg 2012).

Custodian farmers in Cachilaya are neither the richest nor the poorest in the community in terms of access to land and inputs. Interviews and survey data indicated that middle to middle-low class families hold the highest levels of crop diversity in the community. These

²⁰ Dehydrated potato products that form an important component of the household diet

farmers have more land than the poorest farmers but also have less income to buy food than the richest farmers. They thus tend to cultivate greater levels of crop diversity to assure a more diversified diet for their families. The poorest families do not have access to sufficient land and planting material to cultivate high diversity, hence they limit their production to a few varieties for the market and for their own consumption. The richest families, on the other hand, tend to grow high yielding varieties in large areas for sale in the market and use the income to purchase different products for their consumption. According to PROINPA, rich families still often cultivate a few traditional varieties for home consumption because of their unique flavour or exotic aspects.

In the past in the Bolivian Andes, diversified gardens would legitimate wealth, reflecting the social value attributed to crop diversity. However, the significance of crop diversity in defining wealth and prestige in Andean communities like Cachilaya is changing and it seems that crop diversity is becoming synonymous with poverty. At the same time, wealth is becoming more associated with agricultural inputs. The following quote obtained in an interview with a PROINPA technician in La Paz highlights the negative connotation that crop diversity seems to have gained today:

The rich [farmer] has improved seeds that they have purchased. The middle [class farmer] has a bit of everything. It seems that they have many varieties and they are not appreciated by the community, [they are seen] as a poor farmer. They have not progressed. The others use chemicals, fertilizers (Flores 2012).

In terms of age, it is interesting that in Cachilaya the elders are not the ones holding the highest levels of crop diversity as is seen in many other parts of the world (e.g. Uzbekistan: Van Dusen, Dennis et al. 2006; Zimbabwe: Cromwell & Van Oosterhout 2000; and the Peruvian Amazon: Perrault-Archambault 2005). Don Ricardo Vargas for instance, was the elder in the group of *custodians of agricultural biodiversity* and he held crop diversity below the community average. Instead, data from PROINPA show that the group of farmers cultivating the highest levels of diversity are those between 25 and 55 years old. This age range coincides with the dominant age group of members of the farmers' association APROCA and is also the age of most of the *custodians of agricultural biodiversity* in Cachilaya.

As was seen for middle class farmers, middle age farmers tend to cultivate more varieties to assure a more diversified and nutritious diet for their families. The elders of the community cultivate lower diversity for two main reasons: 1) because their children have their own household and they consequently do not require the same diversity and quantity of produce; and 2) they are physically constrained from cultivating bigger plots and taking care of many varieties with different planting schedules and care requirements. While the elders do not necessarily hold the highest levels of diversity, they are important holders of knowledge (Van Oudenhoven 2011). For example, Doña Francesca knew about wild varieties of quinoa that could be used in times of drought. Younger people, in contrast have less diversity for three main reasons: 1) they just started their households so they have not had time to accumulate different varieties; 2) they tend to prefer higher yielding or modern varieties rather than native ones; and 3) most of them do not live in the community so they cultivate just a few furrows for their own consumption. Furthermore, young people in this community often migrate to other rural and urban centres, which limits their capacity to be custodian farmers. The consequences of this phenomenon are explored in greater detail in the following section.

Migration, Transfer of Knowledge and Crop Diversity

Throughout the study, it became evident that there is a “generation gap” in Cachilaya as it is very difficult to find people in the community between 18 and 25 years old. People this age leave the community either permanently or temporarily to pursue an education or an alternative livelihood. The interviewees recalled that migration always formed part of the community dynamics but they argued that it had increased over the past number of years. They explained that an indicator of migration is the number of children enrolled in elementary schools. In the year of the study, only seven children were enrolled when the usual number was around 30. More and more, young members of the community are obliged to leave and raise their children outside the community such that, according to *custodian of agricultural biodiversity* Don René Huallpa, in approximately five years there will be “no children enrolled in elementary schools”!

There are different reasons for migration but the most mentioned during the study was the lack of land. The constant division of land through inheritance makes it difficult for families to satisfy their subsistence needs. Moreover, they do not have enough land to use their labour to its full capacity. In this sense, young people see the necessity to migrate in search of other opportunities. Furthermore, there are several environmental problems such as drought interchanged with flooding that affect agricultural production. Even older people would like to migrate. For example, Don Elias mentioned that he would migrate but he is too old to find a job in the city. Don René also explained that he would be gone long ago if he did not need to help his elderly parents.

A process of cultural erosion is occurring in Cachilaya as a consequence of migration because the knowledge related to crop diversity is no longer transferred from one generation to the next and the youth no longer implement traditional practice. According to Doña Viviana, young community members lack interest in crop diversity:

“They [the youth] are not interested. They cannot distinguish amongst varieties. They just know a few” (Herrera 2012).

Younger generations instead tend to develop a simplified version of agriculture that involves buying improved seeds and chemical inputs from the market. The ensuing lack of knowledge transmission to younger generations represents a serious threat to the conservation of traditional crop diversity. Knowledge is required to cultivate, validate, and continuously improve crop resources to adapt them to evolving needs.

Traditional knowledge is also challenged, however, by severe environmental changes occurring in this region and these changes may contribute to the youth’s lack of interest in traditional practice. For instance, in some communities of the Andes, people explain that their traditional knowledge is unable to address increasing pests and diseases to the extent that they feel obliged to make heavy use of agrochemicals. At the same time, some farmers also attribute their inability to cope with these challenges to the erosion of local knowledge²¹. From a positive perspective, it is possible that the youth will play a significant role in merging traditional knowledge with formal knowledge gained at schools to have a constructive influence on the conservation of biodiversity and adaptation to climate change.

²¹ Despite the erosion of traditional knowledge, many solutions to problems related to climate change can still be found among the community. For instance, some farmers want to increase production of dairy products as a strategy to deal with climate change. They explain that because of the rains, their agricultural production is suffering but they still produce two pieces of cheese every day.

In many cases young migrants keep a bond with the community by cultivating a few furrows of potato for their consumption - this bond may eventually bring them back to the community as permanent residents.

Custodian Farmer Roles

As mentioned previously, farmers around the world select and conserve seed and planting material, making them *de facto* conservationists of crop diversity. However, the contributions of custodian farmers to on-farm conservation are thought to exceed those of average farmers and thus investing in them to leverage their efforts could be very strategic.

In general, both farmers and PROINPA staff interviewed agreed that custodian farmers are responsible for obtaining, selecting, and planting seed. In this sense, Don Ricardo considered that being a custodian farmer means to “prepare the land and to cultivate the seeds”. However, these are the responsibilities of all farmers. So what responsibilities differentiate custodian farmers from the rest? The most important quality that was distinguished through the discussions was that custodian farmers share their planting materials and knowledge with their community. Many farmers may choose to conserve crop diversity but they share and exchange their knowledge and material only inside their kinship boundaries. Custodian farmers may be said to be those farmers who conserve crop diversity and have a sense of responsibility for sharing their materials, knowledge, heritage and culture with their families, communities, and society at large.

Another important attribute of custodian farmers that came out in many of the discussions was that they constantly experiment with crop diversity. While all farmers have the responsibility of selecting and conserving seeds to secure the livelihoods of their families, most farmers do not go further in collecting and experimenting with crop diversity. These roles in conserving, sharing, and experimenting with crop diversity are summarized by PROINPA technician Juana Flores:

A custodian farmer is someone who has a vocation to conserve. He is the one that brings seeds, plants them and tests them. He is the one that uses, that likes [to conserve], and shares [the planting material] (Flores 2012).

These roles in conserving, experimenting and sharing crop diversity are similarly recognized by Sthapit and colleagues (2013) who define custodian farmers as those who maintain, adapt and promote agricultural biodiversity. However, everyone interviewed did not agree that experimentation was an important role of custodian farmers. In fact, surprisingly, the farmers and PROINPA staff interviewed could not all agree on any responsibility of the *custodians of agricultural biodiversity* besides the responsibility of sharing.

The weak understanding and agreement on custodian farmer roles in Cachilaya stems from the fact that this is a new concept in the community and also in the on-farm conservation methodology. The definition of custodian farmer roles is in an exploratory phase in this community and also in the broader picture of the global on-farm conservation discourse. Regardless of the cause, poor understanding of custodian farmer roles could represent a limitation for their conservation work. For instance, if the other members of APROCA and the rest of the community do not comprehend the roles and responsibilities of the *custodians of agricultural biodiversity*, this condition could well jeopardize their legitimization. The *custodians of agricultural biodiversity* also do not know what is expected from them, nor the degree of responsibility they have towards their community in terms of conservation. For example, they do not know if they are expected by the community to

share seed with others in stressful situations or the conditions under which this sharing would occur (e.g. amounts to share, remuneration for the sharing, etc.). Furthermore, extension workers also do not know how to assist the *custodians of agricultural biodiversity* and to what extent they can demand specific actions from them (e.g. requesting them to fill out and maintain community biodiversity registers).



Farmers gather for a meeting outside the community centre. The women sit on the ground behind the men, with the exception of Doña Viviana who sits on a bench at the front of the group (H. Gruberg 2012).

Although the roles and responsibilities of custodian farmers in Cachilaya were not clear to the community, there were some ideas about what they could be. PROINPA, for instance, would like to rely on the *custodians of agricultural biodiversity* to develop different activities for the benefit of the community, to be part of the research process, to be "key informants" for studies, and to be the first point of contact who would help to motivate the rest of the community to participate in collective conservation actions. Some of the most commonly mentioned roles and responsibilities mentioned during the interviews carried out during the study include the following:

- Knowing the crops and varieties of the region in terms of management and uses
- Conserving the crop diversity of their communities in the community seed bank
- Managing the community biodiversity register
- Recuperating seeds and reproducing them through the community seed bank
- Acting as a link between the community and the National Genetic System (in the process of forming in the country) in order to complement *ex situ* conservation of their plant genetic resources and in case of loss in the community, recovering their germplasm for re-introduction

These responsibilities would seek to strengthen the role that these farmers already naturally play in sharing and managing crop diversity by linking them with conservation work at the community and national levels. For example, sharing is an agreed distinctive responsibility

of custodian farmers that can be developed through the community gene banks, although the precise mechanisms for sharing have not yet been established in Cachilaya.

PROINPA has decided to work toward the development of an internal norm that will clearly define the roles and responsibilities of the *custodians of agricultural biodiversity* in Cachilaya and in other communities where this Agency is working in Bolivia. These norms will be developed in close consultation with each community so that everybody will be familiar with them and the process itself will contribute to legitimize these actors and their crucial contribution to safeguarding local crop diversity and knowledge.

In parallel to on-going work defining the roles and responsibilities of *custodians of agricultural biodiversity* in Cachilaya is a similar process for the community seed bank that was recently established in the community. As methods are under development, it will be valuable to explore ways of fostering greater synergy and mutual support between the *custodians of agricultural biodiversity* and the community seed bank. Strengthening these links could contribute to greater success and sustainability of on-farm conservation by distributing the workload and establishing the custodian farmer role as part of a community-wide effort. These issues are discussed further in the methodological notes below.

Tricky Terminology

Part of the problem underlying the lack of definition of roles and responsibilities for the *custodians of agricultural biodiversity* in Cachilaya was the concept of “custodian farmer”. It seemed that people did not embrace this concept because its significance in the Spanish language is contradictory to the only agreed responsibility: sharing. In the Spanish language “custodian” means someone that guards, cares, and saves. In this sense, a custodian is related with someone that guards seeds from others. One interviewee mentioned “for me a custodian farmer sounds like a guard dog, I don’t like it”. Others mentioned that the concept of a custodian “is related to jail” and with “someone that does not let people touch or look”.

This finding suggests that it will be important to identify a term for “custodian farmer” in each location and context that people can relate to, embrace and clearly understand. During the interviews different words came up including “promoters”. In recent years many NGOs have been working with “promoters” who are outstanding farmers that follow training courses and are in charge of diffusing their knowledge in their community. The farmers mentioned this term because they understand the responsibilities it implies. The *custodians of agricultural biodiversity* also mentioned the word *yapuchiri* that means “farmer” in Aymará. However, PROINPA experts pointed out that this term is not appropriate because everybody is a farmer in the community.

PROINPA is working to find a suitable concept that better matches the socio-cultural context of the Andean region of Bolivia. We believe that the same should ideally be done in each place of intervention. However, we do suggest that the term “custodian farmer” continue to be used in the global on-farm conservation discourse in order to maintain a consistent terminology.

Methodological Notes and Recommendations

The approach used to identify and define the role of custodian farmers in Cachilaya has its upsides and downsides. On the upside, it facilitated the creation of a group of custodian farmers who will develop their conservation role as a responsibility toward their association. This aspect is very important in the Bolivian Andes because if someone agrees to take over a public position, they must give their best or they face recrimination from the rest of the community. On the downside, the process of selection did not consider that some potential custodian farmers may not want to take on public positions for many reasons (e.g. shyness) or that some of the selected custodians may have felt obliged to take on this role because they were part of the board of directors of APROCA.

As discussed above, public involvement of custodian farmers is advantageous in that it allows the benefits of their work to reach a greater number of people. However, the greater visibility of leaders in APROCA may have also made them more likely to be selected as *custodians of agricultural biodiversity* by their fellow farmers, when many other farmers might have also been suitable for this role. A tendency for communities to recognize expertise in more socially engaged farmers was previously recognized in a study in the Peruvian Amazon (Perrault-Archambault 2005). Similarly, in this study, we saw that the 'true' knowledge holders were not always recognized as custodian farmers because they did not participate in workshops and meetings due to their shyness, poor communication skills, or busy schedules. It will be important to determine mechanisms of identifying such shy or uncommunicative farmers that hold significant levels of crop diversity and traditional knowledge and encourage the flow of their knowledge and materials to the community. In this sense, it will be important to work not only with the outgoing, leader farmers, but also with other community members who may not be so visible during initial contacts.

Another factor that biased the selection pool for *custodians of agricultural biodiversity* in Cachilaya was that they were selected only from within the farmers' association APROCA. By including only members of this association in the selection process, the majority of the community was eliminated from consideration for the *custodian of agricultural biodiversity* role. When PROINPA initiated the establishment of APROCA in 2007, they invited the whole community of approximately 170 families to participate. Only 50 families came to the early meetings and in the end, only 25-30 families remained to eventually form the association. Now that the association has started to generate funds, other families have become interested in joining in but APROCA has been reluctant to give them entry. Mr Milton Pinto (2012) explains that APROCA needs to work on a plan to include new members and PROINPA is searching for mechanisms to involve the rest of the community. Similarly, we believe that mechanisms should be developed to ensure that custodian farmers are selected from the widest representation of the community as possible.

An important consideration as organizations seek to support custodian farmers is that working with just a set of farmers brought some tensions among members of the community and even within APROCA. Although, the *custodians of agricultural biodiversity* saw their work as beneficial for the whole community, other people did not completely understand their role. For instance, when our work was introduced to APROCA, many members protested because they did not want the study to focus "just on the custodian farmers", they felt "it should include everyone". Custodian farmers already existed in the communities in an informal way. They did not have a specific name but they were respected for their contribution. The community knew that certain families and individuals

held different varieties and associated knowledge. The problem arose when we proposed a process of formalizing their role as a public position. This situation revealed to us an important aspect: By identifying “one” custodian farmer and giving them visibility over other members of a community there is a risk of overlooking the complex social dynamics involved in the process of maintaining crop diversity. Management of seeds and planting material is a shared activity among the members of a household, a community, or a seed system through the division of tasks and flows of information and material (Louette 2000; Zimmerer 2003). In this sense, a field technician of PROINPA explained that “biodiversity cannot be held by just a few farmers because an extreme event could take over everything” - the conservation effort has to be carried out by many more people (Flores 2012).

Following from these insights, it will be important to consider the nature of each community of intervention so as to determine whether to work in promoting collective action rather than or in addition to working with individual farmers. The involvement of the rest of the community in Cachilaya is clearly required, otherwise the work of the *custodians of agricultural biodiversity* is limited in the sense that people may no longer want to share seeds or planting material with them, creating barriers in the seed flows. In this respect, community seed banks, which are more advanced in South Asia (e.g. Shrestha, Vernooy et al. 2013), are seen as a highly complementary strategy to supporting custodian farmers in on-farm conservation. Further investigation is needed to fill gaps in knowledge on how to complement the roles played by individuals (custodian farmers) with those of collective efforts (such as community seed banks) with regards to the maintenance, valorisation, and sharing of both genetic diversity and traditional knowledge.



Women work together while chopping alfa alfa (H. Gruberg 2012)

Part of the problem in generating tensions in the community was that the roles and responsibilities of the *custodians of agricultural biodiversity* were not clear to members APROCA or to the rest of the community. The roles and responsibilities of custodian farmers should be defined in consultation with the community members to ensure that their collective nature is understood and validated. Custodian farmers could play an important role in preserving traditional crops and knowledge in community gene banks and

biodiversity registers. However, all tasks should be decided upon by the farmers and their communities in a voluntary manner.

A final consideration regarding the methods used here is that although identifying custodian farmers and defining their roles is meant to support on-farm conservation, there are potential downsides to formalizing this role that could oppose the desired effect. Field staff from different development organizations are concerned that formalizing the role of custodian farmers in a public position could mean that the amount of work and responsibility that will lay over the custodian farmers will become enormous. From their point of view, being a custodian farmer could become an obligation with too many tasks that will be burdensome and potentially demoralizing, with the risk of completely losing farmers' participation. These problems could be minimized by defining their roles and responsibilities in a voluntary, participatory, and communal manner as suggested above. Moreover, the involvement of more actors such as local authorities and community organizations could also minimize these problems because there would be shared responsibilities. Approaches that focus on the recognition of custodian farmers' efforts and self-esteem building can also encourage them to continue in this valuable role. In this sense, initiatives aimed to support custodian farmers should work to ensure that the benefits reach the farmer and that "support" acts to ease rather than to intensify their work load. This idea is clear in a quote by PROINPA's Juana Flores:

"First, we should focus on giving benefits to the people. Then conservation will come easier" (Flores 2012).

Conclusions

The present study aimed to develop understanding of custodian farmer attributes, roles and responsibilities so as to assist in the development of methods to support these actors in enhancing their contribution to on-farm conservation. The study built on the stories of three custodian farmers who were identified in Cachilaya, Plurinational State of Bolivia through a consultative process with the local farmer's association (APROCA). The characteristics of these farmers were considered, as well as their perspectives and PROINPA staff perspectives on what they considered to be the attributes, roles and responsibilities of custodian farmers in general.

The study showed that each custodian farmer is unique in their drives, aspirations, interests and social skills. These differences influence their conservation work regarding both crop genetic diversity and associated traditional knowledge. At the same time, the study showed also the existence of a number of commonalities among custodian farmers. For instance, these actors are typically highly knowledgeable about the uses of crop diversity, which ensures the continued validation of the resources they look after. They are also curious and interested to try new varieties and techniques.

One surprising finding of the study was that custodian farmers do not necessarily hold the highest levels of diversity to be found in their community. Instead, they stand out for their eagerness to share their knowledge and resources with other farmers and their willingness to participate in on-farm conservation efforts. The act of sharing ensures that the benefits of their work reach out to other community members. Meanwhile, the observed engagement of the *custodians of agricultural biodiversity* with people from within and outside their community is a characteristic that enables these farmers to access new information and

materials, as well as to connect into on-farm conservation efforts occurring at regional, national, and global scales.

The attributes of custodian farmers identified in this study are not carved in stone and will vary according to their intrinsic personality and the broader social context. Indeed, the findings of this study cannot be generalized, even to villages in the same region. For instance, in Cachilaya most custodian farmers were middle aged and middle-low class farmers, whereas in other regions of Bolivia and in other countries, custodian farmers are found to be among the elders (e.g. Cromwell & Van Oosterhout 2000; Perrault-Archambault 2005; Van Dusen, Dennis et al. 2006), the poorer wealth classes (e.g. Cromwell and Van Oosterhout 2000; Birol, Kontoleon et al. 2006; Strajeru, Ibanescu et al. 2009) or the richer wealth classes (Zimmerer 1996; Perrault-Archambault 2005; Van Dusen, Dennis et al. 2006).

The attributes of custodian farmers will also certainly differ depending on the methods used to identify them. In the present case, custodian farmers were identified through a social process wherein they were recognized by the members of their community. As a result, the farmers identified were highly visible members of their community and leaders in a local farmers association (APROCA). To our surprise, the methods did not necessarily result in the selection of farmers conserving the highest number of varieties. If the selection process were carried out in a different manner with higher priority placed on holding the highest levels of crop diversity, we might have come out with different farmers with different social attitudes and conservation roles.

There are merits and pitfalls to the methods of identifying custodian farmers used in this study. Sharing and engaging with on-farm conservation projects are essential traits to ensuring sustainable conservation of crop diversity and thus the fact that highly engaged farmers were selected can be seen as an advantage. The fact that farmers with the highest levels of crop diversity were not selected could either be considered a pitfall of the methodology or not. Farmers with the highest levels of crop diversity do not necessarily share their knowledge and materials with the community and also may not be willing to participate in on-farm conservation projects, which is, in our view, a relevant limitation. We recognize, however, that this is a poorly explored territory of research and more work is necessary to refine approaches to identify custodian farmers in ways that are most relevant within a long-term conservation and community-benefit-sharing perspective. In the case of Cachilaya, the process that is followed must clarify the roles of the *custodians of agricultural biodiversity*, other farmers in the community, APROCA, and partner agencies and determine how their roles complement one another for the conservation of crop diversity and the development of sustainable livelihoods.

An interesting finding of this study is the concept of a “*shared custodianship*” among the members of a household wherein husband and wife carry out different but equally important responsibilities related to conservation of crop diversity. This study thus highlights the important role of the family in supporting the conservation of crop diversity beyond the role of the individual farmer. The idea of recognizing custodian families rather than custodian farmers has been discussed at recent meetings in India and Nepal but the details of what this entails require further discussion (Sthapit, Lamers, et al. 2013, Sthapit, Meldrum, et al. In Prep). For instance, the passion and drive of an individual can be the driving force for a whole family to conserve high levels of crop diversity but the work itself is not achieved in isolation.

In a similar sense, shared custodianship may also be recognized among community members as part of a collective phenomenon rather than an isolated and individual action. This study acknowledges that there is a risk that on-farm conservation could be weakened by working with custodian farmers if it causes tensions within the community. It will be important to consider the nature of each community of intervention to determine whether to invest more in supporting collective rather than individual farmer actions and how these two contributions can be best blended synergically. Based on the results of this study we agree with the recommendation made at a Bioersivity conference held in Frankfurt, Germany in 2011, which focused specifically on the on-farm conservation of neglected and underutilized species:

“Initially focus on "champion farmers" to give visibility and then engage more members” (Padulosi et al. 2012, p. 238).



Painting of the landscape surrounding Cachilaya that was created by the daughters of Don Elias, Yola (15) and Fanni (17) (Image courtesy of the Bioersivity International project on landscape resilience).

One way to include the community and to facilitate the work of custodian farmers is through communal discussion and establishment of the roles and responsibilities of custodian farmers. In Cachilaya there was a general lack of understanding and agreement on these roles and responsibilities, which turned out to be a limitation for both custodians and for those agencies promoting on-farm conservation. We must recognize, however, that this experience is part a process that is just starting in the community The roles and responsibilities of custodian farmers should be defined in consultation with the farmers and community members to ensure that the collective nature of these roles is well understood

and does not become overwhelming. Likewise, a local concept for “custodian farmer” should be established with the community, something to which the people can relate in their day-to-day life.

Overall, it can be concluded that custodian farmers can be individuals as well as families, households, or groups of farmers who besides conserving their traditional crop diversity also seek out and experiment with new varieties and have a sense of responsibility for sharing their crop diversity and traditional knowledge, heritage and culture with their families, communities and society in general. Farmers can be seen to play as important a role in crop diversity conservation as scientists (Brush 1991 p. 159). Their valuable contribution to on-farm conservation is increasingly recognized but should be further promoted and legitimized by the community, national and international bodies and legal frameworks. On-farm conservation of plant genetic resources is one of the most challenging but important pursuits that humanity is faced with in present times. Understanding and supporting custodian farmers represents a promising avenue to enhance on-farm conservation with great potential to improve livelihoods, nutrition, and quality of life of the rural poor and all of Humankind.

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Appendix A. Questions and Hypotheses

Prior to commencing fieldwork, a series of hypotheses about custodian farmers was established based on a survey of existing knowledge in the literature. Four primary research questions were defined to clarify the definition of custodian farmers and their roles and responsibilities in the conservation of crop diversity. Each research question (R) is presented below with its corresponding sub-research questions (SR) and hypotheses (H).

R1. Who is a custodian farmer?

SR1.1. What are the attributes of a custodian farmer?

- HSR 1.11 A custodian farmer is the most knowledgeable person in the community.
- HSR 1.12 A custodian farmer is not necessarily the one holding the highest diversity but is the one eager to share his/her knowledge and planting material with the rest of the community having a great number of exchanges.
- HSR 1.13 A custodian farmer is innovative, experimental and open to change.
- HSR 1.14 A custodian farmer is recognized as good farmer and a trustworthy member of the community.
- HSR 1.15 A custodian farmer is communicative and shares their planting material and knowledge.
- HSR 1.16 A custodian farmer is a leader in his/her community.

SR1.2 What are the socio-economic characteristics of custodian farmers?

- HSR 1.21 The gender of a custodian farmer is defined by gendered distribution of tasks and access to resources.
- HSR 1.22 Custodian farmers are the elder members of the communities.
- HSR 1.23 Custodian farmers are wealthier because they have access to more land with different microclimates.

R 2. Why do custodian farmers conserve crop diversity?

SR2.1 What are the motivations of custodian farmers to conserve crop diversity?

- HSR 2.11 Custodian farmers conserve their culture, traditional knowledge and heritage.
- HSR 2.12 Custodian farmers conserve crop diversity for its emotional value.
- HSR 2.13 Custodian farmers conserve crop diversity for the sake of it.
- HSR 2.14 Custodian farmers conserve crop diversity for food sovereignty, health and livelihoods.
- HSR 2.15 Custodian farmers conserve crop diversity to be recognized as good farmers.

R 3. What are the roles and responsibilities of custodian farmers in relation to the conservation of crop diversity?

- HSR 3.1 All farmers are de facto conservationist but custodian farmers besides of holding high levels of crop diversity have a sense of responsibility for keeping and sharing their crop diversity as well as their traditional knowledge, heritage and culture with their families, communities and society in general.

R 4. How is the migration of young members of the communities affecting the conservation of NUS crop diversity?

SR 4.1 How is the transfer of knowledge being affected by migration of young members of the community?

- HSR 4.11 The former mechanisms and spaces for the transfer of knowledge are no longer functional.

SR 4.2 How is traditional knowledge of crop diversity been shaped by migration?

- HSR 4.21 Traditional knowledge is being merged with the knowledge they gain at schools and places where they migrate.

SR 4.3 What are the perceptions of the young members of the community about traditional knowledge and the conservation of crop diversity?

- HSR 4.31 Traditional knowledge is no longer reliable but itself under the current socio-economic conditions.

Appendix B. Interview Guidelines

Custodian Farmer Interview

Name: _____ Age: _____ Ethnicity: _____
Gender: _____ Community: _____ Date: ___/___/___
Name of Interviewer: _____

I. Background Information

1. For how long have you been a *custodian of agricultural biodiversity*?
2. What were the factors that contributed to you being selected as a custodian of agricultural biodiversity?
3. What are your responsibilities as a *custodian of agricultural biodiversity*?
4. Are these responsibilities different from those you had before you were a *custodian of agricultural biodiversity*?
5. What tasks do you complete as a *custodian of agricultural biodiversity*? (very similar to previous question)
6. What are the positive and negative aspects of being a custodian farmer?
7. In hindsight, would you take on the role of custodian farmer again?
8. What are the characteristics of a custodian farmer? (Read list of characteristics from R1 in Appendix 1 and note their response/reaction) Do custodian farmers have the following characteristics:
 - Hold a higher number of crop species and varieties than other farmers
 - Have an agricultural vocation
 - Are respected and recognized by other farmers
9. Would you add other characteristics? No _____ Yes _____ Which ones?
10. What are the most important characteristics of custodian farmers?
11. What are the responsibilities of custodian farmers? (Read list from R3 in Appendix A and note response/reaction)
12. Do custodian farmers have a special name or nickname in the community?
13. How were the custodians of agricultural biodiversity selected? What did you think of the process? Would you change or improve anything?
14. How do the *custodians of agricultural biodiversity* relate to other custodians in the community? (meetings, seed bank, etc.)
15. Who are the people who know the most about crops and agricultural traditions in the community? (Compare names to see if they are *custodians of agricultural biodiversity*)
16. Who are the most innovative and experimental people in the community?

II. Seed Acquisition

1. In general, where do you get your seeds and planting material?
 - Own seed
 - Relative
 - Friends/Comrades
 - The Community
 - Extension Workers
 - Market
 - Research Organizations
 - Government
 - Community Seed Bank
 - Other
2. Which of these seed sources do you use the most?
3. Why? (e.g. seed quality, knowledge, confidence, etc.)
1. What type of exchange?
 - Purchase
 - Gift
 - Exchange seeds
4. What is your relationship with the community seed bank?
5. When do you get seeds?
6. Do you travel to get seeds? Where do you go?
7. How did you obtain your first seeds?
8. What are the most treasured seeds? Why?
9. To whom do you give seeds?
10. In exchange for what??
11. How would you describe a good farmer?

12. When is it acceptable to lose seeds or ask for seeds? (drought, transfer, etc.)

III. Motivations

1. Why did you accept to be a *custodian of agricultural biodiversity*?
2. Since when have you saved seeds? (Ask them to describe some of their history)
3. How do you save seeds?
4. Why do you save seeds?
5. What are the benefits of saving seeds?
6. What is more important: saving seeds or sharing seeds?
7. What is the value of the traditional varieties?
 - Income generation
 - Medicinal Value
 - Nutritional Value
 - Conservation
 - Resistant to adverse conditions (e.g. dry or degraded soil)
8. What would happen if you stopped saving seeds?

IV. Gendered distribution of labour

1. How many people are in your family?

Name	Gender		Age	Work in the Farm		Location	How Often?
	F	M		Yes	No		

2. What farm activities do you participate in? With whom?

Activity	F	M	Children
Collecting Firewood			
Caring for large and small livestock			
Caring for large livestock			
Crops for the market			
Crops for household consumption			
Fruit crops			
Medicinal crops			
Ritual crops			
Craft crops			
Ornamental crops			
Agricultural planning			
Sowing seed			
Cultural practices			
Seed selection			

V. Knowledge Transfer

1. Who taught you how to take care of crop seeds?
2. Where did you learn about seeds, agriculture and tradition?
3. Why are certain varieties abandoned?
4. Have you maintained your grandparents' traditions in the community?
5. How have traditions changed? Since when? Why?
6. Do traditional practices still work (e.g. climate forecasting, pest and disease control)?
7. Do young community members use traditional practices?
8. How could traditional practice be promoted? (e.g. school)
9. Do you teach your children about agriculture?
10. What do your children do?
11. What do you hope for your children's future?

VI. Migration

1. Do you or your partner migrate?
2. When? To where? Why?
3. Generally in your community, who migrates? Where?
4. How does migration affect agricultural activities? (e.g. less land, more workers)
5. When did migration become more common?

6. When do they come back to the communities?
7. How are the communities affected by migration (positive and negative)? (e.g. income, new agricultural knowledge)
8. How do you make up for the missing labour during the year?

VII. Limitations and Requirements

1. What are the main constraints in conserving traditional seeds?
2. What do you need to continue to conserve traditional seeds?

Observations

Who is responsible for the selection of seeds? (for variety).
 Who takes care of the garden?

PROINPA Staff Interview

Name: _____ Date: ____/____/____
 Position _____ Project: _____

1. How long have you worked with PROINPA?
2. What are the main issues your work addresses?
3. How long have you been working with custodian farmers?
4. What was the process used to identify custodian farmers?
5. What do you think about the selection process? How would you modify or improve it?
6. What are the characteristics of custodian farmers? Do you think they have the following qualities:
 - Expert farmer Eager to share Good farmer
 - Trustworthy Innovative, experimental, open to change
 - Woman or Man Older Rich
7. Would you add any characteristics? Which are the most important?
8. Are custodian farmers those who conserve the most crop species and varieties?
9. What do you think are their motivations to conserve seeds?
10. What do you think are their roles and responsibilities related to seed conservation?
11. What do you think of the concept of custodian farmer?
12. Do you think it is a sustainable concept?
13. How do you recognize them in their communities?
14. How are they related to community seed banks?
15. What changes should be made to the methods of working with custodian farmers?
16. What is the level of involvement of the rest of the community in in situ conservation?



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