



Strengthening the role of custodian farmers in the national conservation programme of Nepal

Sajal Sthapit, Gennifer Meldrum, Stefano Padulosi and Nadia Bergamini, Editors

Proceedings from the National Workshop
31 July to 2 August 2013, Pokhara, Nepal



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Cover: Top: Indra Devi Oli, a custodian farmer in Doti, surveys her farm. Photo Credit: Indra Paudel/LI-BIRD. Bottom: Custodian farmers exchanged a diversity of seed during the seed exchange session of the workshop. Photo Credit: Mahesh Shrestha/LI-BIRD.

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List of abbreviations and acronyms

ABS	Access and benefit sharing
CBD	Convention on Biological Diversity
CCAFS	CGIAR Research Programme on Climate Change Agriculture and Food Security
CCI	Crowd-sourcing crop improvement
CGIAR	Consultative Group on International Agricultural Research
FAO	Food and Agriculture Organization of the United Nations
GEF	Global Environment Facility
IFAD	International Fund for Agricultural Development
LI-BIRD	Local Initiatives for Biodiversity, Research and Development
MSSRF	M.S. Swaminathan Research Foundation
NABIC-Nepal	Network for Agrobiodiversity Conservation in Nepal
NARC	Nepal Agricultural Research Council
NESFAS	North East Slow Food and Agrobiodiversity Society
NGO	Non-governmental organization
NPR	Nepalese rupees
NS/S	Native Seeds/SEARCH
PACS	Payment for agricultural biodiversity conservation services
SAHAS	Group of Helping Hands
TFT	Tropical Fruit Tree
UNEP	United Nations Environment Programme

Foreword

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For millennia, farmers have cultivated plants to provide food, medicine and shelter for their families and society at large. In their wisdom, they have learned to select the better performing plants in their fields and have identified traits that are useful to them - not only traits that have better agronomic qualities, but also better culinary properties that have important cultural and social significance. Crops have thus co-evolved with humanity and this co-evolution has produced a wide diversity of local landraces. In Nepal for example, over 2000 local varieties of rice are known to exist. Farmers value this diversity, as they derive many agronomic, culinary, cultural and social benefits. Maintaining this continuing and dynamic evolution on farm is critical to guarantee the raw materials that farmers need to meet food and nutrition security.

Unfortunately the diversity of local varieties is known to be disappearing due to their replacement by high yielding cultivars. Society has recognised though that some farmers in their communities are maintaining a diverse portfolio of traditional crop species and varieties and continue to select those adapted to local conditions and promote their use and conservation among their friends and neighbours. Such “custodian farmers” play a strategic role as conservators of traditional varieties and in keeping alive the evolutionary system. They are also recognised to play a complementary role to the conservation services provided by *ex situ* genebanks.

Over its past 40 years of history, Bioversity International has been sensitive to the loss of traditional varieties and has been carrying out research to better understand the scientific basis of on farm conservation and linking the conservation to use of local varieties. In Nepal, it has collaborated with LI-BIRD who pioneered this work. We are grateful for the financial support from our donors, in particular IFAD, and more recently CCAFS for supporting this research.

This workshop held in Pokhara, Nepal from 30 July to 1 August 2013 on custodian farmers has been a landmark event in better understanding their needs and challenges in conserving crop diversity and how to sustain their efforts into the future. It has brought together farmers, scientists and policy makers from South Asia to dialogue and listen to each other, share knowledge and explore possible synergy among them. Finally I would like to express my thanks to the editors for putting together the proceedings of this workshop to share the results with the world.

Executive summary

The workshop “Enhancing the contribution of custodian farmers to the National Plant Genetic Resources System in Nepal” took place in Pokhara, Nepal from 30 July to 1 August 2013, organized by Bioversity International, LI-BIRD and NABIC-Nepal with the financial support of IFAD and CCAFS. The meeting brought together farmers from distant parts of Nepal who were recognized for their outstanding dedication and contribution to the conservation of agricultural biodiversity, known as custodian farmers. Joined by researchers, NGO representatives and government officials, the meeting facilitated knowledge sharing and discussion between stakeholders in plant genetic resource conservation in Nepal with regard to three objectives: 1) to define methods and tools to support the work of custodian farmers, 2) to explore policy options to enable agricultural biodiversity conservation and 3) to develop understanding of the characteristics and motivations of custodian farmers. These proceedings share the results of this experience.

The document begins by establishing the context and goals of the workshop, it then shares papers contributed by researchers and NGO representatives that were presented at the event, participating farmer profiles, and the results of breakout discussions. The workshop recommendations were derived from the group discussions on the third day of the meeting and consist of a vision and action points to strengthen the conservation of agricultural biodiversity in Nepal as proposed by a spectrum of critical stakeholders in this pursuit. The document follows the general flow of events of the meeting, ending with reflections by the workshop organizers on the outcomes, as well as observations by gender specialist Marlène Elias (Bioversity International) on how to ensure the custodian farmer approach is gender responsive.

The workshop advanced understanding of custodian farmers roles and needs in conservation of agricultural biodiversity, also considering how family and community members enable or hinder their work. Several viable approaches to leverage and strengthen the contribution of custodian farmers to plant genetic resource conservation in Nepal were identified, including network building, fostering connections and synergy with community seed banks and *ex situ* conservation, and incentive mechanisms.

Meeting Context and Objectives



Meeting Context and Objectives

Custodian farmers: keepers of plant genetic resources essential for nutrition, climate change resilience and sustainability

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Crop diversity: a threatened essential resource

The conservation and use of crop diversity is essential to achieve food security for a burgeoning human population. Currently, about 12% of the world's population suffers from chronic hunger and upwards of 60% is malnourished due to lack of enough calories or insufficient micronutrient levels resulting from an imbalanced diet (Doak et al. 2008; Pimentel et al. 2010; FAO 2013a). Although there are more than 30,000 edible plant species, 80% of the world's cropland is covered by a small collection of annual cereals, legumes and oilseeds (Wilson 1992; Glover et al. 2007; Schmidt et al. 2010). Wheat, rice, maize, and soybean by themselves account for over 50% of arable land (Glover et al. 2007). This lack of diversity is starkly reflected in the diets we consume, where 95% of our plant-based calories can be traced back to only 30 or so crops (FAO 2013b).

Over-reliance on a handful of crops puts food security at risk through depleted dietary diversity and greater vulnerability to infestation and climatic perturbation, which is a particularly pertinent problem in the face of global climate change (Thrupp 2000; Altieri and Koohafkan 2008). At the same time, this trend exposes people to the risks of rampant speculation in food prices resulting in food crises and riots, as seen in 2008. The dominance of just a few crops in agricultural production is also associated with the disappearance and loss of traditional crops in many parts of the world. These threatened local crops are often more nutritious than dominant commercial crops and better performing on marginal lands, making them highly valuable in ensuring food security for the rural poor (Nangula et al. 2010; Ravi et al. 2010). Mostly in the form of landraces or wild plants, local crops have been central features in traditional diets but their use is limited in current food systems because of neglect from research and development and the wrong perception that they are “food of the poor” (Padulosi et al. 2013). Given the great potential these neglected and underutilized species hold to address global challenges such as hunger, poverty and climate change adaptation, there is need to revisit research and development priorities in their favour and to develop strategies together with stakeholders to increase their use. This is a global

requirement but its implementation would be realized only through supportive policies and development programmes in each country.

A critical step towards this end consists of lending support to *in situ* conservation in order to secure the dynamic maintenance of the genetic diversity and knowledge associated with these threatened resources (Brown 2000; Padulosi 2012). Both crop diversity and traditional knowledge are being lost at fast pace, calling for urgent attention. As knowledge is lost, so is the ability to value and use the crop resources, including cultivation practices to leverage their resilience, postharvest processing techniques, and cooking recipes for bringing them to the table. In this sense, the maintenance of traditional knowledge can be considered equally important as the conservation of crop genetic diversity. Because of this dual objective and the highly dynamic nature of on farm conservation, which facilitates the continued adaptation of crop genetic resources to biotic and abiotic stressors, it is argued that greater attention should be paid to those farmers who continue to cultivate and valorise these resources through use (FAO 2010; Padulosi 2012).

Custodian farmers

Within this context, there is need for identification of custodian farmers and better understanding of the needs and challenges they face in conserving crop diversity. Custodian farmers are those who maintain a diverse portfolio of traditional crop species and varieties, who select species and varieties adapted to local conditions, and who promote the use and conservation of local diversity among their friends and neighbours (Sthapit et al. 2013). Often custodian farmers are outstanding members of their communities for their dedication and enthusiasm in conserving a wide diversity of traditional crops and sharing their knowledge and materials with their community (Gruberg et al. 2013). These actors' inherent drive to conserve genetic diversity and knowledge is strategic for sustaining local food culture. Bringing their voices into discussions and decision-making processes regarding the conservation of agricultural biodiversity could be integral in developing national strategies that combine *ex situ* and *in situ* approaches, which are currently very poorly linked to one another.

The research focus on custodian farmers is fairly new and methods of identifying and engaging these actors are still under development. The definition and mechanisms for supporting custodian farmers are still being refined, particularly with regards to their applicability to different crop types and social contexts. For instance, the roles and responsibilities of custodians of annual crops likely differ from those of custodians of long-lived tree species. In the diversified smallholder farming systems found in Nepal, custodian farmers typically maintain high richness of crop species and a large number of varieties within species. In other locations where farming is more commercially-oriented, custodian farmers may tend to hold highly specialized knowledge and many varieties of just one or a few specific crops, as seen for the custodians of mango diversity documented by Sthapit et

al. (2013). Gendered division of labour often means that men and women develop different knowledge and understanding of the crops they cultivate and, in this sense, they may play different roles as custodians of crop diversity. It is important to consider gender differences in the development of methodology for identifying and supporting custodian farmers and to include the perspectives of both men and women in discussions concerning on farm conservation. Furthermore, it is important to address how work with custodian farmers can complement on farm conservation initiatives at the community scale, such as community seed banks and participatory selection and breeding activities. Conservation of diversity is fundamentally a collective process but it depends on the actions of individuals. Balancing support at individual and community scales could thus be fundamental in strengthening on farm conservation.

On farm conservation and custodian farmers in Nepal

LI-BIRD is the secretariat of the Network for Agricultural Biodiversity Conservation in Nepal (NABIC-Nepal¹) that provides its member institutions an interactive platform for sharing knowledge and experiences to promote the on farm conservation and use of agricultural biodiversity. One of their key focus areas is the identification of custodian farmers and facilitation of knowledge sharing between them.

In 2012, a national workshop on community seed banks in Nepal brought together different practitioners involved in community seed banks to consolidate their understanding of seed conservation concepts and methods and to lay the groundwork for greater collaboration (Shrestha et al. 2013). One key outcome was the initiation of linkages between the *ex situ* National Genebank and *in situ* community seed banks. This has given farmers managing community seed banks renewed motivation and a sense of how they are contributing to the greater good. To add further impetus to this work, the connections between custodian farmers and community seed banks should be explored to devise strategies to maximize the contribution of these actors in maintaining, adapting and promoting crop diversity. There is also a need to discuss and design tools, mechanisms and intervention options to create a more supportive environment for custodian farmers' activities, as well as to include more women in the discussions to ensure representation of their knowledge and viewpoints.

Workshop objectives

This workshop, organized in collaboration between Bioversity International,

LI-BIRD and NABIC-Nepal, with funding from IFAD² and CCAFS³ brought together custodian farmers from across Nepal along with plant genetic resources experts, gender specialists, and policy experts in order to pursue three specific objectives:

- 1. Develop tools, mechanisms and intervention options to support custodian farmers in the safeguarding of crop diversity and knowledge.** Discuss the potential for facilitating linkages between community seed banks and custodian farmers to strengthen the maintenance, adaptation and promotion of crop diversity at individual and community scales, the potential to establish a nation-wide platform to allow farmers to share lessons and experiences about deploying resilient crops to cope with climate change, and potential incentive mechanisms to encourage on farm conservation and climate change adaptation.
- 2. Explore policy options to establish an enabling environment for on farm conservation.** Explore institutional, policy and regulatory options needed to support on farm conservation and raise the visibility and recognition of custodian farmers in the management of plant genetic resources.
- 2. Develop understanding of custodian farmers' characteristics and status.** Build on the work from custodian farmer meetings in India (Sthapit et al. 2013) and in Nepal (Sthapit this volume p21) earlier in 2013. Continue to develop understanding regarding custodian farmers, who they are, how they differ from other farmers, how their demographics have changed or are changing over time, their roles and contributions to the national plant genetic resources system, and their challenges, needs and opportunities related to ensuring the sustainability of their invaluable (and so poorly acknowledged) contribution to conservation of agricultural biodiversity.

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2 Visit the Neglected and Underutilized Species (NUS) community webpage for more information on the IFAD-NUS project: <http://www.nuscommunity.org>

3 Visit the CCAFS webpage for more information on their research on climate change and food security: <http://http://ccaafs.cgiar.org>

A woman with dark hair tied back, wearing a colorful floral sari and a red beaded necklace, is harvesting green beans from a vine in a field. She is holding a silver plate in her left hand and using her right hand to pick the beans. The background shows a dense field of green vines with yellow flowers. The image is part of a larger composition with a central orange vertical band and a close-up of the plants on the right.

Experiences with Custodian Farmers in South Asia

Experiences with Custodian Farmers in South Asia

Briefing on the custodian farmer workshop held in Delhi, India in February 2013

*Bhuwon Sthapit, Hugo Lamers, V. Ramanatha Rao and
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Background

Agricultural biodiversity contributes to reducing malnutrition, alleviating poverty and combating climate change challenges but this diversity is in danger of disappearing and global commitments to support conservation are limited. Despite this global scenario of biodiversity loss, there are still a few farmers who actively maintain, adapt and disseminate agricultural biodiversity, and who possess the knowledge needed for its use and cultivation. Such 'custodian farmers' maintain diverse portfolios of agricultural species and varieties, select varieties adapted to local conditions and promote the use and conservation of local diversity among their friends and neighbours, even in the absence of any tangible incentives. They are well recognised in their communities for their efforts.

Many people have reported the existence of such farmers and their significant contribution to conservation and use of genetic diversity on farm/*in situ* (e.g. Altieri et al. 1987; Sperling and Berkowitz 1994; Lilja et al. 2001, Jarvis et al. 2011). However, until recently, there has been a lack of methodology to guide frontline researchers to identify such custodian farmers and understand their characteristics. The sources of motivation for custodian farmers are poorly understood and documented. Their unique characteristics, how they differ from average farmers, and the roles they play in the conservation and use of agricultural biodiversity are still not well understood. As far as we know, no systematic research has been done concerning these custodian farmers but it is feared that their number is dwindling, given that around the world young rural dwellers are not very keen to continue farming.

Workshop

A two-day workshop took place in New Delhi in February 2013 entitled "Custodian Farmers of Agricultural Biodiversity: policy support for their roles in use and conservation" (Sthapit et al. 2013). The objective of the workshop was to answer some key questions such as:

- How to define and identify custodian farmers?

- What are the roles of custodian farmers and how could their roles in conservation, innovation and promotion be consolidated?
- Could the establishment of a network or networks of such custodian farmers equipped with an effective information sharing system be considered as a viable on farm conservation strategy?
- Which kind of low-cost policy recommendations could support their contribution to society?
- Could custodian farmers play a role in a national system of genebanks and contribute to a national conservation strategy?
- How could custodian farmers be linked to the public sector genebank system?

The workshop brought together custodian farmers from across India and other countries from South and South-East Asia with experts and policy makers for plant genetic resource conservation. A total of 20 farmers participated in the workshop. The majority were from India but there were also farmer representatives from Indonesia, Malaysia, Nepal and Thailand. There was only one female custodian farmer among the participants.

Meeting structure

All farmers introduced themselves to the group explaining the diversity they hold, which unique material they have, their motivation to maintain diverse crops and/or varieties, and what kind of support they need to be able to continue their conservation, dissemination, or adaptation efforts. The group included a farmer who maintains 135 rare farmer varieties of mango within his orchard, a farmer who has gathered over 80 varieties of rice, and a farmer who experiments with and cultivates a wide range of tuber crops and vegetables at his home in Nepal. Many farmers in the group had domesticated wild tree species (*Garcinia* and *Mangifera*), including some that developed varieties that could grow in marginal soils. The personal presentations, supported by photos of their farms, families and unique plants, were followed by break-out sessions to discuss their motivations and functions in maintaining, promoting and improving crop diversity. Groups also discussed the type of policy support needed for their activities related to the conservation and use of crop diversity. Farmers were mixed in groups with scientists, where the scientists had the role of facilitating the discussions with and among the farmers. The results of the group discussions were presented in plenary session.

Defining custodian farmers and their functions

The workshop assisted in redefining the working definition of 'custodian farmer', highlighting their roles in maintaining, adapting and promoting crop diversity. The refined definition emphasizes that both men and women may be custodian

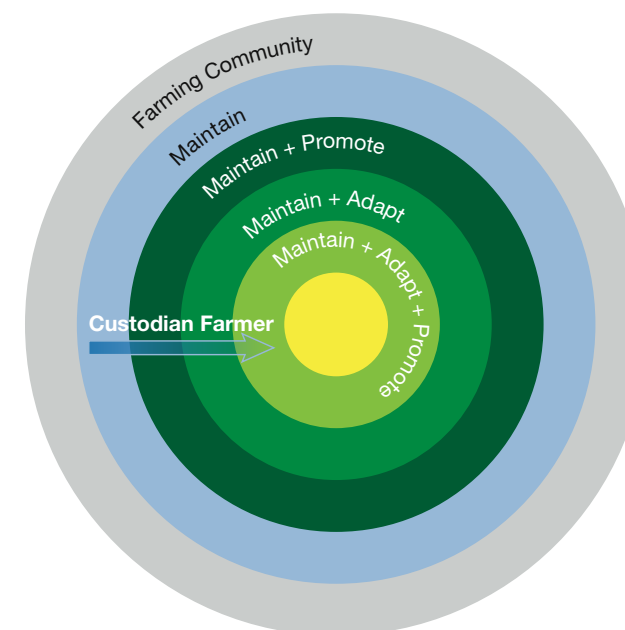


Figure 1. Typology of custodian farmers of agricultural biodiversity

farmers and that their work is carried out within households and communities, whose members often actively support or benefit from their conservation efforts. The definition that emerged for custodian farmers at the end of the workshop is as follows:

Custodian farmers are those farmers (men and women) who actively maintain, adapt and disseminate agricultural biodiversity and related knowledge, over time and space, at farm and community levels and are recognized by community members for it. Often, custodian farmers are actively supported in their efforts by household members and community.

Based on the 20 custodian farmers present at the workshop, an initial typology of four types of custodian farmer was identified. Within farming communities one can find a) farmers who maintain a rich and unique portfolio of species and varieties, b) farmers who maintain and promote a portfolio of species and varieties, c) farmers who maintain and adapt a portfolio of species and varieties, and d) farmers who actively maintain, adapt and promote their set of species and varieties (Figure 1).

Discussions and case studies suggest that boundaries between the types of custodian farmer might be blurred depending on the local context, including the crop type, local culture, environmental conditions and the level of exposure to new knowledge and geographic locations. What is important to note, however, is

that custodian farmers are often central actors in local institutions for community based management of crop diversity, such as community seed banks in which they play nodal roles driven by their own set of motivations. The purpose of the typology therefore is to highlight the diversity of custodian farmers one might expect to find in the field.

Motivations

It was clear from the farmers' presentations that motivations to maintain a wide range of crop species and landraces differ among farmers according to factors such as the type of crops maintained, socio-cultural background, and geographical and climatic context. The only woman farmer participating in the workshop was motivated to maintain native millet varieties due to their high nutritional quality and high adaptability to diverse local land conditions in the Kolli Hills, India. Several mango growers were motivated by the honour of having a century old orchard containing many rare varieties inherited from their forefathers. Other farmers were inspired by the desire to have a diverse portfolio of crops and varieties and/or unique traits. The motivations of the 20 farmers were found to be diverse, responding to the personal, socio-cultural, economic and environmental needs of the farmers.

Exploring policy support

The workshop was instrumental in developing a responsibilities and rights framework for the identification of policy support to custodian farmers, which can be found in the workshop proceedings (Sthapit et al. 2013). The framework is based on the principle that farmers are the primary actors in *in situ* conservation on farm, for which they deserve full recognition and appreciation from the global community.

The deliberations also shed light on the sustainability of conservation efforts by custodian farmers. Although in some farmer families the custodianship will be passed on to the next generation, there are numerous cases where this continuity is not guaranteed. In the meeting it was proposed that a network of custodian farmers could ensure that the tenure of one custodian farmer can be taken over or shared by one or more farmers in the network when they are no longer capable of continuing their efforts. Custodian farmers at the workshop liked the idea of establishing this type of network, which could be organized based on geography or type of crop/species (perennial, annual, animals, etc.). Farmers showed interest in using such a platform to learn from other farmers, to share and exchange planting materials, to obtain knowledge and skills through technical training such as grafting or seed management and to receive assistance in the commercialization of unique species or varieties. National policy support is required to facilitate establishment of such a platform and to ensure its sustainability.

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Characteristics and motivations of custodian farmers in South and South East Asia: a preliminary reflection

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Abstract

Field experiences show that not all households or community members are equally involved in managing, using and conserving plant diversity. Certain men and women play a much larger role in collecting, propagating, growing, evaluating, sharing and obtaining new fruit species or varieties. In February 2013, we held a special workshop with custodian farmers in New Delhi, India. The workshop was conducted together with government research institutions and NGOs to improve our knowledge about the functions and motivations of these men and women. To improve our understanding we developed profiles of 17 custodian farmers in a standardized format describing their farm, family and livelihood activities related to plant diversity. We tried to formulate a standardized approach of how to identify such men and women and categorize them based on three key functions of maintaining, adapting and promoting plant diversity. Besides we conducted a survey among 66 farmers regarding their a) role, b) type of motivation, c) type of support they require and d) their linkages with the formal seed system.

Introduction

Since 2009, Bioversity International and partners have been implementing the United Nations Environment Programme-Global Environment Facility (UNEP-GEF) funded Tropical Fruit Tree (TFT) Project, which strives to strengthen the on farm and *in-situ* conservation of tropical fruit tree diversity using a Community-Based Biodiversity Management approach⁴. The project selected 36 villages in India, Indonesia, Malaysia and Thailand located in areas that are known as diversity hotspots for mango, citrus, mangosteen, rambutan and their wild relatives. A wide range of concerted activities were implemented from 2009-2013 in which local practices were identified and strengthened by organizing diversity fairs, documenting local species and varieties in a fruit catalogue, establishing nurseries, conducting specific training on grafting or other farming aspects, assisting in the processing and marketing of certain varieties or species and identifying and institutionalizing conservation actions such as marking best source trees and establishing diversity blocks in school gardens or sacred groves.

TFT Project experiences showed that not all households or community members are equally involved in managing, using and conserving fruit tree diversity. Certain men and women play a central and crucial role in collecting, propagating, growing, evaluating, sharing and obtaining new fruit species or varieties and function as a knowledge reservoir regarding varieties, species and their unique traits or uses. The project further realized that these men and women are nodal points in the traditional (often eroded) seed system and key entry points when targeting interventions, especially when pursuing an economically, socially and ecologically effective and efficient approach to strengthen local crop diversity and seed exchange systems.

Custodian farmer profiles

A standardized approach was developed for how to identify and document such male and female custodian farmers, which involves the following aspects:

- Use **earlier information** collected during focus group discussions and surveys to identify a list of potential men and women
- Conduct **focus group discussions** or consult **key community informants** to discuss the definition, functions and characteristics of custodian farmers for identifying potential candidates
- Formulate **checklist questions** based on definition, functions and characteristics of custodian farmers for evaluation in semi-structured interviews with potential candidates
- Short-list a potential 5-6 farmers in each community and carry-out **informal interviews** with selected individuals and families to document their story

⁴ The UNEP-GEF funded project 'Conservation and sustainable use of cultivated and wild fruit tree diversity: promoting sustainable livelihoods, food security and eco-system services'. Visit the project webpage for more information: <http://tft.atbioversity.net/>

- **Record** conversations by audio or video recorders, take pictures of the farmer, family and surroundings and document the personal stories in 1 to 3 pages
- Use **four cell analyses** to assess the level of richness and evenness of the species or varieties found on their farm
- Most importantly, try to understand the **triggers and driving factors** for the farmers to maintain, adapt or promote diversity supported by anecdotal stories.

To improve our understanding, and as a means of verification for their selection, 17 custodian farmer profiles were developed in a standardized format describing their farm, family and livelihood activities related to plant diversity. The profiles were documented using below structure:

- Introduction – *household, landscape, farm, livelihood activities*
- Maintain – *which crops and landraces?*
- Promote – *share knowledge and seeds – what, which and how?*
- Adapt – *improve, evaluate or select seeds – which and how?*
- Motivations – *Anecdotal stories showcasing why?*
- Unique features – *why is this person special or different than others?*
- Continuation – *involve younger generation?*
- Support – *needs and requests.*

A two-day workshop was held in New Delhi, India in February 2013 with multiple partners including government, research agencies, and NGOs to discuss the emerging concept of custodian farmers (Sthapit et al. this volume pg. 9). In total 20 farmers from India, Indonesia, Malaysia, Thailand and Nepal participated in the workshop to share their personal stories regarding their motivations, functions and the support they need to continue their activities related to the conservation and use of a wide range of crop species and varieties. The 17 custodian farmer profiles prepared through the TFT Project have been published in the proceedings of the workshop (Sthapit et al. 2013).

Custodian farmer survey

As part of the workshop a short questionnaire was developed and shared among the custodian farmers to get more insights into their functions, motivations, needs and linkage with the formal seed system. With the help of MSSRF, Protection of Plant Varieties and Farmers' Rights Authority, Dhan Foundation, the North East Slow Food and Agrobiodiversity Society (NESFAS) and LI-BIRD the same questionnaire was spread among farmers known for growing diverse and unique rice, millet or vegetable species and varieties. In total 66 farmers responded, of which 34 fruit farmers were identified within the TFT Project in India, Indonesia, Malaysia and Thailand, 26 millet farmers were identified by MSSRF in India and 6 other farmers growing rice and vegetables in India and Nepal were identified by the other partners. In total 13 female and 53 male custodian farmers were interviewed. The questionnaire included 26 questions of which most were multiple choice.

The results of the questionnaire (n=66) show that most farmers (68%) are unaware of the term 'custodian farmer', although they were recognized as such by scientists and NGO workers. Majority of respondents confirmed they maintained more diversity than fellow villagers (68%), they exchange plant material (80%), advise other farmers (80%) and actively evaluate and select the best seed material (70%). Just more than half of them (55%) confirmed to have rare types not commonly found in their village. Most often confirmed motivations for maintaining diversity among respondents were home use (91%), to avoid loss of diversity (86%) and to continue growing species inherited from their forefathers (85%). Adaptation (74%), income (62%) and hobby (52%) were less often confirmed and few confirmed they maintain diversity as part of cultural celebrations or practices (36%). More than half of the farmers confirmed they could earn more income by replacing and growing commercial varieties (53%) against few farmers that denied (35%) this statement.

Most farmers started or gained interest in conservation activities more than 20 years ago (55%) or during the last 10 to 20 years (23%). Minority got involved in last 10 years (23%). Majority is confident their children will take over their custodian activities (68%), a minority (8%) is sure their children will discontinue their activities and several (28%) are not sure. All respondents showed interest to exchange their knowledge and seeds (100%). About all of them requested support in the official registration of their particular seeds (98%), technical advice and training (97%), to be recognized for their conservation role (94%) and to be involved in research (94%). Financial support was the least confirmed type of support requested (85%).

Discussion of results

Above results show that respondents acknowledge and are aware of their role and functions in maintaining, promoting and adapting crop diversity. However, the questionnaire showed that the majority of respondents don't know what a genebank is (86%), this being while more than half of the respondents had previously shared some of their seeds or germplasm with scientist or breeders of the formal seed system (55%). After the workshop farmers felt motivated and more confident. "It is our responsibility to create awareness about the conservation of fruit trees among youth and other farmers and I will try to find more custodian farmers in my village" (Mr. Palin from Papar, Malaysia). Mr. Suradet, a mango grower from Chiangmai in Thailand experienced the meeting as highly informative but also sometimes difficult to grasp. He was motivated and very interested to learn from other farmers and countries.

Rana et al. found that farmers maintaining high levels of biodiversity tend to be relatively well-off in the community (2007). This is consistent with the custodian farmers' request for knowledge intensive activities and capacity building. Among the support requested, financial support was requested by 85%, so that is

not trivial per se. Since the farmers tend to be relatively well off already, social mobilizers, researchers and development workers need to be cautious to ensure that working with custodian farmers is not leading to elite capture. The method proposed includes consultation of community members on how they understand the definition of custodian farmers and who they think fulfils that role. This step can help ensure that farmers making additional contributions to biodiversity conservation are selected. As with all participatory rural appraisal tools, the participant selection and facilitation will be key to this methodology.

There were variations in the confidence the farmers had on whether their custodian roles will be carried on by their children. Exploring the family characteristics and the reasons given for their confidence could help us better understand what kind of incentives and motivations can help influence a greater number of farmers to take interest in biodiversity.

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Summary of results from the April 2013 custodian farmer workshop in Pokhara

Sajal Sthapit
LI-BIRD

As the Secretariat of the NABIC-Nepal, LI-BIRD organized a National Exchange Forum for Custodian Farmers on 2-3 April 2013 in Pokhara. The purpose of the forum was to shed more light on the work of custodian farmers, their needs and challenges. The meeting was attended by 25 custodian farmers (including 9 women) collaborating with Parivartan Nepal⁵, Group of Helping Hands (SAHAS) Nepal⁶, Dalit Welfare Organization⁷, Machhapuchre Development Organization⁸ and LI-BIRD. Profiles of two of the participating custodian farmers were published in the NABIC-Nepal newsletter in Nepali language and more will be featured in subsequent issues.

The participating farmers were asked to bring seeds of 8-10 varieties that they considered the most important and worthy of sharing with other farmers. Nonetheless, most farmers ended up bringing 30 or more varieties. The sheer number of varieties brought was overwhelming so at the exchange, we asked the farmers to identify the 10 (or fewer) varieties that they considered most important to them. We documented the selection criteria the farmers used to identify their preferred varieties (Figure 1), as well as the important features of the varieties.

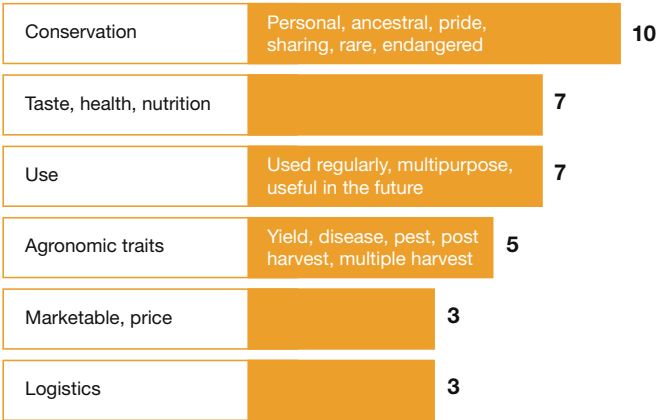


Figure 1. Selection criteria used by custodian farmers to select their top 10 varieties.

5 <http://www.parivartannepal.org.np/>
6 <http://www.sahasnepal.org.np/>
7 <http://www.dwo.org.np/>
8 <http://www.mdonepal.org.np/>

The most commonly reported selection criterion was conservation related, with farmers reporting rarity, endangerment and need to share as the reasons for selection. The next common reason was related to better taste, health and nutrition with 5 farmers reporting it, while usage was the third most common reason. Surprisingly, agronomic traits, market traits and logistical reasons (e.g., easy to carry) were cited by only a few custodian farmers, suggesting the different ways in which these farmers look at biodiversity.

All the varieties brought by the farmers were put up for seed exchange but we collected data only on the top varieties that were identified by the farmers (for a total of 134 varieties). For each particular variety, we recorded how many other farmers also brought it to the exchange. A variety was said to have 100% overlap with other farmers if all the custodian farmers had brought the same variety. If a variety was not brought by any other custodian farmer, then the variety was said to have 0% overlap with other farmers. We also noted what variety was taken by which farmer. A variety that no farmer took was deemed to have 0% desirability, while a variety taken by all the other custodian farmers was deemed to have 100% desirability.

The average overlap of varieties was 46% and the average desirability was 9%. We plotted the varieties across the two axes of i) low to high overlap and ii) low to high desirability, using the average values as cut off points, to yield four quadrants (Figure 2). Based on the quadrant the varieties fit into, some plausible generalizations on the varieties and action steps for their conservation and use have been suggested in Table 1.

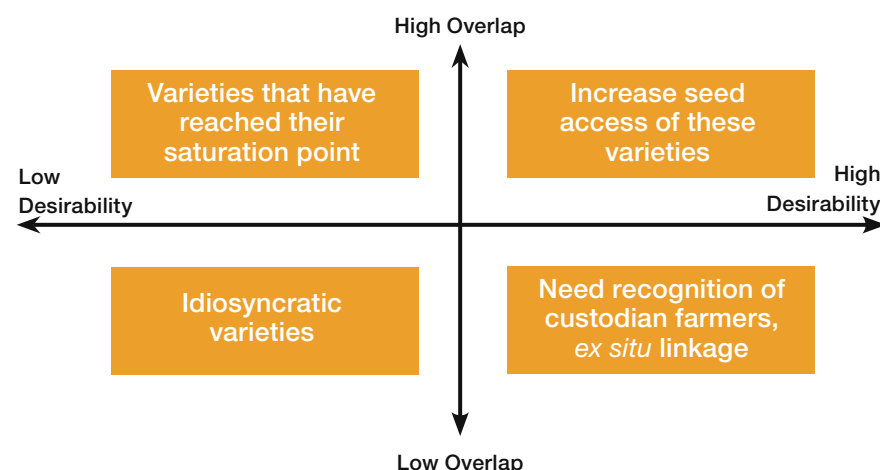


Figure 2. Overlap and desirability of the priority varieties of custodian farmers.

Table 1. Classification of varieties at the seed exchange. Data from 134 varieties that were identified as the most important to the farmer bringing them.

Quadrant	No. of varieties (%)	Possible implications
High overlap, high desirability	64 (48%)	This quadrant may contain popular varieties that have widely preferred traits, yet there are still many farmers who do not have access to them or do not know about them. We predict that these varieties will have high adoption rates simply through improving access to the seeds.
High overlap, low desirability	63 (47%)	This quadrant may contain popular varieties that have widely preferred traits but which most farmers are already growing, i.e., they are near their saturation point. We predict that there is little scope of increasing adoption by simply distributing seeds and hence they represent varieties that need the least action.
Low overlap, high desirability	4 (3%)	This quadrant likely represents the most valuable contribution of custodian farmers. These are the varieties that could be highly desirable for most farmers but have been limited in their reach due to their rarity. We may need to work closely with their custodians to increase seed volume, keep safety duplication in community seed banks and genebanks and recognize the contribution of their custodians when raising awareness and promoting the varieties.
Low overlap, low desirability	3 (2%)	This quadrant may contain idiosyncratic varieties which the farmers maintain for very specific or personal reasons.

The four varieties that fit into the low overlap-high desirability category from this exchange were: *lampate saag* (a leafy green brought by Shanta Bohora), *kalo aalu* (a black coloured potato brought by Khem Chand), *Resunga* maize (brought by Ujela Kumal) and Gulmi-2 maize (brought by Lal Kumari Basnet). Among these, *kalo aalu* shows the true role of Khem Chand as a custodian farmer. He learned about this nutritious (it is rich in iron) and tasty dark coloured potato that had become very rare due to people's bias against its colour. He went searching for it in neighbouring villages and collected seeds from three farmers. Since then, he has multiplied, maintained and shared this variety. *Resunga* and Gulmi-2 are

new maize varieties developed through participatory plant breeding by farmers in Gulmi and LI-BIRD, hence explaining their relative novelty and desirability to farmers outside Gulmi. *Lampate saag* is a green leafy vegetable that was introduced to resource poor farmers in Shanta Bohora's village by LIBIRD's Narayani Acharya through the home garden project. Shanta reckons that this green is very tasty and can be picked for a long time. The relative novelty of the variety and Shanta's sales pitch might explain its placement in the quadrant of low overlap and high desirability.

The three varieties that fit into the low overlap-low desirability category from the exchange were: *seto lamo hiude simi* (brought by Shanta Bohora), Radha-17 rice (brought by Shyam Bahadur K.C.) and *kaparijat* (brought by Kaliram Tharu). *Seto lamo hiude simi* is a variety of bean introduced by LI-BIRD's Narayani Acharya. Shanta says that other farmers have discontinued it as there are better tasting varieties but she is growing it to honour the contribution and hard work of Narayani Acharya. Radha-17 is a variety of rice that was once very popular but has been in decline for over a decade. *Kaparigat* is a medicinal plant that Kaliram finds pleasing to look at and he is using it for both ornamental and medicinal purposes in his home.



Custodian Farmer Introductions



Custodian Farmer Introductions

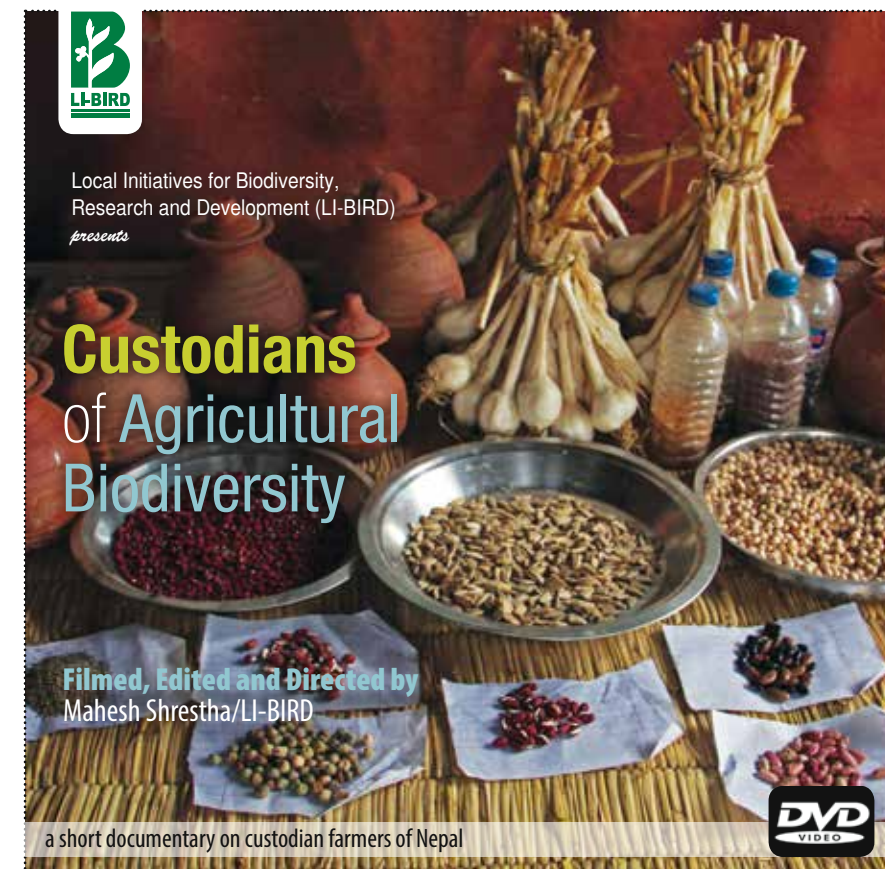
Premiere of a short film:

'Custodians of agricultural biodiversity'

On the opening day of the workshop, the first screening of a short film produced by LI-BIRD, filmed, edited and directed by Mahesh Shrestha entitled 'Custodians of Agricultural Biodiversity' took place. The film showcases eight custodian farmers from different parts of Nepal, all of whom were present at the meeting. Through compelling footage of their farms and their work, the film explores their motivations for maintaining agricultural biodiversity and aims to "portray and define what custodian farmers are."

The film can be viewed on the LI-BIRD's YouTube Channel:

<http://youtu.be/-pDVJMmQIAk>



Farmer introductions: participating farmers' profiles

A total of 21 farmers from Nepal attended the meeting, including four farmer couples (husband and wife). The farmers came from all over Nepal (Figure 1). Additionally, two farmers from Meghalaya (India) and one farmer from Bhutan participated to share their knowledge and learn about the work going on with custodian farmers in Nepal. All participating farmer names and locations are presented in Table 1.

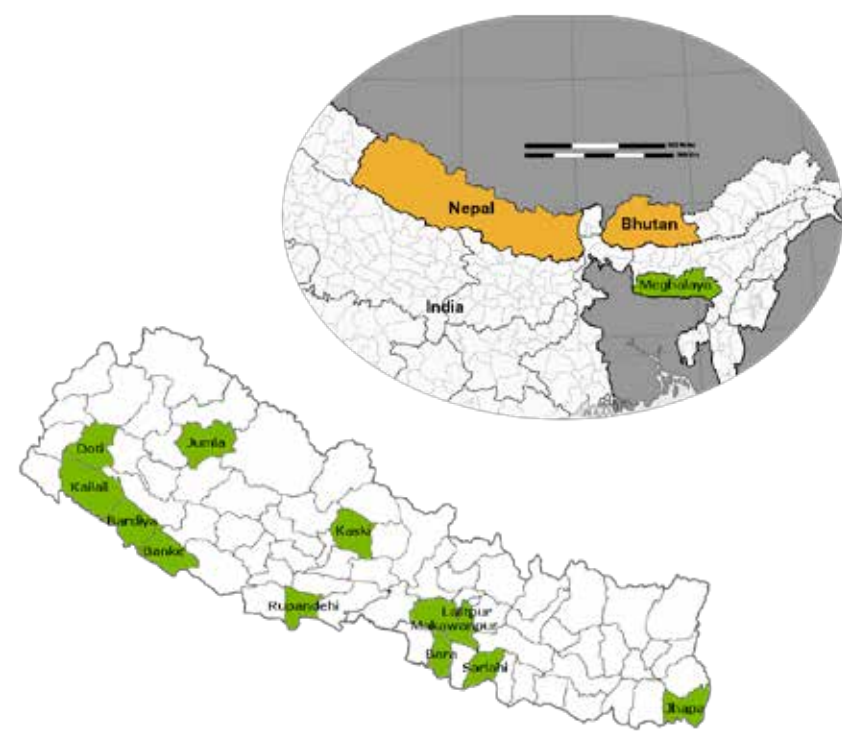


Figure 1. Home locations of participating farmers: Nepal (12 Districts), Bhutan and India (Meghalaya). Maps modified from Rarelibra map of the districts of Nepal. Illustration: Gennifer Meldrum/Bioversity International.

On the first day of the workshop, all farmers in attendance gave a five-minute presentation to the group about themselves, the crops they keep, their motivations to conserve agricultural biodiversity and the support they see would be useful to strengthen conservation on their farms and in their communities. Profiles of these farmers are provided in the pages that follow. Detailed profiles were developed for the Nepali farmers that have been recognized by LI-BIRD specifically as 'custodians of agricultural biodiversity' using the typology proposed at the meeting in New Delhi (Sthapit et al. 2013). These farmers preserve a high diversity of traditional crops and varieties and engage in adaptation and promotion of agricultural biodiversity. The local names of crops that were provided by the farmers were cross-verified with ethnobotanical literature (Manandhar 2002).

Table 1. Farmer participants from different regions of Nepal, India and Bhutan.			
Home	Village, District	Farmers	Page
Nepal (Far West)	Patharaiya, Kailali	Khem Bahadur Chand and Rijana Chand	33
	Ghanteshwor, Doti	Indra Devi Oli	37
	Ghanteshwor, Doti	Dilsara Biswakarma*	95
Nepal (Mid West)	Talium, Jumla	Til Bahadur Rawal	41
	Kachanapur, Banke	Prem Bahadur Biswakarma and Jhuma Biswakarma	45
	Naubasta, Banke	Phularani Tharu	49
	Beluwa, Bardiya	Kaliram Tharu and Indrani Tharu	53
Nepal (West)	Begnas, Kaski	Surya Prasad Adhikari and Saraswati Adhikari*	57
	Chaur, Kaski	Lal Kumari Thapa and Jaya Bahadur Thapa*	61
	Chamkipur, Rupendehi	Shanta Bohora	65
Nepal (Central)	Dalchoki, Lalitpur	Man Bahadur Ghalan	69
	Faparbari, Makawanpur	Som Bahadur Ale Magar	73
	Parwanipur, Sarlahi	Harka Bahadur Shyangtan*	77
	Kachorwa, Bara	Kumari Krishna*	95
	Kachorwa, Bara	Ram Ekval Yadav*	95
Nepal (East)	Duwagadi, Jhapa	Anita Khadka Sherpa**	79
India	East Khasi Hills, Meghalaya	Bibiana Rane	83
	Khweng, Meghalaya	Redian Syiem	85
Bhutan	Khamaedthang, Samdrup Jongkhar	Karma Tenzin	89

* Farmers invited not as custodian farmers *per se*, but as farmers with valuable experiences to contribute to group discussions and the workshop.

** Could not travel to attend the workshop due to illness.

In a few cases, it was recognized that the spouse of the identified custodian farmer was also making an integral contribution to conservation on the farm, so they were invited to attend the meeting to foster discussion on how to recognize and support the role of the family in the custodianship of agricultural biodiversity. A few farmers who are highly engaged in community seed bank initiatives or local breeding/selection efforts were also invited to participate in the meeting to deepen the discussion and broaden perspectives on the definition and roles of custodian farmers and how they can be supported to strengthen on farm conservation.

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Custodian farmers Khem Bahadur Chand and Rijana Chand

Profile by Sajal Sthapit
LI-BIRD



Introduction

Mr. Khem Bahadur Chand and his wife Ms. Rijana Chand live in a home surrounded by a fruit tree nursery, several bee boxes, and trees. Their homestead in Patharaiya Village Development Committee of Kailali District, in the Far-Western Development Region of Nepal, resembles a botanical garden with plants of all shapes and sizes, as well as a fish pond, ducks and pigs. Aside from their homestead, they have limited land of their own for growing paddy rice. Hence, they also lease 5.7 hectares of land for farming. Their dedication to diversity is apparent and they are truly befitting of the moniker 'custodian farmers'.

Maintain

The Chand family farmland has around 30 species of fruit trees and 28 species of other trees, 15 species of vegetables, pulses and oilseeds, 20 species of ornamentals and 30 species of medicinal plants. Within these, they currently maintain 22 varieties of beans (*Phaseolus vulgaris*), 15 of cowpea (*Vigna unguiculata*), 11 of taro (*Colocasia sp.*), 11 of yam (*Dioscorea sp.*), 10 of potato (*Solanum tuberosum*), 10 of bottle gourd (*Lagenaria siceraria*), and 5 of sponge gourd (*Luffa cylindrica*). Working with the local farmers' organization, they also maintain 22 varieties of rice in a diversity block. In terms of fruits, they grow

10 varieties of mango (*Mangifera sp.*), out of which 7 are grown by only a few households in the village.

As a resource home gardener, Khem has integrated fish, pig, vermi-composting, apiculture, vegetables, fruits, and medicinal plants in his home garden. He grows several varieties of a crop in his home garden so that he can compare traits. “The number [of varieties] themselves are not important and keep fluctuating from year to year,” Khem says. “Some years I lose a few varieties or find they are the same, and some years I add a few more.” The important part is that he constantly seeks out diversity and tries to maintain it.

Khem is constantly in search of diversity. For example, he knew of a black potato variety (*Kalo Aloo*) and another variety *Tharu Aloo* that used to be common in his village but which have become increasingly difficult to find. People did not prefer this variety due to the black colour of its flesh but Khem was able to see beyond that single trait. Compared to other potatoes, this variety has higher iron content, tastes better, cooks well and the sizes of the spuds are uniform. He went to neighbouring villages and collected the seed of *Kalo Aloo* from three farmers and now maintains the variety on his farm.

Promote

Khem collects seeds of varieties that he does not have whenever he comes across them, often paying for the seeds or exchanging them with the varieties he possesses. In the process, he tries to explain the difference in the traits to the farmers that he collects from. This process of collection thus becomes an occasion for him to raise awareness on the value of diversity.

For the past five years, Khem has been an active member of the Patharaiya Biodiversity Conservation and Development Committee. This committee manages a community seed bank that maintains the seeds of rare landraces, raises awareness about these landraces, and provides access to interested farmers. They also operate a revolving community biodiversity management fund that provides farmers with access to credit for building livelihood assets. In return, the farmers contribute their land or labour to help maintain populations of selected local landraces.

Khem produces saplings of local fruit trees and medicinal plants from seed, grafting and layering for sale and distribution. He distributes seeds or saplings even to political parties of his community to promote local crops. Last year he sold several hundred saplings of mango, lychee (*Litchi chinensis*), pear (*Pyrus sp.*) and at least five species of medicinal plants and similarly he sold earthworms from his vermi-composting pit (around 30 kg earthworms available for sale at a time).

Motivation

Khem wasn't always so dedicated to the conservation of agricultural biodiversity. He was always interested in farming and plants but until 2007/2008, Khem did not care much about what varieties he grew. He did not save his own seeds, nor did he concern himself with the different merits and limitations of landraces, improved varieties and hybrids. He simply bought whatever seeds he could find in the market and consequently, he often “paid the price” with poor yields.

After being involved in various training courses, diversity fairs and exposure visits through the agricultural biodiversity component of the Western Terai Landscape Complex Project, he developed an understanding of the value of diversity and quality seeds. He internalized the fact that different landraces have different useful traits, such as tolerance to water stress or water-logging, pest resistance, and medicinal and nutritional values. “If farmers are able to discern the differences in traits, then they can manage the variety of options for their unique needs.” Armed with this realization, Khem has been searching and finding rare and lost traditional landraces from his own village and surrounding villages and rehabilitating their populations.

Why are they different?

Compared to other farmers in the area, Khem expresses greater interest in identifying differences within the population of crops. Although he has several varieties of a crop, if he notices something new in another orchard or home garden in the village, he adds it to his collection. He is a leader of local farmers' groups and is actively involved in raising awareness of the local varieties in his village, often in the process of collecting seeds from his neighbours. The amount of diversity he has amassed in a mere five years, despite his limited resource base, is commendable and rare among farmers in the area. He is a lifetime member of LI-BIRD Nepal as he was the winner of Best Innovative Farmer Award, 2011.

Khem is able to articulate about the finer taste-related traits of the varieties he maintains. However, he is not a good cook and his ability to discern the finer tastes is wholly depended on the culinary skills of his wife, Rijana. Rijana also contributes in management of diversity and in ensuring that seeds of different varieties do not get mixed up.

Future

“What else can I do?” responds Khem when asked about the future of his work. He definitely plans to continue it. Continuing to collect and add a diversity of vegetables, fruits, and medicinal plants is the best option he sees for making a livelihood. By maintaining diversity, he aims to derive income while also inspiring

others to do the same. He is also considering school children as a worthy target group to influence. In fact, two schools have already visited his farm and learned from his work.

Support

According to Khem, the support from which he can benefit the most is promotion of the work he has been doing. This will raise awareness of biodiversity among a wider range of people, ranging from farmers to school children to researchers. If many people visit his family farm, they can learn from their experience, and this in turn will motivate him and the family to carry on. The visitors will invariably learn about the wealth of diversity and may be interested in buying some seeds or saplings, which could also be a source of supplemental income.

Custodian farmer Indra Devi Oli

Profile by Saraswati Bhurtyal
LI-BIRD



Indra Paudel/LI-BIRD

Introduction

Ms. Indra Devi Oli lives in Ghanteshwor-3 Village Development Committee of Doti District in the Far-Western Development Region of Nepal. Ghanteshwor is well suited for the cultivation of citrus fruit species. More than 400 families in the village grow limes (*Citrus aurantifolia*), lemons (*Citrus limon*), sweet limes (*Citrus limetta*) and mandarin oranges (*Citrus reticulata*) in their homestead. The local citrus processing plant and the village Biodiversity Conservation and Development Committee buy ripe limes and lemons from the farmers in the area.

Indra Devi has five daughters aged eighteen, fifteen, eleven, nine and seven. The eldest daughter has achieved her School Leaving Certificate (grade 10) and is planning to study nursing, while the other four daughters are studying in school. On her land, she keeps a garden and nursery for vegetables, a water reservoir, cereal crops, a vermi-composting pit, two beehives, and a shed for her livestock.

Maintain

Presently, Indra maintains four species of cereal crops (including maize and finger millet (*Eleusine coracana*)), 13 species of vegetable and root crops (including broad leaf mustard (*Brassica juncea*), beans, amaranth (*Amaranthus sp.*), tree tomato

(*Solanum betaceum*), etc.), five species of spices and oilseeds, three species of pulses and seven types of fruits (limes, lemons, guava (*Psidium guajava*), etc.). Among these crops, she is growing five varieties of taro, five varieties of beans and three improved varieties of cauliflower (*Brassica oleracea*). She is preserving rare local beans *Kirbire Seto* and *Bhote*. *Kirbire Seto* has high yields and is tasty. *Bhote* bean can be used as pulse, as well as a vegetable. It is a perennial crop as it regrows every year from the roots. She is also maintaining three rare varieties of rice: *Laure*, *Setokuchai* and *Ghaiya*. She keeps five species of animals on her farm including two buffalos, seven goats and chickens.

Adapt

Indra is gaining a lot of knowledge about farming, nursery management, and identification of climate friendly plants. She is highly interested and engaged in experimenting with the characteristics of different crops. She collected seeds of local varieties from different districts when she participated in a seed exchange programme.

Following the guidance from recent extension activities, she took initiative to construct an improved cattle shed and a water harvest pit with the financial help of her community. She later built a vermi-composting pit with shade and improved her cattle shed to produce her own nutrient-rich organic fertilizer.

Promote

Indra is an active female farmer in the Ghanteshwor Village Development Committee. She is also an active member of the Bar Pipal Cooperative and Ghanteshwor Farmers' Group. She was first chairperson of the farmers' group of her ward.

She sells her products to consumers to gain income to cover her household expenses. In the previous season she sold seeds, saplings and fruits and earned NPR 5000, 4000 and 3000, respectively.

Motivation

Indra always grew several cereals, vegetable crops, fodder trees, and fruits, aiming to preserve what her ancestors had preserved on farm. Upon her community's encouragement, she joined the local farmers' group in 2065 B.S. (2008/2009 Gregorian Calendar). Through the groups, she started attending workshops, trainings, exposure visits, and meetings of the village Biodiversity Conservation and Development Committee. Through her participation, she learned about the importance of agricultural biodiversity and conservation of local

varieties and gained knowledge of new farming techniques (such as preparation of biopesticides and liquid manures, improved management of farm yard manure, improvement of cattle sheds, preparation of nursery beds for vegetables, preparation of vermi-compost, integrated farming, etc.). She added some local varieties to her farm and paid greater attention to identify the special qualities of different varieties.

Other farmers in her community neglected the traditional rice varieties (*Laure*, *Setokuchai* and *Ghaiya*) due to their low yields and low market demand at the time. Now the demand and price for these varieties have increased in the market, which has rewarded her perseverance and motivated her to continue cultivating them.

Why is she different?

Indra has a unique enthusiasm for finding different local varieties, trying new techniques, and learning new technical skills and knowledge. She is especially committed to two local varieties of beans (*Kirbire Simi* and *Bhote Simi*), which are not common in her neighbourhood.

Future

She believes her daughters will continue her work in agricultural biodiversity management. They are already helping her with vegetable farming and animal husbandry. In her home garden she wants to see lush foliage of diverse agricultural plants and fresh air, vegetables and fruits.

Support

To support the conservation of agricultural biodiversity she sees the need for government support for irrigation facilities, access to seeds, local market development, higher market prices, insurance for animals, plants and farmers, and training in producing organic liquid manures, pesticides, mulching techniques and root cutting techniques. Her brother-in-law and other male neighbours are helping with ploughing because women are culturally not allowed to do this activity. She hopes all neighbours will continue to be supportive in her endeavour to conserve agricultural biodiversity.

Custodian farmer **Til Bahadur Rawal**

Profile by Laxmi Lama

LI-BIRD



Sajal Sthapit/LI-BIRD

Introduction

Mr. Til Bahadur Rawal lives in Talium Village Development Committee in Jumla district. Jumla is in the remote high hills of the Mid-Western Development Region of Nepal. In this district, a cold-tolerant indigenous rice variety called *Jumli Marsi* is cultivated. In fact, Jumla is known as the highest elevation location where rice is cultivated.

Til Bahadur is a fresh vegetable grower as well as a researcher in his own way. The conservation of local crop diversity is his passion. He and his wife, Ms. Tila Rupa Rawal, have been able to provide their two daughters and son a good education from their annual income of NPR 40,000-50,000 from farming, even though the food sufficiency from their own production is only for six months per year.

Maintain

Til Bahadur has around 7 species of cereals, 7 species of fruits, 23 species of vegetables, pulses and oilseeds, 10 species of ornamental plants and 8 species of medicinal plants in his 3 *ropani* (0.15 hectares) of farmland. In spite of his limited farmland, he maintains rare and underutilized crops like finger millet, proso millet (*Panicum miliaceum*), foxtail millet (*Setaria italica*), *choto mula* - a local variety of radish (*Raphanus sativus*) - and many more. He is the only farmer who maintains all 20

locally available varieties of beans, while others go for a mixed cultivation of seven to nine varieties. He is a keen seeker of diversity. He has collected tree tomato, sorghum (*Sorghum sp.*), *Akabare Khursani* - a variety of chilli pepper (*Capsicum sp.*) - and taro from different districts and maintained them in his home garden. As he explains "I always want to maintain as much diversity of crops as possible in my home garden, which gives me satisfaction in my work towards conservation."

Adapt

Til Bahadur is also an experimenter. He explains, "trying out new things and having new experiments on my farm is my great hobby." Recently he has been working on developing a new variety of rice that is high yielding, non-shattering and easier to thresh than the popular but very old local variety *Jumli Marsi*. He started to work on this new variety after he found two unique panicles of rice in his field that were distinct from other paddy cultivated in Jumla. He saved the seeds and kept multiplying it. Til Bahadur is also researching a new variety of red rice he found in Shreedhuska, Talium Ward no. 2. Currently he has planted 2.5 kg of seed for the third generation in his low land and has given it the name "T.A.R.S 2" (Til Anusandhan *Radha* Shreedhuska 2). The Agriculture Research Station in Jumla has selected him as a resource farmer for farmer field trials of cereals in the high hills.

Promote

As an active member of the Satrakhamba Biodiversity Conservation and Development Committee and a chairperson of his ward-level Biodiversity Conservation and Development Committee, Til Bahadur has been taking the lead not to let any of his local crop species go extinct and to conserve them for future generations. Every year, on behalf of these associations, he establishes a diversity block of local crops to raise awareness among fellow farmers. The crops in the diversity block include 20 varieties of beans (17 of which are local), foxtail millet, proso millet, finger millet, horse gram (*Macrotyloma uniflorum*) and amaranth.

He is a poet and a singer, and delivers his pleas to people to conserve local crops through his songs in whichever programme he participates. The farmers in the village often come to visit him for seeds, seedlings and saplings of cereals, vegetables and fruits when it is time for planting.

His role in promoting local crops in a market dominated by major vegetables and fruits shows his passion for conservation. Amaranth, although grown by half of the population in his village, is not sold in the market as a leafy green, it is mostly consumed for its grain. Til Bahadur tried to sell the leafy amaranth in the local market but found little success. So he tried a little experiment. Instead of using the local name for amaranth (i.e., *marsey*), he started yelling "*latte ko saag aayo*" "amaranth greens have arrived" in the market place. Amaranth greens are

commonly called *latte ko saag* in the Western and Central Development Regions of Nepal. With this simple rebranding, he managed to attract curious customers to his stall and easily sold out the amaranth greens.

Motivation

Til Bahadur, at the age of 16 was forced to move to India for work since his father had to sell his property. After working for a few months for a commercial vegetable farmer in India, he returned to Nepal hoping to use his knowledge and skills to start vegetable farming in his own country. From the income of his hard work he succeeded in having his land reinstated and got married. In 1996 he got into commercial vegetable farming with support from the training provided by the District Agriculture Development Office and other NGOs regarding off-season vegetable farming and compost preparation.

He was initially an improved and hybrid vegetable seed user, but through participation in LI-BIRD, NARC and Bioversity International's *in situ* conservation project in 1999, he understood the importance of conservation of local crops and has since been conserving local crops and varieties. Further motivated by his learning and experience from various training courses, diversity fairs, and exposure visits through the Community-Based Biodiversity Management Project, he has been actively involved in conservation of local crops for future generations and utilizing them for income generation. He has become a great asset for LI-BIRD's current projects in Jumla, especially for the project on neglected and underutilized species funded by IFAD.

Future

Til Bahadur is greatly interested in continuing the collection and conservation of local crop varieties. He has been sharing his rich knowledge on farming and conservation with many fellow farmers and also the young ones in hopes that they will continue the work. He aims to earn more income through off-season vegetable production and through buying suitable land for growing buckwheat (*Fagopyrum sp.*) so that he can conserve it too. In regards to T.A.R.S 2, he is planning to work with NARC for development of the variety.

Support

He thinks sharing knowledge is the most important way of learning. He does not want his knowledge to be limited and seeks opportunities to visit farmers from different districts and countries to enhance his knowledge and to collect and add diversity to his territory. For this he wants support from the government and NGOs working in his area, since the district is remote and a large amount of money is required for travel.

Custodian farmers

Prem Biswakarma and Jhuma Biswakarma

Profile by Saraswati Bhurtyal

LI-BIRD

This profile documents the experiences of the custodian farmers and the Dalit Welfare Organization.



Introduction

Mr. Prem Bahadur Biswakarma and his wife Ms. Jhuma Biswakarma live in Kachanapur-6, Hariharpur, Banke with their four sons, two daughters and one daughter-in-law. Banke district lies on the Outer Terai in the Mid-Western Development Region, the largest of the five development regions of Nepal. It includes some of the most remote and economically deprived areas of the country, in particular the Karnali Zone. It is also home to two major ethnic and religious minorities, the Tharu and Muslims.

The major crops in the region are cereals (rice, wheat, maize), pulses (beans), vegetables (fresh greens, sponge gourd, bottle gourd, bitter gourd (*Momordica charantia*), etc.), spices (coriander (*Coriandrum sativum*), ginger (*Zingiber officinale*), etc.) and fruits (mango, litchi, guava, peach (*Prunus persica*), jackfruit (*Artocarpus heterophyllus*), etc.). Crop yields are very poor in the hill and mountain districts, particularly in the Karnali Zone and parts of Jajarkot and Dailekh districts.

Prem and Jhuma have an integrated farming system, in which they grow vegetables, flowers and fruits, engage in beekeeping, maintain a fish pond and a pig shed. They do this in their home garden and they also plant suitable crops

in fallow or vacant land. They maintain available local agricultural biodiversity on their upland and lowland, growing several varieties of vegetables, fruits, spices, medicinal plants and mixed crops.

Maintain

The family gives their main priority to growing cereal crops, as Prem's parents had done for many years. In addition they collect and cultivate other crops around the farm, including pulses, oil seeds, vegetables, spices, and fruits. They prioritize rare local varieties of crop species like beans, cowpea, eggplant, chilli, rice, maize, papaya (*Carica papaya*), and mango. Among the cereals, they grow three rice varieties (*Bindeshwori*, R-84, and *Jaran*), two local varieties of wheat (local, *mul*) and two local varieties of maize (yellow, white). They also have several local varieties of bitter melon, snake melon, bottle melon, ridge melon (*Luffa acutangula*), beans, eggplant (*Solanum melongena*) and taro. Prem labours to collect seed, seedlings and plants of rare and local varieties.

Promote

Prem is an active member of Unnat Home Garden Agriculture Group. He is always available to share, teach, and provide his experience to other farmers, neighbours and visitors. He promotes local seeds and local varieties for cropping. He keeps a nursery for seedlings and saplings of vegetables and fruits and sells them. This furthers conservation by improving access to local varieties.

Motivation

Prem always collected seeds from neighbours and agro-veterinarian shops but he didn't always try to collect seeds of local crops specifically. He grew several horticultural crops but only for home consumption. His family never thought that products like vegetables and fruits could be sources of income. Through his participation in the Home Garden Project, he was engaged in training workshops on nursery preparation, integrated crop management, local seed collection, post-harvest technology, and an exposure visit. This experience, made him and his wife recognize the value of conservation of local agricultural biodiversity. They started to collect and exchange local seeds and seedlings and to search for rare vegetable seeds for their promotion. When he learned about environmentally-friendly and improved cropping patterns in organic agriculture, he became enthusiastically involved in the preparation of organic manures and pesticides and increased the biodiversity on his farm. This has contributed to his social empowerment and financial improvement.

Why are they different?

Prem is alert to catch the growing seasons of different crops - he never misses a planting season. He has knowledge concerning seed conservation, nursery preparation, and fallowing land. He has set aside a piece of land for agricultural biodiversity conservation. He does not miss out on an opportunity to discuss the importance of local seeds and their conservation with people in his community. He uses local seeds and biopesticides, local organic manures (liquid), compost and farmyard manure. He always pursues indigenous knowledge and local activities.

Future

Prem will separate a larger part of his land for agricultural biodiversity conservation. He will continue to follow a mixed and integrated cropping system in the future. He hopes that his son and daughter-in-law will continuously help him in his agricultural activities instead of going off to the Gulf countries as migrant labourers.

Support

He is often getting support from his community but he has not received any support from the government. He needs more technical support, irrigation facilities, access to seeds of other landraces and agricultural inputs. He also would benefit from training and exposure visits to learn more about available technologies and good practices.

Custodian farmer Phularani Tharu

Profile by Saraswati Bhurtyal

LI-BIRD

This profile documents the experiences of the custodian farmer and the Dalit Welfare Organization.



Indra Paudel/LI-BIRD

Introduction

Ms. Phularani Tharu lives in Naubasta, Saheluwa Gaun, Banke. Banke is located on the Outer Terai in the Mid-Western Development Region of Nepal, bordered on the west by Bardiya district. The most popular crops in Banke district are rice and wheat.

Phularani lives with her husband, four daughters, son and grandson in her small home. She has vegetables, spices, medicinal plants, flowers, fodder trees and honeybees in a mixed cropping system in her home garden. She has a nursery for seedlings of vegetables.

Maintain

Phularani produces cereals and more recently has invested in seasonal vegetable production. She grows 3 species of cereals, 10 vegetable species, 9 species of root crop, and 8 species of fruit. She also keeps three species of animals. Among these crops, she grows three varieties of rice (*Radha 4*, *Mala*, and *janti*), a local variety of wheat, and two varieties of maize (yellow and white). The vegetables she keeps are bittergourd, snakegourd (*Trichosanthes cucumerina*); sponge gourd, bottle gourd and eggplant. She also keeps broad beans (*Vicia fava*), and cowpea.

Among the root crops she keeps yam, taro, potato, onion (*Allium cepa*), radish, carrot (*Daucus carota*), and turmeric (*Curcuma domestica*). Among the fruits, she keeps mango, jack fruit, guava, lime, banana (*Musa sp.*), bayer (*Ziziphus sp.*), bel (*Aegle marmelos*), papaya, and chutpute (*Momordica cochinchinensis*). She raises buffalos, goats and chickens and uses their manures to fertilize her fields. She has collected many local varieties and landraces through exposure visits and workshops.

Promote

Phularani is a member of Naubasta Home Garden Farmers' Group. She sells and exchanges local seeds with other farmers. She also sells her production when in season. She participates in local fairs and festivals to display her seeds and products to a wider audience and promote local seed use.

Motivation

Phularani likes fresh vegetables but previously the market was 10 km away from her village, which made it difficult for her to buy them. Hence, she and her husband started growing their own vegetables along with rice so that they could consume fresh vegetables and fruits throughout the year. Phularani likes to use and exchange local seeds because she does not like to spend money buying seeds from the market.

Following training and a workshop about plant nurseries, vegetable farming and the conservation of agricultural biodiversity as part of the home garden projects of the Dalit Welfare Organization, Phularani became more conscious about her cropping patterns and started to search and add local varieties to her home kitchen garden. She learned about homemade organic manures and pesticides for vegetable production. She says that agricultural biodiversity is crucial "for improving human health, environment and farming as well as changing the financial and social structure and thinking [of society]." According to her experience, agricultural biodiversity provides employment to the members of her family.

Why is she different?

Phularani plants several varieties on her farm but she mostly prioritizes local varieties. She and her husband are continuously searching out and planting diversity on their farm. Regarding planting seasons, she never misses the time of sowing. She is aware of seed conservation techniques, nursery preparation, planting on fallow lands, and incorporating pesticides and local manures. Using this knowledge she provides recommendations to other farmers.

Future

Phularani has plans to separate some land for agricultural biodiversity conservation.

Support

All her family members are involved in farming. She hopes that they will support her to handle her biodiversity related work continuously in the future. She has obtained technical support, honey bees, and seedlings and saplings of fruits and vegetables from the government, the Dalit Welfare Organization and her community.

Custodian farmers

Kaliram Tharu and Indrani Tharu

Profile by Saraswati Bhurtyal
LI-BIRD



Introduction

Mr. Kaliram Tharu and Ms. Indrani Tharu live with their daughter in Beluwa-9, Bardiya. Bardiya is located on the Outer Terai in the Mid-Western Development Region of Nepal. Their house is situated close to the Bardiya National park. They own a hectare of land on which they manage a home garden with vegetables, vermi-composting pit, small fish pond, several fruit trees and a fruit nursery (0.35 hectares). The rest of the land is used as a cereal crop plantation.

Maintain

Kaliram and Indrani maintain 16 types of fruits along with 15 species of medicinal herbs in their nursery. Their home garden has 20 species of vegetable and root crops, and seven species of oilseeds and spices. They also have seven species of plants for forage and fodder. They have been growing air potato (*Dioscorea bulbifera*) and elephant-foot yam (*Amorphophallus paeoniifolius*), which are not native to their village. They have been cultivating two rare varieties of rice for conservation: *Anadi* (grown for a traditional alcohol that is required during religious celebrations and wedding ceremonies) and *Bagari Dhan* (Bulgaria Rice). They also grow rare varieties of vegetables, such as *Guiti Hariyo Simi* (green beans), which is traditional but very rare. Previously, farmers did not sell this variety in the

market because the size of the bean is small. Nowadays, with quality vegetables competing in the market, this variety is in high demand for its good taste and it has a high market price. It was Kaliram who reintroduced the variety to the village. He has collected a number of rice and vegetable landraces to conserve in their community seed bank.

Adapt

Kaliram is one of the most successful farmers in grafting mango, which can be seen in his fruit nursery. Currently he is using different techniques like enlarging, grafting and veneer grafting, as well as self-practiced cleft grafting and side grafting.

He has been constantly seeking out new varieties to grow on his farm. He heard about elephant-foot yam and right away obtained seeds from LI-BIRD personnel and started cultivating it. Likewise, he brought a type of air potato from another part of the district and introduced it in the village. This variety of air potato has a smooth surface and a favourable taste. Whenever he comes across a new variety during his visits to different places, he collects seeds/saplings and tries to grow them in his nursery. He does this with wild species too.

Whenever he comes across a new type of pest in the village, he takes a sample to a nearby agricultural station to find out the best method to control the pest and makes recommendations to his fellow farmers. For instance, on his friend's farm he noticed that the leaves of cauliflower were drying and withering unusually. He took it to a nearby agriculture station and discovered that the damage was caused by intense fog. The expert recommended that he use a particular fungicide to get rid of the problem and he proceeded to share this information with his friend.

Promote

Kaliram is motivating other farmers and has a leading role in conservation awareness activities. He is an active member of the Biodiversity Conservation and Development Committee of Belawa, Bardiya for which he has been a chairman for some time and currently has the role of an advisor. The committee aims to conserve and utilize local crop species and varieties. He is also involved in the Cyber Plant Conservation Project, in which he is motivating school children to conserve rare fruit and medicinal plants through diversity blocks and he has been monitoring their conservation activities.

Furthermore, Kaliram has provided herbs for medical uses in his village free of charge to 30 people. He has provided *Chirayita* (*Swertia chirayita*) to eight people for successful treatment of piles.

Motivation

Kaliram is inspired by his father. He has been interested in agriculture since he was a child, but limited water for agriculture in his region was a major constraint for him to excel in this field. With the introduction of the Nepal Water and Health: Water, Sanitation and Hygiene project in the year 1995, the problem of water scarcity was alleviated and the agriculture sector gradually developed in his village. In 1996, the Nepal Smallholder Irrigation Market Initiative provided a lot of information on vegetable farming, which is when his work in vegetable farming intensified. He attended a programme on biodiversity conservation as part of the Western Terai Landscape Project in which he learned techniques for producing saplings, grafting and cutting. One year later he initiated a fruit nursery integrated with a herb plantation beside his home.

Along with commercial farming, he has been growing unique and rare varieties due to his concern for loss of biodiversity. He believes preservation of certain species and varieties is important due to their interdependency. A certain species or variety might be acting as an insect repellent and thereby protecting vulnerable crops growing nearby. For example, growing marigolds around a tomato plantation decreases pest attacks.

Why is he different?

Kaliram is an exemplary farmer in his community. He has been using each and every opportunity to intensify his contribution to agricultural biodiversity conservation through activities with different organizations. He won the Best Innovative Farmer Award, 2009 from LI-BIRD and is thus is a lifetime member of the organization.

Future

Kaliram is a bit worried that his work in agricultural biodiversity conservation might come to an end after his retirement. Two of his elder daughters are already married and the third will be getting married soon and will most likely move out with her husband. However, he has trained his youngest daughter to graft and wishes that she and her husband will stay in Belawa and continue the nursery. If they move away, then after his retirement, he would try to hand over his work to his nephew, who is in the Nepal Army service.

Support

Kaliram is very grateful to his wife and younger daughter for their support. His wife plays a very important role in carrying out many of the agricultural and conservation activities on their farm.

They live close to the Bardiya National Park and wild animals can cause serious damage to their crops. They want compensation from the government in case of crop damage by wild animals and would like the government/park authorities to find ways to keep the wild animals away from their farm. Techniques like electric fencing should be used for this purpose but currently there have been no such initiatives in the area. Another problem he states is with irrigation. He expects the government to provide the community with a perennial irrigation source. He is ready to take leadership in the community and to work with the government to develop better agricultural practices in the region.

He believes the promotion of his work is important so that other farmers from different parts of the country realize the importance of agricultural biodiversity conservation.

Custodian farmers **Surya Prasad Adhikari and Saraswati Adhikari**

Profile by Saraswati Bhurtyal
LI-BIRD



Mahesh Shrestha/LI-BIRD

Introduction

Mr. Surya Prasad Adhikari and his wife Ms. Sarawati Adhikari live with their two children (one daughter and one son) in Dandathar-1, Begnas in Kaski District in the hills of the Western Development Region of Nepal. The main source of income in the village is agriculture. The main cash crops are fruits (oranges, banana, jackfruit, guava, and peaches), in addition to finger millet, rice, and fish.

Surya and Saraswati's daughter is married and lives with her husband and son in the nearby Pokhara valley. Their son is pursuing his studies in New Zealand. The family has been incorporating conservation agricultural practices on their farm and Surya is dedicating himself to the conservation of agricultural biodiversity. The family's homestead has a total area of 6.5 ropani (0.33 hectares), consisting of a vegetable garden, small coffee (*Coffea arabica*) nursery, newly established kiwifruit (*Actinidia sp.*) plantation, biogas plant, vermi-composting pit, beehives, a rainwater harvesting tank, several fruits, and medicinal plants. In addition he has established a coffee plantation on his own land of 12.5 (0.64 hectares) in the past year.

Maintain

They produce wheat, rice, vegetables, maize, and coffee, and raise cows and goats. They currently maintain 3 species of cereal crops, 21 species of vegetable and root crops, 7 species of spices and oilseeds, 2 species of pulses, 11 species of fruit, 20 medicinal plants and 2 species of animals. On their farm one can find around 152 varieties. They keep 8 varieties of taro, 6 varieties of coffee and 3 varieties of yam. They manage seeds of 52 varieties of rice, including local rice varieties *biramphool*, *mansara*, *anga* and *ramani*. They also grow a variety of finger millet named *shamdhi*, which produces a lighter coloured flour compared to other finger millets and is used to prepare meals for important guests, such as the *samdhi* (in-laws). In the Nepalese context, regular millet flour is considered to be too dark (and hence deviating from the ideal of white rice) to be offered to distinguished guests. Surya and his wife are also a custodian couple of the medicinal plant 'Dumri (*Ficus racemosa*)', which is used during pregnancy and delivery. It can be eaten as a vegetable and is also good food for cattle, though other farmers prefer not to cultivate this plant because other crops cannot grow under its shade.

Adapt

Alongside his production activities, Surya is leading the local participatory plant breeding initiatives. Due to his poor eyesight, Saraswati conducts the actual crossing between parent lines. They, in collaboration with experts, have successfully crossed a number of varieties for better production. Farmers from Humla are using his services for crossing. He is always interested in trying new things on his farm. He is enthusiastic to try new varieties and species to see how well they adapt to the soil and climatic conditions.

He developed a rainwater harvesting tank in 2003 to overcome water scarcity. He also collects kitchen wastewater in a tank to use it for irrigation in his home garden. He collects cattle urine and manure to produce biogas and fertilizer. He also experimented using the water from coffee bean shelling for irrigation and biogas. He found that the water is too acidic to be used for irrigation but that it can be used for biogas production. He was able to successfully produce a fungicide for orange and coffee plants using turmeric, *Jatropha* and *simdi*. He uses red ants to control aphids in citrus. Both Surya and Saraswati continually develop their skills, through participating in permaculture design courses.

Promote

Surya has been actively involved in the promotion of his work at the regional level and also at the international level. Every year for the last 7 years, around 100 volunteers from different parts of the world have come to his farm to learn and gain experience with different farming techniques. Other foreign students

have come to his farm to study research and market promotion of coffee. On the occasion of the International Day for Biological Diversity in 2013, he was declared by CARE Nepal as a 'Successful Farmer of Agrobiodiversity Conservation' for the market promotion of coffee and research centre for foreign students.

Every year around 150 people from different parts of the country approach him to obtain coffee plants. Last year he sold a total value of NPR 50,000 of coffee from his own plantation.

Surya is a chairman of a participatory plant breeding group, the National Farmers' Network Group and the Lekhnath Agrobiodiversity Conservation Area Committee, as well as founder member for the Nepal Permaculture Group and executive board member of LI-BIRD Nepal. He is an advisor for district coffee commercial organizations and a member of the Management Committee of LI-BIRD Nepal.

Motivation

Surya and Saraswati are dedicated conservation farmers. They have been conserving agricultural biodiversity since 2042 B.S. (Gregorian 1985/1986). When Surya started farming, he had only 3 ropani (0.15 ha) of land. He followed traditional farming practices using his traditional knowledge and skills. He was also a health assistant in a medical post. He attended an agricultural biodiversity conservation workshop organized by CARE Nepal, which focused on organic farming and soil conservation methods, which motivated him to conserve agricultural biodiversity on his own land. After leaving the medical service, he dedicated himself to agriculture. He believes that diverse farming is important because plants coexist with one another in nature. For instance, certain colours or smells could serve as a repellent for certain pests, thus protecting vulnerable plants in the vicinity.

Why Is He Different?

Surya and Saraswati are an exemplary farmer couple in the region. They maintain an outstanding level of diversity on farm, which contains around 152 species of plants. Surya won the Innovative Farmer Award in 2005 from LI-BIRD and Saraswati won the Innovative Biodiversity Conservation and Farmer Breeder Award in 2009.

Future

When asked about the successor of his work, Surya is hopeful that his community will continue his good work in agricultural biodiversity conservation. He believes it is important to have agricultural courses in schools so that students gain information on farming systems. He is consulting with experts to establish an agricultural school in his village.

Support

Surya has received strong support from his community, the Nepal Permaculture Group, LI-BIRD, and other NGOs. He wants the voices of farmers included in policy advocacy for conservation and farmers' rights.

He sees a need for financial support from the government and the District Development Committee for custodian farmers to ensure local variety conservation throughout the country, villages and communities. He mentions that the population is increasing and food is lacking. To balance conservation of local varieties and food security, he believes that we need an improved national agricultural biodiversity conservation policy. The policy needs to provide incentives for farmers to realize that they are not only farming for themselves but for the whole community.

He expresses that he has a small well for collecting kitchen wastewater but due to the high soap concentration in the waste, it has not been useful for irrigation. He is thus searching for modern techniques for filtration of contaminated water.

Custodian Farmers Lal Kumari Thapa and Jaya Bahadur Thapa

Profile by Saraswati Bhurtyal
LI-BIRD



LI-BIRD Photo Bank

Introduction

Ms. Lal Kumari Thapa, lives in Chaur, Lekhnath-11, Kaski District in the hills of the Western Development Region of Nepal. She lives with her husband Mr. Jaya Bahadur Thapa, her son of 30 years and daughter-in-law. They have a small grandson and a granddaughter. They have a total land holding of six ropani (0.3 hectares) of upland, where they have a home garden. They keep a separate two ropani (0.1 hectares) for medicinal plants.

Maintain

In their home garden, Lal Kumari and Jaya Bahadur keep cereal crops, legumes and various vegetables. She maintains three varieties of beans, two varieties of cowpea and five varieties of taro. In their medicinal plant garden, they keep a total of 121 varieties, including the rare medicinal plant *chautajhar*. The root of this plant can be used to treat broken or fractured bones or swellings. Three years ago she brought another medicinal plant called pakhanbet (likely *Bergenia ciliata*) from Pakhurekot, Tanahun. It grows on walls and it is good for women during and after pregnancy. She also grows aloe (*Aloe vera*), serpentina (*Rauvolfia serpentina*), hibiscus (*Hibiscus sp.*), neem (*Azadirachta indica*), cinnamon (*Cinnamomum sp.*), bakaina (*Melia azedarach*), etc.

Lal Kumari is involved in grafting a number of fruit species, including mango. She also keeps two buffalos, two goats, four beehives and a fish pond. She uses products from animals for medicinal purposes. For instance, urine of the cow is used for treatment of cough and cold, gastritis, etc. She collects the best seed from her plants for conservation.

Promote

Lal Kumari is a member of the local Women's Group and the Pratigya Cooperative. She and her husband displayed medicinal plants and medicines at various fairs and now many people come to their home to buy plants and products.

Lal Kumari and her husband sell their medicinal remedies/powders and saplings of medicinal plants, as well as vegetables. Last year, their earnings from selling saplings of medicinal plants were around NPR 10,000 and around NPR 4,000 from the sale of vegetables. In 2012, her family earned NPR 200,000 from medicinal products. Sometimes she provides free medicine to poor people, as some of her products are very expensive. For instance, noon dhike (likely *Osyris wightiana*) can cost up to NPR 400 per piece.

Lal Kumari provides seedlings and seeds to others who are interested in transplanting them. Three people have already learned and started medicinal plant farming in her community.

Motivation

Lal Kumari's father and father-in-law are both involved in medicinal plant cultivation, which is how she acquired her knowledge. Before starting conservation of medicinal plants, she made a list of plant species in the forest through a programme of Community Forestry. It was at this point that she became motivated in this profession. Medicinal plants provide her with income and she likes to share her knowledge.

Why is she different?

Lal Kumari has several medicinal plants in her farm for treatment of gastritis, jaundice, and wounds and she has extensive knowledge on how to use medicinal plants to treat different diseases. She is a lifetime member of LI-BIRD for winning the Best Innovative Biodiversity Conservation and Farmer Breeder Award (Female) in 2007.

Future

Lal Kumari thinks her son and daughter-in-law will continue her work. Both are involved in the work, especially her daughter-in-law. The people who come to her to learn about medicinal plants and products could also be the ones to ensure continuation of the knowledge and seeds.

Support

Lal Kumari's husband and daughter-in-law are also involved in agriculture and medicinal plant cultivation. LI-BIRD provided her a grinder machine, which has been very helpful in facilitating preparation of powders of medicinal plants. The government and community do not provide much help according to her. She would like for the government to support her by providing better land for medicinal plant farming, training on the value of medicines, and promotion for her work.

Custodian farmer **Shanta Bohora**

Profile by Saraswati Bhurtyal

LI-BIRD



Indra Paudel/LI-BIRD

Introduction

Ms. Shanta Bohora lives in Chamkipur Village Development Committee of Rupandehi District in the Western Region of Nepal. She is a single woman, living with her two teenage daughters. She has seven *kattha* (0.23 hectares) of land, three of which are being used for vegetable production and the rest for cereal crops. She also keeps her own vegetable nursery, where she produces different saplings and seedlings through grafting, layering and seeds.

Maintain

Shanta produces cereals, oilseeds, vegetables, fruits, spices and pulses, as well as ornamental plants. Her farmland has around 30 species of vegetables, 2 species of cereals, 5 species of spices and oilseeds, 3 species of pulses, 7 species of fruits and 3 species of animals. Among these species, she currently cultivates 3 varieties of cabbage and 3 varieties each of potato, yam and taro. She grows 2 varieties of rice. The *Motisama* variety of rice is tasty and grows better in soil with a high water-holding capacity. The *Osan* variety of rice prefers an area with good drainage and ripens early, hence it frees up the paddy land for intercropping garlic (*Allium sativum*) and broad-leaf mustard earlier in the season. She is collecting and searching for other local varieties of rice and vegetables and is conserving indigenous knowledge and farming skills and practices.

Adapt

Shanta has taken part in numerous research projects, including a zero tillage trial for garlic production in paddy fields after harvesting the rice, a comparative study between the production of a Kathmandu landrace of cauliflower and her local cauliflower, and trials examining the use of cattle urine in paddy cultivation as fertilizer.

Promote

Shanta is the chairperson for the Kalika Home Garden Farmers' Group, which manages a nursery that maintains seeds of rare local varieties, helps raise awareness about local varieties, and provides access to seeds for interested farmers' groups and individuals.

Shanta distributes/sells her own saplings and seedlings to the farmers in her community. Villagers approach her to get her opinion on different techniques of nursery management and vegetable farming and she willingly shares her knowledge.

Her enthusiasm for agricultural biodiversity is visible through her active involvement in local seed conservation and dissemination, making her well-suited for the title "custodian farmer."

Motivation

Since beginning her collaboration with LI-BIRD three and a half years ago, Shanta has gained many technical skills in vegetable farming. LI-BIRD provided her with skills on bio-fertilizer production, various vegetable farming methods, mushroom farming, etc. As a result of these experiences, she realized the importance of the different crops. She started to conserve local traits in her nursery and her garden. She converted some of her cereal crop land into a garden to increase her income through vegetable production.

Why is she different?

Shanta is a single woman but has full confidence in pursuing her farming initiatives. In her community, all the neighbours call her a successful resource gardener and a role model for her community. Instead of using plastic bags, she uses leaves for the seedlings that she produces in her nursery. She uses only bio-pesticides, thereby promoting organic farming in her society. She is a lifetime member of LI-BIRD as the winner of the Best Innovative Farmer Award, 2012.

Future

Shanta has plans to continue her efforts to conserve agricultural biodiversity in her home garden. Her two daughters have been trained in nursery management and other home garden work. She is hopeful that her daughters will continue her work and maintain agricultural biodiversity for society.

Support

According to Shanta, she has not received any support from either the community or the government. She has an expectation from the community to collect seeds of local crops for use by her and the rest of the community. She hopes that researchers will visit her garden for more studies and to support her research endeavours.

Custodian farmer Man Bahadur Ghalan

Profile by Saraswati Bhurtyal

LI-BIRD

This profile documents the experiences of the custodian farmer and SAHAS-Nepal.



Saraswati Bhurtyal/LI-BIRD

Introduction

Mr. Man Bahadur Ghalan lives with his wife, daughter, two sons, grandmother and parents in Dalchoki Village Development Committee of the Lalitpur District in the hills of Nepal. Lalitpur is a part of the Bagmati zone. It is one of the three districts in the Kathmandu Valley, along with Kathmandu and Bhaktapur.

Man's homestead has different fruit trees of various shapes and sizes, a poultry farm, and a shed with goats, buffalos and pigs. He has a total of 20 ropani (1.1 hectares) of land. He grows maize in 18 ropani (0.9 hectares), wheat and vegetables each in one ropani (0.05 hectares) of land.

Maintain

On his farmland, Man has around nine species of fruit trees and 14 species of other trees, 22 species of vegetables, pulses and oilseeds, 4 species of cereals, 10 species of ornamentals and 13 species of medicinal plants. Within these, he currently maintains 4 varieties of chayote (*Sechium edule*), 12 varieties of beans, 2 varieties of broad leaf mustard, 4 varieties of pumpkin (*Cucurbita maxima*), 2 varieties of cucumber (*Cucumis sativus*), 2 varieties of maize and 2 varieties of garlic. In terms of fruits, he grows 3 varieties of persimmon (*Diospyros virginiana*),

2 varieties of peach and 4 varieties of banana. Beyond these, he maintains a nursery for seedlings of vegetables and saplings of some fruits. He also grows different medicinal plants and fodder trees.

Man is regularly searching for new varieties and when he finds them, he purchases them and brings them home. For example, he knew about a sweet variety of wheat (*Mudule Ganhu*) that used to be common in his village but had become increasingly difficult to find because people did not prefer it due to its colour. He started to search for it throughout the village and collected the seeds from neighbours and other farmers. He now maintains this variety on his farm. It has higher protein content, cooks well and tastes good. He is collecting seeds of local varieties whenever he finds them during visits to other communities.

Promote

Man has been an active member of the Dalchoki community seed bank for 15 years, which maintains seeds of local varieties, raises awareness, and provides a forum to discuss problems in agriculture. He is also an active member of the home garden group of Dalchoki. He shares his knowledge with interested farmers during workshops and gains knowledge in discussing with other farmers. He sells seedlings from his nursery to other people in the community.

Motivation

Man first became interested in farming and conserving rare and local plants 15 years ago. Previously, he did not care about what varieties he planted or what seeds he stored. He did not devote attention to saving seeds of local varieties and was not conscious of conserving agricultural biodiversity on his land. Nonetheless, he was maintaining a lot of varieties around his farm. He collected or bought seeds of seasonal crops from the market, his neighbours and relatives but he would not separate higher quality seeds for storage. After participating in various training sessions, diversity fairs, farmer knowledge sharing experiences, and an exposure visit facilitated by USC-Canada Asia and SAHAS-Nepal he appreciated the importance of conserving agricultural biodiversity on his farm. He started to store quality seeds of local varieties for subsequent seasons. In understanding how different species contribute to the farm, he realised why his ancestors had been saving and maintaining agricultural biodiversity.

Why is he different?

Man is different from other farmers in his community. He conserves a higher number of varieties of legumes, cereals, pulses, leafy vegetables, fruit trees, oilseeds, and ornamentals. He maintains local varieties of mandarin, garlic and maize that are not found in neighbouring villages.

Future

He plans to share his knowledge about agricultural biodiversity conservation with other interested farmers of his district. He wants to identify climate-friendly varieties in his community, which will be important to conserve. He expresses his desire to collect those important varieties and expand their provision and sale, eventually becoming a well-known conservation farmer all around the country. He wants an organic farm, rich in agricultural biodiversity that incorporates a seasonal cropping pattern. He will continue to collect and search for vegetables, fruits, and medicinal plants, as well as information to promote organic farming rich in agricultural biodiversity.

Support

Man's family is supportive of his farming. He also receives support from his community and farmers' organization. He needs more training on farming techniques and better access to important local seeds and bio-pesticides. He sees a need to establish a forum for interaction among custodian farmers from different districts of Nepal. He is interested in acquiring more knowledge about propagation (layering, grafting, etc.) of fruit trees. He is seeking knowledge, skills, local varieties and researchers for promoting his agricultural biodiversity.

Custodian farmer

Som Bahadur Ale Magar

Profile by Saraswati Bhurtyal

LI-BIRD

This profile documents the experiences of the custodian farmer and Parivartan Nepal.



Saraswati Bhurtyal/LI-BIRD

Introduction

Mr. Som Bahadur Ale Magar lives in Faparbari-8, Ratamata on the Inner Terai in Makawanpur District in the Central Development Region of Nepal. He has four family members and all are well educated. He is an active farmer, who is raising cattle and producing farmyard manure for organic agriculture. His main source of income is agriculture and he has enough land to support his family. He keeps a wide variety of plants on his farm.

Maintain

Som conserves the seeds of old varieties of different crops. He grows rice, maize, finger millet, wheat, buckwheat, and *junelo* (sorghum) in addition to several species of vegetables, fruits, pulses, oilseeds and root crops. Among these crops he grows three varieties of rice (*Makawanpure*, basmati, and *Gaurapakhe*), five varieties of maize (local yellow, white, Rampur composite, Arun-2, and black), two varieties of sorghum, two varieties of finger millet, two varieties of wheat (local and NL) and sweet buckwheat (*Fagopyrum esculentum*). He has over 30 varieties of vegetables and root crops, 10 species of pulses, 18 species of fruits, 5 species of oilseeds, 7 species of spices, and 7 species of animals, including fish.

Adapt

Som is an informal scientist who has different types of knowledge and skills. He is testing different practices to make biological pesticides using cattle urine and other locally available resources. He and his community realize that effective seed and seedling production is essential for good production. Hence, he is usually busy searching and collecting the seeds, seedlings and saplings of new and rare varieties of cereals, pulses, vegetables and fruits.

Promote

He is a leader in his village, acting as board member of the Community Forest Management Association and a member of the farmers' group. He is spearheading initiatives for awareness, and sharing knowledge about agricultural biodiversity and its conservation. His community requests him to conduct agriculture related workshops. He provides the products and seeds of rare species of cereals and vegetables to his neighbours.

Motivation

Som previously used chemical fertilizers and pesticides to manage the insects and pests on his crops but he realized that such practice led to the loss of soil fertility and productivity in the long run. Now he has improved his cattle-shed, urine and manure management and has transitioned to using organic manure that he produces himself. He is considered a worthy descendent of his ancestors because he has adopted the farming and conservation of rare and local seed varieties.

Why Is He Different?

Most farmers in the community are not interested in organic practices. Som values conservation and sees the plants he grows as more than just a source of food and income. While working in his fields, he brings a radio, not only to listen himself but also because he believes that the plants are happier with the music. He enjoys seeing grasshoppers dance near the radio. Parivartan Nepal⁹ identified him as a custodian farmer because he is continuously working to identify and conserve local cereals and vegetables. He collects, conserves and promotes local seeds.

⁹ <http://www.parivartannepal.org.np/>

Future

Som hopes that his sons will continue to give him support in the future and will continue to support the conservation of agricultural biodiversity.

Support

The community is supportive of his work and provides him opportunities to lead and participate in work related to agricultural biodiversity. Som acquires seeds and seedlings of new and rare species and varieties of cereal crops and vegetables from the government. He thinks improving access to information and technology related to new and rare varieties would be beneficial.

Custodian farmer

Harka Bahadur Shyangtan

Profile by Saraswati Bhurtyal

LI-BIRD

This profile documents the experiences of the custodian farmer and Parivartan Nepal.



Saraswati Bhurtyal/LI-BIRD

Introduction

Mr. Harka Bahadur Shyangtan lives in Parwanipur-2, Bohore, Sarlahi District on the Outer Terai in the Central Development Region of Nepal. His family includes his wife, two sons, daughter-in-law and two granddaughters. His sons and granddaughters are well educated. He adopted organic farming three years ago.

Maintain

Harka maintains 15 different varieties of cereals, 36 varieties of vegetables and root crops, 23 varieties of spices and oil crops, 18 varieties of pulses, 14 varieties of fruits and 5 types of animals. He keeps vulnerable and rare species such as *thulo bethe* (*Chenopodium* spp.), horsegram, ricebean (*Vigna umbellata*) and foxtail millet (*Setaria italica*). He grows four varieties of local maize.

Adapt

He does not use inorganic fertilizers and chemicals for insects and pest control, instead relying on organic and biological control means. He is an expert in selecting the seeds for the next season.

Promote

Harka promotes the use of organic manures and insecticides for organic farming. He teaches other farmers and neighbours about the importance, as well as the procedures to produce organic manures and pesticides. He has been involved in farmyard manure improvement, solid (*giti*) manure preparation, liquid (*ledo*) manure preparation, mixed cropping, organic farming, and biodiversity conservation. He is the president of an agriculture cooperative organization.

Motivation

Parivartan Nepal provided training about organic farming, nursery management, organic manure preparation, integrated farming, and mixed cropping. After acquiring these skills, Harka wanted to incorporate organic practices into his farming. He started to make liquid manure, compost manure and improved farmyard manure, as well as to collect cattle urine. He engaged in mixed cropping as well as conserving local and other new crop varieties on his farm.

Why is he different?

Harka is a farmer who conserves different types of agricultural crops. He has greater enthusiasm for conserving agricultural biodiversity than other community members, and for sharing his knowledge with others. He enjoys having farmers visiting and learning from his farm. He understands the importance of agricultural biodiversity conservation and is committed to continue incorporating additional varieties and species in his farm.

Future

Harka hopes that his eldest daughter-in-law Ms. Mina Syangtan will continue his work because she is also interested in conservation and has attended several training sessions about farming.

Support

His family members are supportive of organic farming. Among them his daughter-in-law plays an important and powerful role in his family's farming. Harka is interested in exposure visits, where he can learn and see many things. He also wants to conduct his own research on different topics. Parivartan Nepal is supporting him to provide training, seeds, and suggestions. He does not get support from other organizations. He needs the support of the government in irrigation management.

Custodian farmer Anita Khadka Sherpa

Profile by Saraswati Bhurtyal
LI-BIRD*



LI-BIRD Photo Bank

Introduction

Ms. Anita Khadka Sherpa lives in Duwagadi-9, Jhapa with her husband, two teenage daughters and a young son. Jhapa is one of the seventy-five districts of Nepal, located in the terai portion of the Far-Eastern Development Region of Nepal. The district, with Chandragadhi as its headquarters, covers an area of 1606 km² and has a population of 688,109 (2001). The major agricultural products of the region are paddy, maize, sugarcane (*Saccharum officinarum*), wheat, barley (*Hordeum vulgare*), millet, potato, tobacco (*Nicotiana tabacum*), oilseeds, vegetables, tea (*Camellia sinensis*), cardamom (*Amomum subulatum*) and ginger. Around 550 large and medium companies operate in the district in the following industries: agriculture and forestry, manufacturing, mining and quarrying, electrical operations, vegetable oil and garments. Agriculture provides employment to the majority of self-employed people in the region.

The main sources of income for Anita's family are maize and vegetables. Most of the farmers of her village prioritize growing cereal crops like rice and maize. Previously, Anita also gave first priority to rice and maize on her three kattha (0.03 hectares) of farm land but now she grows different vegetables and maintains a fruit orchard and nursery for seedlings and saplings of vegetables and citrus fruits. She also raises poultry, goats and cows and has built a biogas plant on her farm.

Maintain

Anita has a total of five fruit trees including mango, pomegranate (*Punica granatum*), and guava. She keeps 20 varieties of vegetables, including potatoes, maize, cassava (*Manihot esculenta*), and broad leaf mustard. She also maintains eight varieties of bean, seven varieties of taro, and five varieties of chilli. She grows a rare type of cardamom (*elaichi*) that requires less work and less space but has high yield. She also maintains a wide diversity of chayote varieties, which her family uses for roots, tender shoots and fruits.

Promote

She supplies *elaichi* to big cities like Kathmandu and Biratnagar through local businessmen. She sells around 40 kilograms per year and a single piece last year weighed up to 15 kilograms. Vegetable salesmen come to her home in mini-trucks to buy seasonal vegetables. She also sells the seedlings from her nursery to neighbours for income. She uses the money she earns to pay for food, school fees for her children, clothes and farm supplies. Previously Anita worked as a labourer on other people's farms, but these days she is independent and is very satisfied with her work.

Adaptation and motivation

Anita used to grow only rice and wheat on her farm because she had no knowledge of commercial vegetable production. She used to grow seasonal cereal crops, which is what her ancestors had been doing for many years. She grew a few leafy vegetables and beans for home consumption but not many, since she did not think that vegetables could be a good source of income. Five years ago she got a chance to participate in workshops, training courses and an exposure visit through the Home Garden Project, where she received information about agricultural biodiversity, vegetable production, conservation of local varieties, nursery establishment for seedlings and saplings, farm yard manure management, integrated farming and other practices. She was inspired by the useful vegetable production-related technologies and started to plant vegetables in her own land in addition to cereal crops. She understood that vegetables can provide an income source and can contribute to a sustainable livelihood. She has continued to try and learn more and more information about vegetable production, nursery management, farm yard manure improvement, cattle urine collection, compost manure preparation, and other practices from technicians in Jhapa district.

Why is she different?

None of the other farmers in her community have as many species of vegetables and fruits in their home garden. Anita is distinct from others in terms of cultivation and collection of agricultural biodiversity because she is an active and innovative farmer, who produces a lot of vegetables, not only for home consumption but also for marketing to earn money. She maintains several vegetables and local varieties in her orchard, which are not found in the farms of her neighbours.

In her community, her neighbours recognise her enthusiasm in preserving agricultural biodiversity on her land and her labours to collect seeds and seedlings of different vegetable crops, especially local landraces from the market and other communities. Her neighbours are proud to say she is a leading female farmer in agricultural biodiversity conservation. Through their recognition she has become a chairperson for Pathivara Homegarden Women Farmers Group. In the year 2008, she won the award for Best Innovative Biodiversity Conservation and Farmer Breeder from LI-BIRD.

Support

Anita has been looking for *jhumke bethu* (a variety of *Chenopodium* spp.) and *mithe fapar* (sweet buckwheat), both rare crops in her region. She knows *jhumke bethu* requires less work and is less infested with disease, while *mithe fapar* has been locally extinct. Both are very palatable and can be used as vegetable and cereal crops.

Custodian farmer **Bibiana Ranee**

Profile by Annelie Bernhart
NESFAS



Mahesh Shrestha/LI-BIRD

Introduction

Ms. Bibiana Ranee belongs to the Khasis of East Khasi hills, Meghalaya, India. She lives in the Nongtraw village in Sohrarim, Cheerapunji region with her four children: three girls and one boy. There are 37 households in the village and her farm is two acres.

Maintain

Currently, she maintains around 35 varieties of crops in her field and practices shifting cultivation. Most of her production is for self-consumption, while some crops are grown for commercial purposes. On one occasion she received seed support for a potato variety from the government but it did not have much yield and she was unable to save the seed beyond three years.

Promote

Bibiana has raised awareness on the importance of food security and biodiversity with regards to millet. One of the biggest changes that she has campaigned for in her community is the revival of local millets (mainly finger millet amongst

four varieties in total) that were almost forgotten. Bibiana claims that one of her biggest challenges is to convince other farmers of the importance of local foods and biodiversity. However, over her two-year campaign on promoting traditional and local foods, she has discovered that some farmers are now coming forward to support the same cause. Her community has understood the importance of her knowledge and the many measures she has taken to offer her community support, such as setting up school gardens.

Motivation

Seeing how the present day socio-ecological impact is destroying generations of knowledge, Bibiana has recognized the importance of local food, which motivated her to take action and become a custodian farmer.

Future

In the future Bibiana plans to organize seed fairs and is trying to reintroduce traditional foods her community's food system. Bibiana also wants to promote local seed saving systems and incorporate them through community seed banks. The community is now trying to create a local body for knowledge management.

Support

Her family, including her four children, has always provided strong support, largely because they understand the importance of the issues.

Custodian farmer Redian Syiem

Profile by Annelie Bernhart
NESFAS



NESFAS

Introduction

Ms. Redian Syiem lives in Khweng village in Ribhoi district of Meghalaya, India. She is the mother of 11 children out of whom three are boys and eight are girls. In her profession as a farmer she helps her husband Mr. Bah Jewing Nongpoh, who is working with the state police to support the family. She also has a home garden in which she tries her best to sustain and maintain the diversity.

Maintain

In total, Redian plants more than 70 different varieties of crops including tubers, vegetables, fruit trees and rice. She grows these crops traditionally in Jhum fields (shifting cultivation). Remarkable is the abundance of more than 14 types of taro and cassava. She also domesticated wild leafy species from the forest like *Jaren* and *Lapongtham*, which are registered in the international Ark of Taste, a catalogue funded by the foundation of Biodiversity at Slow Food that lists endangered food products that are linked to the culture and tradition of local communities.

Adapt

Redian also attempts to introduce new plant species, sometimes even forgotten crops that she learned from her parents. One such example is mulberry (*Morus sp.*), which was almost forgotten by the community but was promoted in earlier days as a resilient fruit tree. She has taken the initiative to plant several vegetables from the nearby forest in her home garden in order to make wild edibles accessible for home consumption.

The challenging problem that she faces in her garden is the attack of different diseases and insect attacks on her tuber crops. She has experienced negative side effects after applying chemical substances, so now she uses organic methods for pest defence. Presently, she uses organic manure to increase soil fertility and traditional methods to manage pests. She has also observed that planting and harvesting according to the lunar cycle, as by her traditional knowledge, results in healthy crops.

Promote

Today Redian is seen as the promoter of mulberry trees in her community, for which she is greatly respected. She encourages synthetic chemical free farming within the community.

Motivation

Besides the necessity of having to feed and sustain her family, the motivational force that keeps Redian working in the field is the importance of continuing the practice of her forefathers. Moreover, she acknowledges that larger diversity means adapting better to environmental hazards such as climate change, pests and variations in soil quality. She also appreciates the taste of some rare and underutilized plants, which sustains her drive to grow them and use them for home consumption.

Future

One of Redian's future plans is to exchange more seeds with other community members, thereby multiplying and preserving them together with her community. She has also proposed to hold a seed exchange with the school children of her village during one of the school days.

Support

Redian receives support and respect from her community, as she is a role model and a custodian farmer. During community workshops and meetings, she assigns community members and identifies other custodian farmers to take action in seed sharing and diversity documentation. In the future she hopes to get support for documenting her agricultural biodiversity, as she has never done this before in written form.

Custodian farmer **Karma Tenzin**

Profile by Rinchen Dorji
Bhutan National Government



Mahesh Shrestha/LI-BIRD

Introduction

Mr. Karma Tenzin is the father of seven children (three daughters and four sons) and lives happily with his family in Khamaedthang village in Phuntshothang Gewog Block of Samdrup Jongkhar Dzongkhag District in eastern Bhutan. The major crops grown by his community are rice, maize, and finger millet. In addition to spices and vegetables, such as chilli, onion, garlic, potato, pumpkin, radish, cabbage, cauliflower, leafy greens and legumes, cash crops such as ginger, areca nut (*Areca catechu*), banana and mango are also cultivated in the community. Besides crop cultivation, people of this community rear cattle, pigs, poultry and goats.

Among the crops grown in the community, rice is by far the most important and it is also the preferred food crop of his family. Agriculture is the mainstay of his family's livelihood. He practices self-sustaining, integrated and subsistence agricultural production with his small landholding of 1.2 Hectares..

Maintain

Karma cultivates five varieties of rice (Masino, Kongkos, Khamti, Bhur Raykap 1 and Bhur Raykap 2), two varieties of maize (Asham Tsalo and Ashambalingbi), and five varieties of legumes. Besides these, he cultivates mango and banana.

Promote

He is one of the active members of the newly initiated community seed bank in his locality. He is interested in conserving and using as many varieties as possible through the community seed bank. His participation in the national custodian farmers' workshop in Nepal was a source of encouragement to diversify the production on his farm. He is also greatly motivated to share knowledge on the importance of diversity with his neighbours and community.

Motivation

Karma was cultivating nearly all of the major cereal crops in his younger days. Over the years, he has realized that the rate of cultivation of traditional crops and varieties has drastically declined, both in his own house and in the community. He is deeply concerned about restoring some of the crops and varieties, especially millets, which played a great role in filling the famine gap when he was young.

Why is he different?

Unlike other farmers in his locality, Karma fully understands the value of sustainable utilization of crop genetic resources. He shares the importance of crop diversity with other members of the community seed bank. He is also a village leader under the local government. He is interested in collecting, utilizing and maintaining varieties of crops adapted to his locality.

Future

Karma is interested in adding yet more varieties to his farm and in his community at large. Agriculture will remain his lifelong profession to sustain his family's welfare and livelihoods. He remains committed to collecting, utilizing and maintaining as much diversity on his small farm as possible. It is also his dream to make a fully functional community seed bank in his locality.

Farmer participant Dilsara Biswakarma



Ms. Dilsara Biswakarma is a hardworking farmer in Ghateshwar, Doti. In a few years she has managed to transform her home garden into a resource home garden by integrating a fish pond and chickens and by increasing the diversity of vegetables and fruits. She produces surplus vegetables for her family and provides seeds and seedlings to her neighbours. The transformation of her home garden has been supported by LI-BIRD's Community-Based Biodiversity Management project in Doti.

She was invited to this workshop, not as a custodian farmer, but as a woman resource home gardener to contribute to the group discussions.

Farmer participant Kumari Krishna



Ms. Kumari Krishna Jaiswal is an active member of the community seed bank operated by the Agriculture Development and Conservation Society in Kachorwa, Bara.

She was invited to this workshop to participate in discussions and provide her insights from the perspective of a woman farmer operating a successful community seed bank in a patriarchal society.

Farmer participant Ram Ekval Yadav



Mr. Ram Ekval Yadav is the Chief of the Agriculture Development and Conservation Society in Kachorwa, Bara. This is a farmers' organization committed to safeguarding farmers' access to rare and traditional varieties of crops. Their community seed bank is currently conserving nearly 90 traditional rice varieties, and recently started expanding work into neglected and underutilized species.

He was invited to this workshop, not as a custodian farmer, but to contribute his knowledge and experience in conservation to the discussions.

Participatory seed exchange

Sajal Sthapit
LI-BIRD

A participatory seed exchange was organized at the beginning of the workshop to: i) demonstrate a simple approach to seed sharing that can be facilitated at the community level between farmers and farmers' groups, ii) display the wealth of diversity maintained by custodian farmers and iii) act as an ice-breaker for introduction between farmers and scientists.

Twelve custodian farmers brought seeds to the exchange, including three custodian farmer couples. The participating farmers were: Ms. Santa Bohora, Mr. Man Bahadur Ghalan, Mr. Harka Bahadur Syantang, Ms. Phularani Tharu, Ms. Indra Devi Oli, Mr. Til Bahadur Rawal, Mr. Prem Bahadur Biswakarma & Ms. Jhuma Biswakarma, Mr. Khem Bahadur Chand & Ms. Rijana Chand, and Mr. Kaliram Tharu & Ms. Indrani Tharu. Seeds were also brought from the community seed bank in Kachorwa, Bara that is operated by the Agriculture Development and Conservation Society farmers' organization. In total, 176 accessions were brought for display and participatory seed exchange.

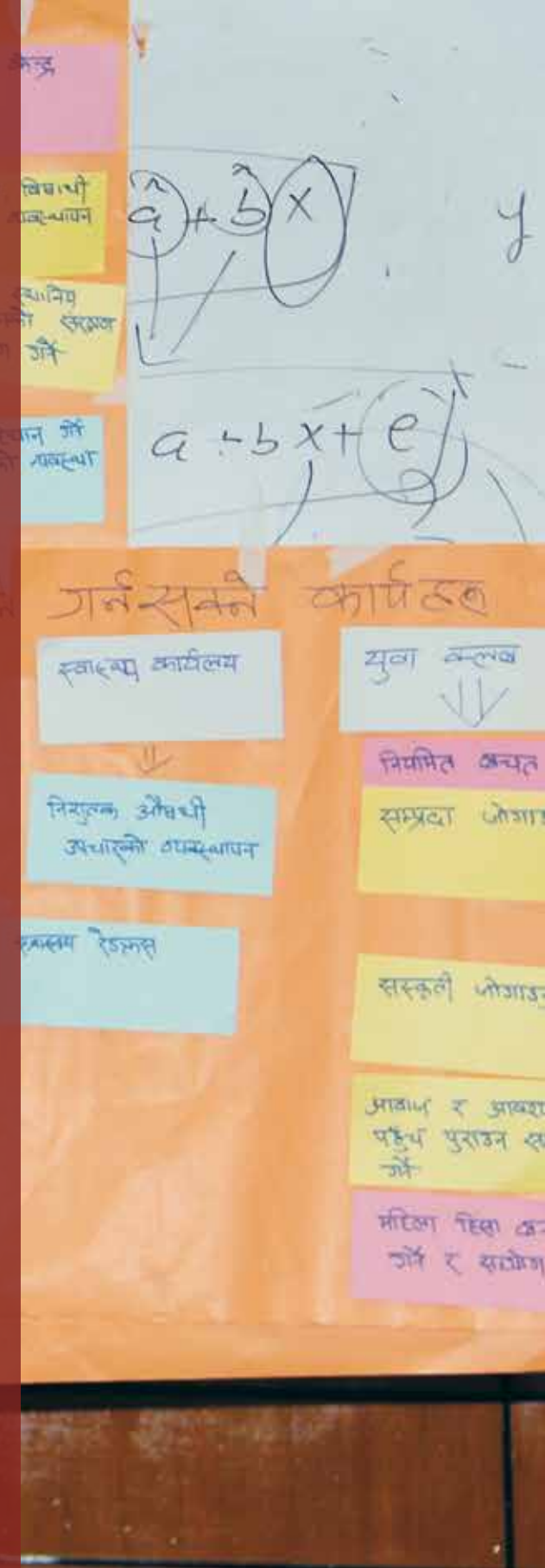
Fourteen farmers from Nepal took a total of 141 accessions from other custodian farmers during the exchange. The farmers whose varieties were most desirable to other farmers were Til Bahadur Rawal of Jumla and Khem and Rijana Chand of Kailali. Farmers took 45 and 24 seed samples from them respectively. Researchers and practitioners took an additional 31 accessions from the exchange.



Mahesh Shrestha/LI-BIRD



Contributions of Individuals, Families and Communities to the Conservation of Agricultural Biodiversity



Connecting custodian farmers through collective institutions to strengthen on farm

conservation: maintaining, adapting
and promoting crop diversity at
individual and community scales

Gennifer Meldrum
Bioversity International

Introduction

The current definition of custodian farmers that was proposed at the recent workshop in New Delhi, India highlights that they are those farmers who “maintain, adapt and disseminate agricultural biodiversity and related knowledge” (Sthapit et al. 2013). These roles can be considered as three pillars of plant genetic resource conservation, making this is an appropriate definition for these farmers who are recognized as focal actors in this pursuit. Although this specific definition was suggested, it was acknowledged that not all custodian farmers carry out these three roles equally well (Sthapit et al. 2013).

Considering the multitude of potential differences between custodian farmers raises questions about how to effectively leverage and consolidate the roles of individual farmers in the conservation of crop diversity. A network of custodian farmers is one solution to harmonize the activities of farmers with different strengths in maintaining, adapting and promoting diversity.

Building from the current definition of custodian farmers, in this paper I discuss the importance of maintaining, adapting and disseminating crop diversity for plant genetic resource conservation and then discuss how a custodian farmer network could leverage differences between farmers and integrate efforts for on farm conservation at community and formal levels.

Three pillars of on farm conservation: maintain, adapt, promote

Maintain

Maintaining crop diversity is the fundamental action custodian farmers carry out to support on farm conservation. The continued cultivation of traditional crops,

landraces, indigenous and heirloom varieties, which together represent the majority of the world's crop diversity, is essential to prevent their disappearance. All other roles custodian farmers carry out in support of on farm conservation can be seen to extend from this central contribution of diversity 'maintenance'.

Farmers perform various activities related to cultivation that consciously or unconsciously influence the maintenance of diversity including, keeping seeds, preparing the soil, fertilizing, planting, watering, weeding, and harvesting their crops. They also hold deep knowledge associated with the cultivation and use of the crops, such as how to identify varieties, their ideal planting locations, their care requirements, harvest and post-harvest practices. This knowledge is linked to the use and valorisation of the resources, which is critical to their conservation into the future.

Adapt

While 'maintaining' is central to plant genetic resource conservation, it is also recognized that the static preservation of crop diversity is not a sustainable conservation approach. Current crop diversity may not meet future needs due to inevitable changes in climate, pests, disease and cultural context. The presence of genetic diversity in farmers' fields can enable adaptation to shifting local conditions and preferences, as the crops are continually subjected to natural and farmer selection. In this manner, and in contrast to *ex situ* conservation, on farm conservation is dynamic. It preserves the processes and farmer practices responsible for the maintenance and creation of crop genetic diversity, rather than focusing on preserving specific genotypes (Bellon and van Etten 2014); Varieties are adapted, introduced and discontinued according to farmer needs, preferences, and constraints (Wood and Lenné 1997; Jarvis and Hodgkin 2000).

Adaptation can occur passively as farmers select the seed of plants that perform well year by year. It can also occur more actively as farmers experiment with developing new varieties through breeding, selection or domestication and procuring and trying out new materials. While the act of selection can inherently decrease diversity, it is also considered that adaptation or improvement of local materials can increase the likelihood that local material will be conserved, rather than being replaced with uniform modern cultivars (Almekinders and Elings 2001). In addition to adapting their crop material, farmers also experiment with new farming techniques that can enhance the performance and sustainability of their production.

Promote

The third pillar of on farm conservation is the dissemination or 'promotion' of crop diversity. Encouraging enhanced use of traditional crops within farmers' communities and society at large is a critical action to enhance on farm conservation. Farmers' decisions concerning which crops to grow

are fundamental to the conservation of crop diversity but these decisions are strongly influenced by socio-economic factors, including agricultural policies and market demand, which are increasingly encouraging production of a narrow range of staple and commodity crops (Thrupp 1998; Wolff 2004; Keleman et al. 2009). In this regard, it is argued that a society-wide effort is needed to raise demand for diversity and create incentives for farmers to continue growing traditional crops. Promotion of traditional crops is key to this end and can involve market interventions and raising awareness about the importance of traditional crops for their nutritional value, cultural appeal, ecological role, and potential for livelihood enhancement through novel food applications.

Another aspect of promotion that is critical to on farm conservation is sharing seeds and knowledge, which facilitates access to the crop genetic resources and encourages their greater use and valorisation (Subedi et al. 2003; Jarvis et al. 2011). Sharing seeds is strongly tied to the dynamics that maintain crop diversity through meta-population dynamics (Alvarez et al 2005). By disseminating seeds to other farmers there is greater chance that if one farmer loses a variety it can be recovered and that the variety will not be lost for the community and society overall.

Different kinds of custodian farmer

Although custodian farmers have been defined as playing exceptional roles in maintaining, adapting and promoting crop diversity, it is also recognized that some custodian farmers may not fulfil all of these roles equally well (Sthapit et al. 2013). Maintaining diversity by cultivating local crops and landraces is the quintessential role custodian farmers fulfil, whereas adapting and promoting crop diversity may not be carried out extensively by all custodian farmers. In addition to their differences in adapting and promoting diversity, custodian farmers differ in terms of the crops that they tend. Some focus on a single crop or two (e.g., Rajan 2013), while others are more attracted to maintaining broad collections of different crops (e.g. Sthapit 2013). These differences between custodian farmers must be considered in developing methods and approaches aimed at identifying and supporting these actors.

In considering differences between custodian farmers, it is important to recognize that men and women will often have different roles as custodian farmers. Men and women farmers develop different skills and knowledge as a result of their divergent responsibilities in cultivation, seed selection, experimentation, and marketing of crops, as well as their different networking opportunities for exchanging seeds and information (Howard 2003). In some cases, men and women are responsible for different crop types, such that they become the custodians for the specific crops they tend (e.g., Sperling and Berkowitz 1994; Negash and Niehoff 2004). In other cases, men and women may be the go-to experts for different points in the

cultivation process and value chain of a particular crop. In developing methods to recognize and support custodian farmers we must consider the contributions of both men and women to conservation and use activities. The roles of men and women in on farm conservation in Nepal will be explored during this workshop day two discussions to recognize their contributions and reveal their different needs and opportunities for support.

Shared custodianship

A recent study in the Plurinational State of Bolivia drew attention to the importance of actively considering the roles of both men and women in crop diversity conservation (Gruberg et al. 2013). In this case, a man was recognized as a custodian farmer by the community but close examination revealed that his wife was also integral to the custodianship. In this case, the wife was engaged with cultivation of traditional crops, holding deep knowledge on the plants, and adapting them to local conditions. Meanwhile, her husband was strong in engaging with the community and sharing her seeds and knowledge. His public presence was the key to being recognized as a custodian farmer. Gruberg and colleagues suggested that through their different responsibilities, the man and wife had a shared custodianship of traditional crop diversity. Together they carried out the three critical roles for on farm conservation: the wife was responsible for maintaining and adapting, while the husband was responsible for promoting.

This concept of shared custodianship could be important in developing methods to support and leverage the role of custodian farmers in on farm conservation, particularly as this concept can also extend to the community level. Greater amounts of crop diversity are conserved at the community level than on a single farm through the actions of different farmers maintaining different varieties (Brush et al. 2003; Dyer and Taylor 2008). Farmers also rely on one another for seed exchange, which contributes to persistence of their varieties through meta-population dynamics (Alvarez et al. 2005). As a reflection of the communal nature of conservation, working only with individual “custodian” farmers was observed to cause tensions in a community where many farmers were engaged in the conservation of traditional crops (Gruberg et al. 2013). A more community-oriented approach that leverages the contributions of many farmers would be preferable in such circumstances. There are several community-based methodologies that have been developed to support on farm conservation (e.g. Jarvis et al. 2011, Sthapit et al. 2006). Exploring the complementarities between the custodian farmer approach and these community-level initiatives is very important and will be addressed during this workshop.

Custodian farmers’ network

One means of supporting and consolidating the roles of custodian farmers in on farm conservation would be through establishment of a custodian farmer network that would reflect and bolster shared custodianship at the community level. Such a network could foster connections between farmers to leverage complementarities in maintaining, adapting and promoting crop diversity and facilitate flows of material and knowledge. For example, a farmer who maintains high crop diversity but who is not inclined towards experimentation could be connected with another farmer who is engaged in improving local crop performance, who could benefit from accessing diverse materials for selection or breeding purposes.

In addition to connecting individuals, the custodian farmer network could also connect farmers with community-based institutions that are engaged in the maintenance, adaptation and promotion of crop diversity (e.g. Jarvis et al. 2011; Sthapit et al. 2006). Community seed banks and biodiversity registers are methods that support the maintenance of crop diversity and associated knowledge. Participatory breeding, varietal selection and farmer field schools support the adaptation of crop material and farming practice. Meanwhile, diversity fairs, seed exchange and collective marketing can promote crop diversity, among other methods. The custodian farmers’ network could be valuable in integrating these various contributions and reinforcing the maintenance, adaption, and promotion of crop diversity by communities and their members.

The custodian farmers’ network could also extend to the national and international levels, such that farmers have a direct means of influencing decisions made by genebanks, formal breeders and policy-makers. These formal institutions that maintain, adapt and promote crop diversity could develop synergy with farmer institutions involved in these activities through the forum of the custodian farmer network. This confluence could be integral in strengthening ties between *ex situ* and *in situ* conservation efforts, which is seen as an important action in enhancing plant genetic resource conservation (FAO 2010). Figure 1 summarizes this idealized framework wherein a custodian farmer network acts as a meeting point for actors engaged in maintaining, adapting and promoting crop diversity at community and formal levels.

The custodian farmer network could be a new initiative in the community or could extend from an existing community-based institution, such as a community seed bank. There are currently 115 community seed banks throughout Nepal (Joshi 2013). These institutions could be involved in connecting custodian farmers engaged in seed conservation with those engaged in adaptation and promotion of crop diversity. The potential for establishing a custodian farmer network in Nepal will be discussed during the workshop.

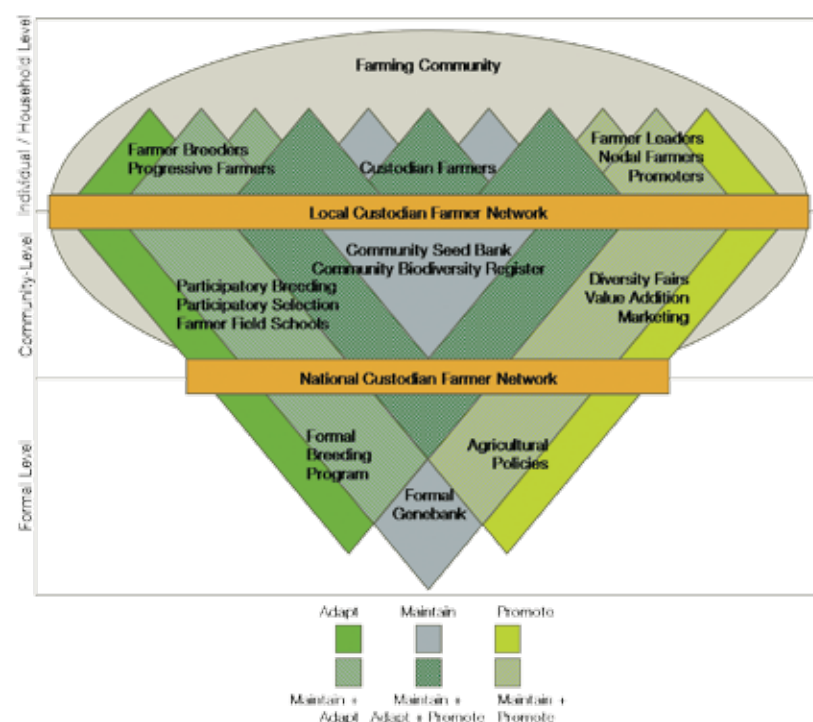


Figure 1. Framework for plant genetic resource conservation based on complementarities between actors who maintain, adapt and promote diversity at individual/household, community, and formal levels.

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The importance of gender in agricultural research

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Abstract

Throughout the world, men and women play distinct roles in agriculture and therefore develop different areas of expertise in managing, shaping, and preserving biodiversity. In addition to contributing nearly half of the labour involved in the production of staple crops (rice, wheat, maize), women in Latin America, Asia and Africa collect up to 80 per cent of wild vegetables, and hold specialized and localized knowledge of wild plants used for fodder and medicine. They additionally grow and preserve underutilized species, which are important for increasing on farm biodiversity and contributing to household food and livelihood security. In fact, in their multiple roles as farmers, plant gatherers, primary health care givers, food processors, preservers of seed, home gardeners, traders, and more, rural women play a key role in managing biodiversity. For instance, many 'female' spaces, such as home gardens, which are generally kept under women's care, are havens of biodiversity where less common species or varieties of cultural, economic, and dietary value are conserved. Over time, women's practices both within home gardens and beyond have favoured the regeneration, domestication, and dispersal of various important species, and enabled the conservation of plant genetic material in fields and in the bush. Yet, women's extensive knowledge of breeding, selection, management, processing, storage and conservation of plant resources is often overlooked. This not only undervalues women's knowledge and contribution to these processes, but also hinders efforts to ensure the sustainable management of agricultural biodiversity, in which both men and women must contribute as allies. Drawing from examples from agriculture and forestry, I highlight the importance of recognizing women's and men's distinct and complementary sets of knowledge and practices to understand and sustainably manage biodiversity.

Background

Research and development projects focusing on agriculture and conservation often fail to include women, as if the management and conservation of agricultural biodiversity were the sole domain of men. Over the years, however, much evidence has demonstrated that any serious effort to conserve agricultural diversity must recognize the farmers who have long managed, adapted, promoted and conserved this diversity; and these custodian farmers include women.

Gendered world

Understanding the role of gender in agricultural research begins with the recognition that we live in a gendered world. Although world views and norms vary over time, regionally, and according to cultural factors, in most farming communities there exists a strongly gendered division of labour. Women and men carry out different tasks in and around the homestead and farm, and have distinct roles and responsibilities with respect to resource management. They may grow different crops or the same crops in different places or they may perform different tasks in a given crop's cultivation. For example, men often clear fields whereas women sow, weed, and so on. Because of their distinct responsibilities, women and men develop separate, shared, and complementary sets of knowledge about the natural world (Rocheleau 1991; Howard 2003a).

Men and women also face gendered constraints and opportunities in agricultural production and consequently develop different interests or priorities for crops. For example, some crops tend to be considered 'men's crops', which men control and sell and from which they manage revenues, whereas others are 'women's crops'. Revenues from sales of these crops allow men and women to fulfil some of their distinctly male or female responsibilities. Hence, it is clear that by focusing only on men's crops, priorities, and knowledge related to agriculture, we are missing half of the story: the half in which women are involved and which tends to be very important to agricultural biodiversity conservation.

Women's multiple and often 'invisible' roles

To bring this half of the story to light, it is worth looking at the many and often 'invisible' roles women play as farmers, seed selectors, food processors, health care givers, and more. In these roles, they have a key stake and responsibility for conserving biodiversity. Yet, because these contributions are not widely recognized, women continue to lack a place at the table in discussions on agriculture and conservation.

- **Women as farmers:** Women farmers are not only responsible for growing nearly half of the world's food in smallholder production systems, but also for growing and preserving underutilized species, which are important for

increasing on farm biodiversity and contributing to household food and livelihood security. Women often cultivate a wider variety of crops than men, but in smaller quantities (making them less visible); and although women farmers also sell agricultural products, their production is often less market-oriented than men's. Nonetheless, it fills extremely important nutritional and cultural purposes (Sasvari et al. 2010).

- **Women as plant gatherers:** In Latin America, Asia and Africa, women and girls collect the major part of wild vegetables, and hold specialized knowledge of wild plants used for fodder and medicine (FAO 1999).
- **Women as health care givers:** Women play an important role in the provision of primary health care. They not only know which plants and non-timber forest products carry medicinal properties, but also know how to process these into useful cures (IDRC 1998).
- **Women as home gardeners:** Home gardens tend to be under the care and maintenance of women. These gardens are key to household food security and health, as well as being conservation sites for special or preferred varieties and testing grounds for new varieties or practices. Described as indigenous experimental stations and genebanks, home gardens contain many semi-domesticated species transplanted from the wild. They are refuges where less common species or varieties that women collect, manage and exchange, are conserved, and sites of agricultural biodiversity conservation, where women's roles as plant breeders and custodian farmers really shine (Jiggins 1986).
- **Women as seed preservers:** Women's contribution to the management and conservation of agricultural biodiversity is also strongly related to their seed management and preservation practices. Worldwide, women are the primary actors involved in smallholder seed selection and storage and in farmer-to-farmer seed distribution networks (Oakley and Momsen, 2007). They exchange adapted seed varieties, as well as wild plants and crops, to strengthen their social networks and enhance local biodiversity (Ertug 2003; Wilson 2003).
- **Women as post-harvest processors:** Women carry out many activities to ensure the proper functioning of the household, such as post-harvest processing of crops and plants to generate edible and culturally acceptable foods. As biological diversity is often lost because it is underutilized rather than over utilized, this process of rendering plants usable and useful creates critical incentives for plant management and conservation. Cooking—which requires the use of specialized knowledge of plants—is thus closely linked to the maintenance of agricultural biodiversity as well as of culture, as culinary traditions and cultural identity are intricately linked (Howard, 2003b).

Because of their multiple responsibilities in post-harvest processing and household food security, women tend to use plants in diverse ways. They frequently favour local crop varieties that serve a range of purposes, including ceremonial and religious functions, nutrition, medicine, provision of fibre, fodder, and so on,

that are adapted to local climatic and agroecological conditions. For example, they may grow traditional varieties of rice for various uses: preparation in many dishes, processing leaves into a relish, using straw and husks for thatching and fertilizer, respectively, and employing both as fuel or fodder. Seed selection reflects these multiple uses as well as the plant's processing, storage, taste or nutritional properties. In contrast, men often show interest in introduced varieties that produce high yields of commercial value, and select plants and crops based on agroecological considerations, such as resistance to drought or pests, as well as yields (Jiggins 1986). Women's ability to make decisions about seed selection is thus critical for the conservation of biologically diverse indigenous crops and rare and unique varieties that may be grown in smaller quantities for household nutrition or other consumption purposes. Selecting crops based on many criteria requires high expertise, which women acquire through inter-generational knowledge transmission as well as years of first-hand experience (Pionetti, 2014).

Conclusion

In conclusion, women's multiple roles in agriculture and agricultural biodiversity conservation illustrate that women make significant contributions to the adaptation, promotion and conservation of agricultural biodiversity. Gendered differences and complementarities within the household make both women's and men's knowledge, roles, priorities and expertise in biodiversity conservation essential to discussions about custodian farmers. The selection, improvement and adaptation of plant varieties are complex, and both women and men farmers play key roles in these processes. Men and women may have similar or contrasting preferences and priorities with respect to plant traits sought during seed selection and resource management processes, and may make decisions together or separately about these.

The notion of custodian households, wherein both women and men contribute knowledge and skills to breeding, promoting, and conserving biodiversity paints a more accurate picture of the processes unfolding in farming households. This must be recognized if we want to draw on the knowledge and skills of the real experts in agriculture and biodiversity conservation—both women and men farmers—and to make sure that both women and men gain from efforts to use and sustainably manage agricultural biodiversity for their household's common good.

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Contribution of individuals, families and communities: breakout discussion

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Custodian farmers are those farmers that make significant contributions to maintaining, adapting and promoting agricultural biodiversity. Their endeavours to conserve agricultural biodiversity can be hindered or helped in various ways by their families and communities. This group exercise and discussion was conducted to better understand how custodian farmers, their families and communities work to manage agricultural biodiversity and the social and cultural challenges they face in the process.

The participants were divided into four groups. One group was composed of women farmers and scientists, two groups were mixed with men and women farmers and scientists and the fourth group was composed of national, international and government scientists and officials.

The first three groups were given the following seven questions:

1. How do you, as custodian farmers, define a variety as rare or endangered?
2. What do custodian farmers do that leads to conservation and wider use of agricultural biodiversity?
3. How does the family provide support and encouragement?
4. How does the family provide discouragement?
5. How does the community provide support or encouragement?
6. How does the community provide discouragement?
7. What makes you persist despite the discouragement?

The fourth group was asked to discuss the role played by the national system in agricultural biodiversity conservation through the following questions:

1. How were the Department of Agriculture and NARC (including the National Genebank) supporting wider use of agricultural biodiversity and its custodians 20 years ago?
2. How are the Department of Agriculture and NARC (including the National Genebank) supporting wider use of agricultural biodiversity and its custodians now?
3. Within the existing policies (no policy change), what can the Department of Agriculture and NARC (including the National Genebank) do to support wider use of agricultural biodiversity and its custodians?

The findings from the discussions are summarized below.

Assessment of rarity

Farmers considered a variety to be rare if it was grown by few households in the community. If many households were abandoning cultivation of the variety and it was getting increasingly difficult to find seeds or information on the variety, then the variety was considered endangered. Since 11 of the 18 farmers in the discussions had worked with LI-BIRD and were familiar with the four cell analysis (Sthapit et al 2012) for diversity assessment, it was not surprising that they defined varieties as rare if they were grown by few households in the community and in small areas by these households.

Farmers discussed specific conditions, varietal traits and uses that could be taken as indicators or predictors of whether a variety was likely to be rare or not. If there is an influx of improved varieties and influx of new agricultural technologies or practices, such as fish farming, poultry, etc. then something is likely to be displaced. Hence influx of new technology can be an indicator that certain varieties are now becoming rare. Low yields, poor taste, lodging (in case of rice), and lack of cultural uses were also identified as traits that can predict the rarity of a variety. The long growing time of traditional varieties was identified as a limitation as it made them difficult to fit into the modern cropping calendar (growing commercial vegetables after rice harvesting) and changing rainfall pattern. These older varieties are knowledge and labour intensive requiring the families to dry and store the seeds as opposed to simply buying the seeds from the market.

The two custodian farmers from Meghalaya, India added that loss of production niches can also be an indication of rarity. For instance, the farmers in Meghalaya have a rich food culture based on diversity of wild vegetables. Some of these vegetables grow naturally under the shade of trees. As trees are being cut, these vegetables are becoming rare.

Contributions of custodian farmers

The groups identified the roles played by custodian farmers in their communities. Custodian farmers act as collectors of diversity who focus on adding different and unique species into their production system to increase its richness. They collect diversity from wherever possible: from neighbours, markets and forests. They can also organize the diversity in the form of diversity blocks or demonstration plots that create greater awareness among the community and attract outsiders looking for specific plants or varieties. They become knowledge centres on plant varieties and cultivation and also act as a source of seeds and saplings for other interested farmers. Their provisioning of seeds and saplings of local agricultural biodiversity and the sharing of knowledge encourages and enables other farmers in the community to grow more local diversity. The farmers from Meghalaya also

added that they contribute by sharing recipes of old crops to revive the traditions of their food culture among young community members.

Contributions of the family

The workshop was conceived to recognize the contributions of custodian farmers. During LI-BIRDs interactions with the farmers and their families in field visits and meetings, it became apparent that the role played by the family in supporting conservation of crop diversity is significant. It is a lot of work to grow a large number of varieties and to maintain their seeds. Hence, a lot of support is needed from the family members.

Spouses, siblings and children provide help to the custodian farmers in regular farm work by assisting in irrigating, manuring, weeding, and watering. Another important source of assistance is that the family understands and supports what the custodian farmer is trying to do. They help keep the varieties separated through careful handling and processing of grains and seed. The spouse and children collect new species to add to the family collection when they are travelling.

The mixed groups, as well as the women's group, recognized the role the wife plays in taking care of the children and the household needs (e.g., cooking), which frees the husband to focus on conservation and cultivation of crop diversity. The women's group also recognized the role the husband plays in being supportive of his wife's interest in diversity. In a patriarchal society, the degree of movement and education accessible to women can be less than for men. In this context, the participants recognized the important role that a patient and supportive husband has in supporting a woman farmer collecting and developing greater knowledge of agricultural biodiversity.

Family members are not always supportive of the custodian farmer's endeavours. They often do not understand why one should bother with many varieties and increase the burden of management. They often only consider yields as important and disagree with the custodian farmer who also tries to keep varieties that are neglected and take a longer time to grow. The family can be more interested in simplifying the production system, rather than diversifying, in order to cut down on the amount of work. Sometimes children can pull out the new saplings that are planted.

There was a gender dimension to the discouragement from the family members. The women were especially conscious of the role of their father or mother-in-law in discouraging their interest in diversity. The father-in-law, being the eldest male, can have a big say in the household. The men farmers expressed that sometimes the children do not respect the authority of their mothers when they are away, creating additional burdens on their wife for managing the diversity.

Roles of the community

Rural communities in Nepal generally appreciate productive use of land as opposed to leaving it fallow. Since custodians exploit all the niches in their land to maintain diversity, sympathetic members of the community commend and encourage these efforts. The community also help by showing genuine interest in the diversity custodian farmers maintain and by giving respect to the work they do. Community members ask questions to custodian farmers about their crops. The process of explaining helps custodian farmers to improve their own knowledge, while also providing them motivation to carry on. In a setting where knowledge is seldom written down, regular interactions between knowledge providers and knowledge seekers plays an important role in transmission of traditional knowledge. The community also invites custodian farmers to social events, recognizing their work in conservation of agricultural biodiversity. This provides the custodian farmers respect, dignity and motivation to add more diversity.

Discouragement comes from community members who either do not understand or do not agree with the value of conservation. Our experiences suggest that there might also be an element of jealousy among other farmers as custodian farmers get more recognition and support from outsiders. They can ridicule custodian farmers for wasting time by dedicating land and time to diversity of plants and “wild things” instead of growing more grains to feed the family. When a custodian farmer introduces a new type of fruit, some community members and neighbours take the fruits without asking. Neighbours can also complain about custodian farmers' trees shading their land.

Discouragement from community members is also pronounced for the women custodian farmers. Perceptions that women should be limited to household work can be commonly held by community members. Women are discouraged from travelling and participating in events outside their villages, which limits their access to information, knowledge and genetic resources. Neighbours, relatives and community members can gossip about their character and propensity for affairs while travelling and spending more time outside the household. Since one of the major activities of custodian farmers is collecting and testing different varieties from within and outside the village, such social restriction on women's movement can limit their recognition as custodian farmers. Usually, there is the presence of women in all community groups and meetings, however, meaningful participation in the meetings and decision-making is still limited.

What drives custodian farmers to persist

Despite high knowledge and labour requirements and the occasional discouragement or ridicule from family, neighbours and community members, custodian farmers still continue to collect, conserve and promote agricultural biodiversity. Their drive to persist is supported by a mix of ethical, aesthetic,

cultural and practical motivations. As farmers, they recognize that they and future generations will continue to rely on genetic diversity. Hence, they persist to safeguard genetic resources and associated knowledge for future generations. They see it as their role to keep diversity around so that more people are exposed to it, are informed about it, and are inspired to start incorporating greater diversity in their farms. These farmers also value greater self-dependence for themselves and their communities, which involves maintaining genetic resources for a variety of uses, including nutritious food and medicine. They also see that the genetic resources they safeguard will ultimately be a valuable resource for the country at large. They have invested a lot of effort in acquiring and maintaining diversity, hence it is not easy for them to let it go. They hope that their children and future generations will recognize them for this work.

From an aesthetic and cultural perspective, they consider diversity as a basis for personal and community pride. It is a matter of recognition and identity for themselves and their village. Culturally, they want to continue their religious rituals, which require certain crops and varieties. From a practical perspective, greater agricultural biodiversity on farm, contributes to risk minimization and access to nutritious food and herbal medicine for their families. The support and encouragement from self-help groups and NGOs was also recognized for its role in helping custodian farmers continue with their roles.

Changes and opportunities in the national system

The fourth group tracked the change in support for agricultural biodiversity conservation over the past two decades and identified opportunities within the existing policy framework to increase support for custodian farmers and conservation of agricultural biodiversity. Major change in the stance of NARC and the Department of Agriculture towards the use of agricultural biodiversity were identified, with the trend indicating increasing support to encouraging greater use of agricultural biodiversity and on farm conservation (Table 2).

Table 2. Support for agricultural biodiversity and custodian farmers from the national system.

20 years ago	Now
• Influenced by the Green Revolution, the national system's focus was on developing and promoting high yielding varieties of major cereals, chemical fertilizers and pesticides • Although, farmers' fields had diversified crops, the national system's work did not take advantage of the existing diversity • Farmer's field were leased for testing varieties and working closely with farmers contributed to incorporation of farmers' input in variety development and the dissemination process • In addition to introduction of modern varieties, selection work was also done on promising local vegetable varieties • Germplasm of several neglected and underutilized species, such as grain amaranth, buckwheat, and millets, were collected by the Plant Genetic Resources Unit of NARC • There was no concept of custodian farmers at the time.	• A National Agrobiodiversity Policy is in place • A National Agrobiodiversity Committee has been formed at the ministry level, with representation of farmers • The National Seed Vision recognizes the importance of local seeds • The National Genebank has been established (2010) and is involved in collecting local genetic resources in coordination with the Department of Agriculture and the District Agriculture Development Offices • There is increasing support for community based initiatives • There is a government programme on establishing and supporting community seed banks through the National Genebank • The government is supportive of NGO's role in agricultural biodiversity conservation and use and is actively collaborating • Research work concerning on farm conservation of agricultural biodiversity is not robust and work is also ongoing on genetic resources policy • The Seed Act promotes registration of farmers' varieties giving custodian farmers and their institutions a new opportunity to get recognition for their unique varieties as well as contributing to the national inventory of varieties • The Access and Benefit Sharing (ABS) Act is in the process of ratification, which can lead to development of various mechanisms to recognize contribution of farmers in conservation of agricultural biodiversity. Since custodian farmers have an important role in conservation, they have opportunities to gain from the ABS law.

Opportunities

The group also identified existing opportunities for government actors, civil society organizations, community groups and custodian farmers to strengthen support for work related to agricultural biodiversity conservation. The opportunities identified are as follows:

- Custodian farmers could assist the National Genebank through germplasm collection for the national *ex situ* system
- Genetic resources collected by farmers and community seed banks could be duplicated in the National Genebank
- In reciprocity, custodian farmers could access materials from the National Genebank with technical and small financial support if they wanted to conserve and multiply the materials
- The National Genebank could demonstrate its materials in biodiversity fairs.
- Custodian farmers could be involved in a farmer to farmer network/extension system
- Custodian farmers could be recognized and rewarded for their efforts.
- The capacity of custodian farmers could be enhanced through capacity building and support from the Department of Agriculture/District Agriculture Development Offices and NARC/National Genebank
- The National Genebank (with the Department of Agriculture, NARC/National Genebank, and NGOs) could play the role of coordination of the custodian farmer network, awards, and training
- Programmes to support custodian farmers could be supported through the Village Development Committee fund (15%) and Nepal Agricultural Research and Development Fund
- Market promotion of local crop products and/or niche products
- Registration of custodian farmer varieties (facilitated by the Seed Act) can enable recognition for their work and contribute to the national inventory of varieties
- Opportunities can be explored to recognize custodian farmers through the ABS Act.



Case Studies of Custodian Farmers, Seed Systems and On Farm Conservation



Case Studies of Custodian Farmers, Seed Systems and On Farm Conservation

Custodian farmers of nutri-millets in Kolli Hills: approaches to enhance their contribution

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Introduction

Agrarian communities in hill regions of India have evolved a variety of cropping practices such as mixed cropping and crop rotation that are suited to their local agro-climatological conditions, soil types and the rainfall pattern within the landscape. Malayali tribes of Kolli Hills live in the Eastern Ghats of India at 1300 masl. They live in homogenous communities (98% from the Malayali Tribe) in 305 settlements in 14 Panchayats. The total population is 36,525 (18,511 male and 18,014 female).

During the process of settlement, the Malayali settlers cleared natural forests and utilized the land for cultivation of food crops such as little millet (*Panicum sumatrense*), foxtail millet, kodo millet (*Paspalum scrobiculatum*) and proso millet. In this region, there are currently 42 species of cultivated crops, including both food and cash crops. Tribal farmers of Kolli Hills cultivate diverse landraces of millets under different agro-climatological conditions. It is a hotspot of millet diversity, including 21 landraces and 5 species. The composition of species grown differs between zones as shown in Table 1.

Table 1. Millet species and landraces grown in different zones in Kolli Hills.

Zone	Finger Millet	Little Millet	Kodo Millet	Foxtail Millet	Proso Millet *
Devanur	Sattakelyaragu	Vellaperumsamai	Thirivaragu	NA	NA
Alathur	NA	Karumsamai	NA	Mookkantinai	NA
Thiruppuli	Sundangikelvagagu	Sadansamai Thirigulasamai	NA	Koranthinai	NA
Gunadi	NA	Vellaperumsamai Kattavettisamai	NA	Senthinai	Panivaragu
Selur	Perungelvaragu	Malliasamai	NA	Perunthinai Palanthinai	NA
Total Var	7	7	1	5	1

* Also known as common millet

Millet crops are highly nutritious and linked with local cultural history and customs. They are also very hardy crops, capable of growing under marginal conditions, which makes them integral to the food security of poor farmers in this area. Despite their value to food and nutritional security, the area devoted

to millet crops has been in steady decline in Kolli Hills, partly as a result of land conversion to estates devoted to silver oak, coffee, pepper and cardamom (Figure 1). However, there are farm families who continue to cultivate millet varieties and consume them at home due to their agronomic, culinary and adaptation values. These farmers are considered by the villagers as custodian farmers.

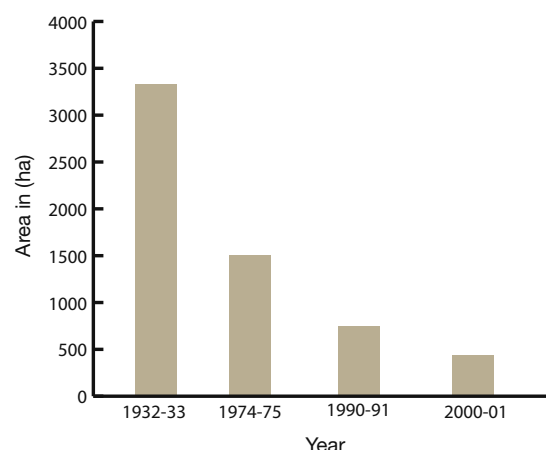


Figure 1. Area under millet cultivation from 1932 to 2001.

A great effort has been undertaken by the M.S. Swaminathan Research Foundation and Bioversity International in Kolli Hills over the last 10 years through the IFAD-NUS project to reverse this declining trend and ensure the conservation of these millets and recognition of the contribution of custodian farm families¹⁰. This project has taken a holistic approach to promoting on farm conservation of neglected and underutilized species through multiple interventions along the value chain – seeking to enhance their cultivation and use through addressing bottlenecks in their availability, cultivation, post-harvest, value addition, and marketing. The approach has involved empowering custodian farm families using a 4C approach to millet conservation and sustainable use:

- **Conservation:** Community mobilization, millet heritage documentation, revival of seed management systems
- **Cultivation:** Improved agronomic practices, introduction of drudgery-reduction technology
- **Consumption:** Processing and value addition, reduction of drudgery (pulveriser), rural infrastructure creation
- **Commerce:** Market linkage and supply chain management, popularization of millets

Through participatory and science-based research the project aims to ensure resilience, enhance capacity and build from grassroots.

Identification of custodian farmers

One aspect of the project was the identification of custodian farmers in the communities. This was done through a participatory process, where local farmers established criteria among themselves, which would be the characteristics of custodian farmers. The criteria established were as follows:

- Continuity in cultivation of millets for the last five years
- Maintaining diversity on farm
- Continuing to cultivate, use and enhance materials
- Having a willingness to share knowledge and materials
- Maintaining locally threatened varieties.

A total of 35 custodian farmers were identified, including 11 women (Table 2) in IFAD-NUS project sites in Kolli Hills during 2012-13. Special efforts were made to identify the role of women in maintaining local cultivars of millets of different species on farm, seed management and active participation in the promotion of millet use. The IFAD-NUS project encouraged active participation of custodian farmers in the 4C activities to recognize and strengthen their contribution to conservation.

Besides identification of the custodian farmers, a documentation system for custodian farmers was developed to facilitate information sharing. Documenting the profiles of custodian farmers can shed light on the characteristics of farmers who are playing an important role in the conservation of crop diversity and act as an acknowledgement of the value of their efforts. This can contribute to raise their self-esteem and encourage continued engagement in conservation. An example of such a profile is provided below.

CUSTODIAN FARMER PROFILE

Village Name: Thiruppulioorpuram

Farmer Name: Ms. Chinnakkal, Age: 55

No. of Family Member: 4

Occupation: (a) Primary: farmer (b) Secondary: labour

Type of cultivation: mixed crop, mono crop

Method of sowing: Line sowing and broadcasting

Type of millet crop: finger millet and little millet

Variety of millet crops and traits: perunkelvaragu, sataikelvaragu, surataikelvaragu, sundangikelvaragu, thirikulasami, maliyasamai, katavetisamai

Type of storage system: Mann pannai

Recipes prepared and consumed: kaali, roti, soru

Need: Improved seed supply for little millet and Foxtail millet, little millet processing mill

¹⁰ Visit the neglected and underutilized species community webpage for more information on the IFAD-NUS project www.nuscommunity.org

Table 2. Custodian farmers identified in IFAD NUS project sites in Kolli Hills, India.

Village	Women Custodian Farmers	Age	Men Custodian Farmers	Age
Thirupuli Oorpuram	Ms. Valamathi <i>wife of Selvam</i>	37	Mr. Murugesan <i>son of Karumagounder</i>	36
	Ms. Cinnakkal <i>wife of Cinnapaiyan</i>	55	Mr. Manikkal <i>son of Velliyagounder</i>	50
			Mr. Karuman <i>son of Periyar</i>	50
Puliampatti	Ms. Rajammal <i>wife of Arapuli</i>	36	Mr. Thivuli <i>son of Periyar</i>	60
	Ms. Maniammal <i>wife of Chellamuthu</i>	48	Mr. Ayyasamy <i>son of Pidaran</i>	36
			Mr. Ganesan <i>son of Kulandaiyan</i>	39
Padasolai	Ms. Malliga <i>wife of Seerangan</i>	33	Mr. Cinnapaiyan <i>son of Ayyakutti</i>	33
	Ms. Ponnammal <i>wife of Cinnakulandai</i>	46	Mr. Nedesan <i>son of Kulandaiya Gounder</i>	47
			Mr. Rengasamy <i>son of Kuppusamy</i>	52
Thuvarepallam	Ms. Latha <i>wife of Chandrakumar</i>	36	Mr. Annadurai <i>son of Nathan</i>	42
			Mr. Cinnasamy <i>son of Lakshmanan</i>	43
			Mr. Ayyasamy <i>son of Chellam</i>	49
			Mr. Subramani <i>son of Raju</i>	36
			Mr. Selvakumar <i>son of Arapuli</i>	35
Sembothuvalavu	Ms. Rajammal <i>wife of Ayyasamy</i>	55	Mr. Cinnasamy <i>son of Ponnusamy</i>	45
	Ms. Thangammal <i>wife of Seenivasan</i>	48	Mr. Cinnasamy <i>son of Sevi</i>	37
	Ms. Pakkiam <i>wife of Kuppusamy</i>	49	Mr. Shanmugam <i>son of Kulandaiyan</i>	43
	Ms. Muthammal <i>wife of Muthusamy</i>	52		
Valukulipatty			Mr. Thangaiyan <i>son of Nachi</i>	34
			Mr. Raju <i>son of Cinnapaiyan</i>	45
			Mr. Shivaji <i>son of Kulandaiyan</i>	44
			Mr. Thangaiyan <i>son of Kuppan</i>	48
			Mr. Ayyasamy <i>son of Kulandaiyan</i>	50
			Mr. Murugesan <i>son of Chellamuthu</i>	37
			Mr. Selvam <i>son of Ponnusamy</i>	43

One of the women custodian farmers from the project, Ms. Kodukka Malliga Seerangan attended the international custodian farmers' meeting in New Delhi in February 2013, which represented a great opportunity to raise awareness of the important role that custodian farmers play in the conservation of agricultural biodiversity and an opportunity to share her knowledge and insights on conservation with policy makers, scientists and other custodian farmers. Her profile has been featured in the proceedings of the meeting (Sthapit et al. 2013).

Approaches to enhance custodian farmers' role in conservation

Approaches to enhance the contribution of custodian farmers to the conservation of crop diversity assessed during the project are as follows:

- Assessing and documenting their knowledge
- Enhancing their skills in use enhancement of agricultural biodiversity and participatory varietal selection through training courses
- Encouraging their participation in People's Biodiversity Registers
- Providing training in threat assessment, and varietal registration
- Enabling their active participation in quality seed production, cultivation, value addition, consumption and marketing
- Promoting their participation in a network of custodian farmers to access State support for rural infrastructure: threshing yard, storage houses, post-harvest machineries, mills, drought animals and crop insurance
- Documenting and evaluating climate adaptive farming practices in mixed farming of millets at the farm level
- Validating traditional knowledge on landraces for climate resilience and nutrient traits of endangered varieties/landraces
- Refining and field testing new prototypes for little and foxtail millets and developing a new prototype for kodo, proso and barnyard millets (*Echinochloa frumentacea*)
- Assessing the supply chain for farmers/smallholders of neglected and underutilized species
- Designing suitable incentive systems for conservation of locally threatened species (identifying cash/in-kind incentives for recognizing custodian farm families for their contribution to on farm management of crop diversity).

Related links

A latest article appeared in New Agriculturist
<http://www.new-ag.info/en/focus/focusItem.php?a=3144>

A latest video of IFAD webcasted
<http://www.youtube.com/watch?v=4HOniSZc10>

Diversity of actions in Spain to reclaim the right to sell our own seeds

Red de Semillas "Resembrado e Intercambiando"

Abstract

The loss of genetic resources in farmers' fields and the recovery of traditional local varieties, as well as farmers' varieties, were the reasons for creating the Spanish Seed Network. This organisation of a technical, social and political nature aims to bring together various local projects in Spain and to provide instruments for carrying out activities regarding the conservation and use of agricultural biodiversity from a point of view that includes food sovereignty, family farming systems and agroecology. The organization helps in coordinating activities amongst the different members and promotes their participation in national and international projects. This national network started working 14 years ago and today is formed by more than 25 local networks working in different regions of Spain. In these local networks there are peasants and farmers' organisations, technicians, agricultural experts, supporters of responsible consumption and fair trade, local action groups, university staff and students, ecologist movements, researchers and all kinds of different collectives. The scope of the organisation is local, national and international. The local work of the Spanish Seed Network is set up by its members. These local networks work on the dynamic conservation, use and promotion of local diversity. At the national level we carry out lobbying work and legal amendments, aiming to unravel the complex legislation on seeds and ascertain its effects on peasants. We also provide information to the local networks and other groups, building a national coordination. The association works very hard also in the construction of an international movement, so we participate as an active member of the European Coordination Let's Liberate Diversity! and we collaborate with several international platforms and Seed Networks from Latin American countries.

Seed network “Resowing and exchanging”

The loss of genetic resources in the agrifood system and the recovery of local varieties in family farming systems were the reasons for creating the Spanish Seed Network¹¹ 14 years ago. This organisation of a technical, social and political nature, is a national network that brings together more than 25 local seed networks that exist in Spain and provides instruments for carrying out activities regarding the conservation and use of agricultural biodiversity from the food sovereignty point of view, helping to coordinate activities amongst the different members and promoting their participation in the national and international level. The main assets of this network are the people and the organisations that belong to it. They include farmers, researchers, consumers, technicians, local action groups, university staff, students, ecologist movements and all kinds of different collectives.

Campaign “Cultivate diversity. Sow your rights”

In 2009 the Spanish Seed Network launched the Campaign “Cultivate Diversity. Sow Your Rights”¹² focused on promoting agroecological and family farming, the use of traditional varieties, the recovery of peasant’s knowledge and local culture, the fight against patents and GMO in agriculture, the requirement of a legal framework that allows peasants to produce and sell their own seeds and demand support from public administrations for the work that peasants and seed networks are doing regarding the dynamic conservation and use of agricultural biodiversity.

The Spanish government, on the one hand, recognizes in the law farmers’ rights to preserve, use and trade their own seeds, the need to protect, preserve and develop the traditional knowledge regarding plant genetic resources for food and agriculture, and the right to participate in decision-making at the national level on policies related to the conservation and sustainable use of these genetic resources. However, on the other hand, it does not start any strategy to implement these rights, as reflected in the Report on the State of Spanish Plant Genetic Resources for Food and Agriculture¹³. This situation highlights the lack of political will that the Spanish government has on this issue.

Traditional varieties provide organoleptic quality, not just visual. They fill our food with flavours and aromas and are an inseparable part of our intangible cultural heritage (Mediterranean diet). Traditional varieties contribute to food security because their inherent diversity allows an agroecological management of our farms, facilitate the cultivation of polycultures and are more stable in adverse

situations. Traditional varieties symbolize ethical values, being the expression of food sovereignty and collective values without intellectual property rights and patents (except those stolen with biopiracy).

The demands

From the Campaign “Cultivate diversity. Sow your rights” the Spanish Government is urged to implement policies to give to the farmers the rights to save, use and trade traditional varieties. These agricultural genetic resources must be part of their livelihoods.

We want a change in the legal framework and the national policies that we consider unfair.

The marketing of seeds by farmers themselves is promoted as a public, non-violent, political and conscious action against the law, committed with the intention to cause a change in the legislation and the governmental action. Acting thus appeals to the sense of justice of the majority of the community and declares, in the opinion of Red de Semillas “Resembrado e Intercambiando” that by forbidding farmers to sell their seeds, the principles of social cooperation between people and their full rights to food are not being respected. Traditional varieties are an essential resource for healthy food, respecting the environment through the correct use of natural resources, enhancing rural culture, ethical values and quality of life.

¹¹ www.redsemillas.info

¹² www.siembratusderechos.info

¹³ <http://www.fao.org/docrep/013/i1500e/Spain.pdf>

Native Seeds/SEARCH: promoting crop diversity for resilient drylands agriculture in the USA and Mexico

Chris Schmidt
Native Seeds/SEARCH

Abstract

The southwestern United States and northwestern Mexico (the “Greater Southwest”) form a region with immense natural beauty, biological and cultural richness, and a 4000 year history of continuous agriculture. Indigenous farmers overcame the serious challenges posed by the region’s arid conditions by developing elegant farming methods and remarkable desert-adapted crop varieties. Today, the Greater Southwest is facing a future of intense water shortages, degraded farmland, overpopulation, and rapid climate change. The region’s diverse indigenous crops hold an important key to developing a productive agricultural system in the region that is resilient to these challenges. In recognition of this fact, and in response to the accelerating loss of this diversity, an NGO called Native Seeds/SEARCH (NS/S) was founded 30 years ago in Tucson, Arizona (USA), to conserve, document and promote the Southwest’s indigenous crop varieties (which incidentally have increasing value globally due to climate change). Through a combination of *ex situ* (seed bank) and *in situ* (on farm) conservation activities, including distribution of seeds back to indigenous and other farmers, NS/S works to strengthen the region’s food security, food sovereignty and cultural resilience. Through its educational programme, NS/S also works to spread the knowledge and skills required for seed saving, plant breeding and the establishment of community seed banks. A new initiative under development by NS/S called ADAPTS (Adaptive Drylands Agriculture Portal for The Southwest) aims to provide tools to acquire and share crop-specific information from the region’s farmers to facilitate climate change adaptation.

Background

Native Seeds/SEARCH¹⁴, an NGO based in Tucson, Arizona (USA), has worked for 30 years to strengthen food systems and cultural sovereignty in the arid southwestern United States and northwestern Mexico (“the Greater Southwest”). This region has among the greatest food security challenges in North America, experiencing rapid population growth, water insecurity, farmland degradation, and substantial climatic change. Native Seeds/SEARCH (NS/S) was founded in 1983 upon recognition that the Southwest’s rich legacy of indigenous desert-adapted crop diversity and associated knowledge was key to regional food security and cultural identity, yet was threatened by accelerating erosion. Today, NS/S combines *ex situ* and *in situ* conservation activities and public education in its efforts to strengthen community-level sovereignty and improve the resilience and adaptability of the region’s food systems.

Seed bank

The NS/S seed bank and 24 hectare conservation farm are central to NS/S’s *ex situ* programme. Seeds stored in the NS/S seed bank are periodically regenerated at the conservation farm using standard techniques to maintain genetic diversity and purity. The NS/S farm also plays a central role in the organization’s research and education efforts and in its production of seed stock for distribution. The seed bank’s collection itself houses 1900 accessions of local crop varieties and crop wild relatives, representing the legacies of over 50 indigenous peoples from the region as well as recent settlers. These crops are relatively tolerant of drought, heat, and poor soils and feature unique adaptations to the region’s arid environments. Such traits have increasing global relevance as climate change and desertification intensify.

Community outreach for *in situ* conservation

NS/S actively distributes seeds from the collection to farmers, gardeners and researchers, recognizing that crop diversity must be utilized if it is to have any value. Currently, over 50,000 seed samples are distributed annually. The distribution of landrace material from the collection is supplemented by heirloom crops that are not traditional to the region but are frequently sought after. This strategy helps fund NS/S’s conservation work while increasing the diversity of locally-available seeds, and also provides enhanced opportunities for public outreach. Seeds are distributed via a retail store, online store, print catalogue and wholesale outlets. An essential NS/S activity is the Native American Free Seed Programme, by which seeds are returned to Native individuals in the region to support the *in situ* maintenance of indigenous agriculture and to share the

benefits of the broader use of the region’s crop diversity. Through its Community Seed Grant programme, NS/S also provides seeds to educational and community development projects in the Southwest and beyond.

The processes that promote continuous crop diversification and adaptation are key to the resilience and sustainability of an agricultural system, and NS/S recognizes that public education is essential to the successful implementation of *in situ* strategies that promote those processes. Through its flagship educational programme, Seed School, NS/S strengthens individual and community capacity for building resilient seed systems through knowledge of seed-saving techniques, seed biology, basic plant breeding, and related topics. Basic information on the characteristics, performance and adaptability of individual crop varieties or species in particular environments is another key aspect of collective knowledge which NS/S is working to strengthen. The organization’s ADAPTS (Adaptive Drylands Agriculture Portal for The Southwest) platform, which is in early development at the time of this writing, is designed to facilitate the public sharing and crowd-sourcing of such information to connect the region’s growers with the most relevant crop diversity for their particular needs.

Achievements and future prospects

The diversity of NS/S’s activities are further suggested by additional past and current initiatives. For example, the organization has played a key role in the recent revival of a local wheat landrace and the establishment of a local grain movement in Arizona. NS/S established the first “seed library” (a small community seed bank providing free exchange of seeds) in Arizona and helped get others started in the region. The Desert Foods for Diabetes project educated Native American communities about the benefits of native desert foods for people suffering from diabetes or obesity. NS/S helped establish a reserve in Arizona for the *in situ* conservation of an important population of wild chillies (*Capsicum annuum*). The organization also founded the Traditional Native American Farmers Association, which networks and supports native farmers in the USA and works toward resilient indigenous communities. Finally, the Cultural Memory Bank project aimed to document and strengthen local knowledge of traditional crops, farming practices and ceremonies.

The pioneering work of NS/S has produced a regional model that has provided inspiration for efforts elsewhere and has brought the importance of crop diversity to increased public attention in the Southwest and beyond. Looking to the future, NS/S identifies that true seed security requires a decentralized, community-driven approach to regional seed production, distribution and education, with solid strategies for backup and exchange of seeds and knowledge. The organization is now envisioning a network of community seed banks in the region, with a strong community of custodian farmers forming a solid foundation, NS/S providing integration and support, and a diverse assemblage of citizen scientists trying out varieties and documenting crop adaptation.

¹⁴ <http://www.nativeseeds.org/>

A citizen science approach to crop adaptation under climate change

Jacob van Etten
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Abstract

Bioversity International and partner organizations have been experimenting with a citizen science or crowd sourcing approach to evaluate modern and traditional varieties in a number of countries. In this approach, farmers individually evaluate combinations of 3-4 varieties from a broader set of varieties. Their observations are then jointly analysed, together with data about local weather conditions collected by field-level data loggers. Results are shared back with farmers and discussed in groups. The approach is a promising extension of participatory variety selection that enables inclusion of more farmers and greater power to account for environmental variation.

Background

To adapt agricultural systems to current climate variability and future changes in climate, it is necessary to investigate which crop varieties perform best under local conditions. For this end, several methods exist, including various approaches to participatory variety selection with different levels of farmer and researcher involvement (Witcombe et al. 1996). In some approaches for participatory variety selection, farmers score crop varieties grown on a common plot, while in other approaches seeds are distributed to many farmers to grow and evaluate on their own land. These ways of working have benefits and limitations. Trials in farmers' fields have the advantage of mass evaluation and greater potential to spread seeds of adapted varieties. However, a challenge of this approach is collecting the evaluations with limited resources and matching the results with climate data for the particular micro-environment of the farmers' fields.

A novel approach

Bioversity International has developed a novel approach to participatory variety selection: crowd sourcing crop improvement (CCI)¹⁵. CCI involves the distribution

¹⁵ Visit the Bioversity International webpage for more information on crowdsourcing crop improvement and the Seeds for Needs project <http://www.bioversityinternational.org/research-portfolio/adaptation-to-climate-change/seeds-for-needs/>

of a large number of varieties to a large number of farmers. Each farmer gets a different combination of three varieties in a seed package. Farmers plant and observe the crop. They rank the three varieties for different characteristics and communicate this back, using mobile telephones where possible. Researchers then combine the resulting ranking data, discover patterns in the data using recently developed analysis methods, and send back the aggregated results to the farmers in the form of variety recommendations. They will also analyse the data to see which varieties adapt where and adjust plant breeding plans based on this information.

CCI is fairly easy to implement. No specialized skills are needed. Also, it is cheaper to reach households with mobile telephones than with field crews. This makes it possible to reach many farmers with this approach.

The other advantage of CCI is that it takes place in many locations. This makes it possible to better take into account environmental differences. Cheap and robust environmental sensors are now available to measure weather conditions in each environment. With this additional information, it is possible to compare different locations and to predict the performance of varieties beyond the test locations.

Future prospects

Bioversity International is now testing and refining this new way of working in different countries. When the approach is ready, we will train a large number of organizations in using CCI.

Further reading

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The economics of agricultural biodiversity conservation and use: exploring the potential for economic valuation methods, decision-support tools and incentive mechanisms to support the conservation of agricultural biodiversity in the Nepali context

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Abstract

This paper provides an overview of concepts, decision-support tools and incentive mechanisms related to the broad field of the economics of agricultural biodiversity conservation and use, as well as project experiences in Asia and Latin America. With a view to exploring the potential for implementing a payment for ecosystem services approach to the on farm conservation of agricultural biodiversity in Nepal. This overview is meant to initiate a dialogue regarding the need for and potential role of such tools and mechanisms in the Nepali context. This dialogue also considers the accompanying capacity building activities required to assist farmer communities, conservation managers, national policy-makers and researchers in using agricultural biodiversity conservation economics research tools and mechanisms to inform real-life conservation strategy design and implementation.

Background

Agricultural biodiversity is the basis of human survival and well-being. However, despite providing a key input into the agricultural development process and forming a cornerstone of global food security, agricultural biodiversity at the ecosystem, species and genetic levels continues to be lost at an accelerating pace from many production systems throughout the world. Causes of such loss include indiscriminate replacement, changes in production systems, changes in consumer preferences, market development and globalization, misguided government interventions (including subsidies), disease epidemics, natural disasters and civil strife (FAO 1997; FAO 2007).

Such loss has far reaching consequences, especially for poor indigenous farming communities. These communities often play a key role in the conservation of species, varieties or breeds with unique adaptive traits (e.g. disease resistance, drought tolerance) bred over thousands of years of domestication across a wide range of environments. Genetic resource diversity contributes in many ways to human survival and well-being, with differing characteristics and hence outputs being tailored to suit a variety of local community needs (Anderson 2003). Such species, varieties or livestock breeds are likely to play a key role in future agricultural research and development, particularly in the context of climate change, the globalization of disease epidemics and biotechnology developments. Such diversity loss, which includes resources with high productivity (and market potential) in the type of marginal environments farmed by the poor, threatens to deprive local communities of important assets for strengthening food security, incomes and resilience in the face of climate change.

Over recent years, *in situ* conservation methods have increasingly begun to be recognized as complementary to *ex situ* approaches, with the former also being mandated by the Convention on Biological Diversity (CBD). Such recognition generates opportunities for smallholders as a collective to identify, develop and be rewarded for the maintenance of an asset of strategic value to broader society. This is because, while individual poor smallholder farmers (women and men) play a key role in maintaining specific plant and animal genetic resources, it is in fact the overall portfolio of diversity maintained across all farms in a community that constitutes a strategic asset of local, national and global importance. Through a process of prioritization and targeting, such assets can be identified, secured and developed. The securing of such a strategic asset would be expected to contribute to the national and global public good (provision of ecosystem services and future option values), as well as constituting an instrument for development leading to the strengthening of poor smallholder food security, nutrition and incomes.

A key constraint to implementing such conservation strategies is that while the benefits of agricultural biodiversity are increasingly recognized, the existence of pervasive externalities (i.e., positive or negative impacts not reflected in market prices) means that their value is often not fully accounted for by individuals or society. This is because many components of agricultural biodiversity provide a mixture of private and public benefits, with markets capturing only a part of their total economic value and thus underestimating their true worth. This results in a distortion where any trade-offs that must be made between growth and biodiversity conservation tend to favour the former, regardless of the increasing scarcity of the latter (Pearce and Moran 1994; FAO 2007).

Components of a strategy for agricultural biodiversity conservation and sustainable use

An overall *in situ* intervention strategy for an environmentally effective, cost-efficient and equitable agricultural biodiversity conservation and sustainable use programme could be expected to address the following:

- 1) Where interventions should take place (**targeting** interventions to areas of high agricultural biodiversity and high poverty in order to maximize impact)?
- 2) What should be conserved (**prioritization** of particular plant and animal genetic resources such that the most diversity can be conserved for any given budget)?
- 3) How much should be conserved (establishing of plant and animal genetic resources **monitoring** systems, baselines and **conservation goals**)?
- 4) Which farmers or communities should be involved in conservation activities (**identifying least-cost** providers so that limited conservation budgets can achieve maximum impact)?
- 5) How to **sustainably finance** such interventions (identifying combinations of market, public and private sources of finance)?

1) Targeting for impact: agricultural biodiversity hotspots & poverty mapping

Given the contribution of agricultural biodiversity to the livelihoods of the poor and the potential to use agricultural biodiversity as an instrument for development, the identification of the overlap in the extent and distribution of plant and animal genetic resources diversity of national/global importance and high rates of poverty permits the targeting of specific locations where pro-poor agricultural biodiversity conservation and use interventions can potentially have the greatest impact.

Action required: Undertake a mapping of the overlap in the extent and distribution of plant and animal genetic resources diversity and high rates of poverty as a means of targeting as well as to gain an improved understanding of the dynamic processes of genetic resources evolution managed by farmers, together with the processes that maintain genetic diversity on farm and their interaction with the drivers of poverty.

2) Genetic resource prioritisation for diversity-maximising cost-effective interventions: decision-support tools to target, prioritise and value the diversity maintained by the poor.

Having identified the key agricultural biodiversity and poverty hotspots to target, it will still be apparent that not everything can be conserved. Many plant and animal genetic resources are threatened and, given limited funding, we cannot conserve everything. In order to decide what to conserve, we need to develop a process by which it is possible to decide which species to take on board Noah's Ark. Weitzman-type decision-support tools (Weitzman 1998; Bioversity International 2011b; Samuel et al. 2013) permit the identification of a priority conservation portfolio that maximizes the diversity that can be conserved for any given budget allocation. Such a prioritization approach has a strong appeal due to its rigorous mathematical justification and the possibility to derive optimum conservation decisions with well-defined properties. Nevertheless, despite the conceptual basis having been developed for an important decision-support tool, there is no existing example of this approach having been used to inform real-life conservation policy design and implementation. This is true for both plant and animal genetic resources.

Furthermore, there is still a high level of scientific uncertainty, especially associated with the definition of critical risk values and with determining the degree of dissimilarity between and among species/varieties and breeds. Moreover, the cost of establishing the baselines necessary for carrying out the prioritization task needs to be taken into account and, given the general lack of detailed national statistics related to the status and trends of specific genetic resources, such activities need to be adequately funded.

Action required: The establishment of the current status of the plant and animal genetic resources targeted for conservation and sustainable use interventions, together with the definition of critical risk values urgently needs to be undertaken.

3) Integrated participatory diversity status and threat monitoring system: understanding the current status of the resources within the priority conservation portfolio.

Although many plant and animal genetic resources are widely recognized as being threatened, there is only limited information available regarding their actual status. Only isolated efforts at monitoring agricultural biodiversity on farm have been undertaken. There is no equivalent of a Red List for crop species under threat. Conventional monitoring efforts, where they exist at all, suffer limitations due to ad hoc approaches that lack rigorous survey and sampling methods, have poor understanding of search effort costs, do not systematically involve the participation of local-level actors and are usually based on collections instead of direct observations in the field.

Furthermore, even once plant and animal genetic resources status has been established, the definition of critical risk values remains to be undertaken i.e. the defining of how much of the prioritized resource should be conserved in order for it to no longer be considered at risk. Plant and animal genetic resources and their (uncertain) future values may be lost irreversibly if their population falls below a critical threshold or so-called safe minimum standard. Safe minimum standard approaches are widely applied with regard to wild biodiversity and seek to avoid maximum future losses of value. In the case of animal genetic resources, FAO defines a livestock breed generally not to be at risk if there are 1,000 breeding females and 20 males. No such equivalent measure exists for plant genetic resources.

In the case of crop genetic resources, the estimation of a safe minimum standard is likely not only to be based on the cultivated area but also, in order to conserve the underlying evolutionary process involving human selection and practices, to be based on the amount of seeds available in local systems and their age, the number of farmers of a specific species/variety, the degree of local knowledge maintained and geographical distribution. While it is possible that the resulting goals might be fairly modest (e.g. individual variety conservation area goals might be expressed in hectares or tens of hectares rather than hundreds or thousands of hectares), to the best of our knowledge, existing research of this type is extremely limited and more work needs to be done in this area.

Action required: Participatory diversity status and threat monitoring system, integrated with systematic conventional, non-participatory monitoring activities urgently need to be developed and tested. The definition of conservation goals based on a safe minimum standard approach also urgently needs to be undertaken. This will permit an enhancement of capacities to prioritize, design and implement cost-effective on farm conservation interventions that actively involve farmers and complement on-going *ex situ* conservation efforts. Potential funders of conservation schemes are also more likely to be willing to finance such schemes where the provision of conservation services is clearly verifiable relative to an initial baseline.

4) Pro-poor conservation and use strategy design and testing: incentives and mechanisms for poor female and male farmers and/or livestock-keepers to maintain genetic resource diversity, and capture the benefits from doing so, improving their welfare and making conservation sustainable for the future.

Having identified where to develop agricultural biodiversity conservation and use interventions (Component 1), on which genetic resources to focus on (Component 2) and their status (Component 3), consideration is required regarding how to design the incentives per se for farmers to maintain the public good values

(i.e. landscape-level resilience, future option values and traditional knowledge/practices) of those genetic resources in the priority conservation portfolio in a pro-poor and cost-effective manner.

Such incentive mechanisms may draw on a domesticated version of payment for ecosystem services. So called payment for agricultural conservation services (PACS) have been shown to be a potentially useful complement to more conventional niche product market development. They can also generate rewards for farmers not only for undertaking conservation activities per se but also for supporting status monitoring and PACS scheme monitoring and verification services, thereby allowing poor farmers to diversify their livelihood options.

Least cost conservation of plant and animal genetic resources approaches would be expected to focus on species/varieties/breeds and agricultural practices that provide considerable private values to the farmer and high public values to wider society. As poor smallholder farmers are often carrying out de facto conservation, they may be expected to provide opportunities to implement relatively low-cost conservation strategies at very low opportunity cost.

Action required: In order to determine how much a PACS-based conservation programme will cost and how these costs can be minimized, there is a need to assess farmer/community willingness to participate in the proposed conservation activities (along with associated PACS programme management costs – including for monitoring and verification activities).

5) Sustainably financing PACS interventions

In addition to the status monitoring and conservation goal identification challenges identified above, the sustainability of PACS interventions is a key area of concern. Programmes might have a limited life-span, unless adequate funding can be established over the long-term.

A number of funding options appear to be worth exploring, including:

- A) Existing agricultural market channels may be used to promote the use of threatened plant and animal genetic resources. Local and more distant consumers of plant and animal genetic resources may be willing to pay for the on farm utilization of some limited range of local plant and animal genetic resources through such mechanisms as eco-labelling, certification or denomination of origin schemes when niche product markets are developed (amongst others see: Hoeschle-Zeledon et al. 2009; Padulosi et al. 2009 and Rojas et al. 2009, respectively for Italian hulled wheat, Indian minor millets and Andean grain examples). Yet the potential to use such an approach as a cornerstone of a wide-ranging cost-effective, diversity maximizing national agricultural biodiversity conservation and use strategy remains to be explored. In particular, the following challenges need to be considered:

- The fact that crop varieties/species with market potential and those that are a priority for conservation might not align. In fact, niche product market development interventions may focus on a portfolio of high market potential traditional crop species that are either unthreatened or only locally threatened. The initial investment costs can be high and long-term success rates low. Finally, market development may be so successful that it displaces other priority crop species/varieties (e.g. white quinoa in the Andes; minor millets in India)
- It is consequently argued that there is likely to be a need to simultaneously implement such market development approaches with PACS schemes. Further details regarding the potential complementarity of these two incentive mechanisms are documented by Drucker (2012) and Narloch (2011).

B) Conservation service beneficiaries and purchasers beyond consumers include (Drucker et al. 2013):

- government agencies (agricultural, development and educational institutions at local, state and national levels), including school meal programmes, other public agency procurement (e.g. for meals for hospitals and the armed forces) and public food distribution programmes
- development and conservation agencies (including development banks), NGOs, foundations, research institutions and private philanthropists as well as a number of international conventions (such as the International Treaty on Plant Genetic Resources for Food and Agriculture and its Benefit Sharing Fund) and financial organizations (such as the GEF, a major funding mechanism of the CBD)
- breeders (both private companies and farming communities)
- agricultural input suppliers for specialized production systems (e.g. seed, pesticide, herbicide, fertilizer, tractor, irrigation equipment and other similar companies)
- mining companies and others private sector entities with significant environmental impacts to offset through corporate social responsibility programmes and regulatory compliance.

There are thus a range of potential beneficiaries and purchasers of the goods and services generated by the conservation on farm of agricultural biodiversity.

Action required: Establishment of a dialogue to determine which combination of private and public purchasers may ultimately be interested in forming a coalition of the willing to invest in agricultural biodiversity conservation. The configuration of purchasers may be expected to vary with context and over time.

Conclusions

A broad *in situ* conservation strategy is likely to require the incorporation of a mixture of research and development components. Such a strategy could be based around a 4Rs approach. That is (Drucker et al. 2013):

- recognizing the need for agricultural biodiversity conservation interventions and that such interventions entail costs
- reducing intervention costs to a minimum while having a strong monitoring system, to ensure donors that their support is being efficiently and strategically used
- realizing product value addition and the enhancement of demand, where possible
- retaining threatened agricultural biodiversity with important public good values that currently do not have significant market potential by ensuring the existence of adequate direct support safety net mechanisms such as PACS.

Until strategic, national and global approaches to agricultural biodiversity conservation on farm are elaborated and their implementation funded, with priority given to the establishment of a functional agricultural biodiversity monitoring programme, the world will continue to lose agricultural biodiversity at an alarming rate. This is because of a lack of informed decision-making and limited capacity to elaborate effective policy frameworks that facilitate optimal investment allocations and policy decisions.

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Custodian Farmer Visions and Workshop Recommendations

Custodian Farmer Visions and Workshop Recommendations

Custodian farmer visions for the future and their role in conservation of agricultural biodiversity: breakout discussion and workshop recommendations

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Format and questions

On the third day of the meeting, the participants were divided into four groups for discussions. While on the second day the discussions focused on the past and the present, these discussions looked to the future and tried to envision the role of custodian farmers and agricultural biodiversity in development. Group 1 was composed of women farmers and women scientists (Annex III). Group 2 included both women and men farmers and scientists. Groups 3 and 4 included stronger representation of national, international and government scientists and officials, as well as both men and women farmers.

The groups were given five questions to discuss that were similar except that groups 1 and 2 focused on the community-scale and groups 3 and 4 focused at the National scale. The discussion questions are presented in Table 1.

Table 1. Discussion questions on day three.

Groups 1 & 2: Community Focus	Groups 3 & 4: National Focus
What is your vision for your community in five years?	What is your vision for your country in five years?
In this vision, what role do you see for agricultural biodiversity and custodian farmers?	In this vision, what role do you see for agricultural biodiversity and custodian farmers?
What are the actions that should happen/be happening to achieve your vision in this time frame?	
Aside from custodian farmers like you, who are the other actors/stakeholders (persons, institutions, etc.) that can influence your vision and desired actions within your community?	Who are the actors/stakeholders (persons, institutions, etc.) that can influence your vision and desired actions at the national level?
What change in behaviour (actions) of these actors/stakeholders do you consider necessary to achieve your vision?	
What can custodian farmers do to bring these changes in behaviour (actions they take)?	How can these changes in behaviour be facilitated (actions they take)?

Discussion results

Notes on the discussions that took place in each of the four groups are provided in Annex III. There was strong overlap in the visions and recommendations from all four groups but some differences in scope and focus reflected the different compositions of the groups. For instance, groups 3 and 4, which focused on the national scale and included more policy-makers and scientists, addressed more broad and high-level concepts such as food security, hidden hunger, resilience and the need for generating evidence through effective research. Meanwhile, groups 1 and 2, which focused on the community-level and were composed mainly of custodian farmers, identified more locally-specific issues and stakeholders.

Gendered discussion results

Some differences were also noted between the women-only and mixed-gender groups that focused on the community scale (Groups 1 and 2). In general, we found that the women farmers took a more system-wide perspective, identifying barriers and avenues traditionally not seen to be linked to agriculture that would increase their own and their children's participation in agricultural biodiversity management and community development. By contrast, the mixed-gender group tended to focus more on technocratic and tried-and-tested solutions that were strictly within the realm of agriculture and marketing. Social and cultural issues were not highlighted as much by the mixed groups. The fresh perspective provided by the women's group enriched the discussions and demonstrated the value of research and development projects engaging more directly with women to gain their perspectives that are informed by their distinct life experiences.

A detailed discussion of the differences between the men and women's discussions is presented below.

Gendered visions of the community

Both community-focused groups produced a long wish list of how they want their community to look in five years, covering access to basic infrastructure, education, technology and health care facilities. In addition to the expected wish list above, they also articulated the role of agricultural biodiversity in their vision. Both groups wanted to see their village brimming with rich agricultural biodiversity and the women's group emphasized all community members being knowledgeable, skilled and motivated to make the most of this agricultural biodiversity. Both groups wanted to see the market valuing agricultural biodiversity. The women's group also emphasized education and leadership opportunities for women, respect and dignity for the farming profession, greater social cohesion and preservation of local food culture. Both groups started out talking in broad brushstrokes, converging on a goal that can be summarized to satisfy both groups as: a village where a large number of farmers are engaged in maintaining and benefitting from rich agricultural biodiversity.

Good practices for agricultural biodiversity management such as seed exchange, diversity fairs, diversity blocks, and marketing and promotion of agricultural biodiversity were identified as actions the participants saw as necessary to support their vision, as well as continued support for custodian farmers. The actions recommended by the men's group were strictly agriculture and market related, whereas the women's group took a more system-wide perspective, touching upon other issues such as women's literacy, the perceived dignity of farm work, the need for a diversity of work to be done in a village, and food culture as also being critical in supporting the path toward their vision.

Gendered perspectives on the role of stakeholders

Both community-focused groups recognized a wide range of stakeholders that could contribute to their work in agricultural biodiversity conservation. Agro-veterinary shops, District Agriculture Development Offices, Village Development Committees, NGOs and schools were recognized by both groups. The women's group also recognized roles for local banks, clubs, communication media, animal health service centres and health posts. The mixed group by contrast, recognized the role of commercial farmers. The mixed group was more likely to identify stakeholders traditionally associated with agriculture, while the women were able to relate the roles of other stakeholders that affect or influence their daily lives.

In terms of a change in behaviour, the women recognized the need for training, especially emphasizing the need for women Junior Technical Assistants to improve women farmers' access to agricultural technical support and inputs. The women also emphasized the need to improve women's education and control alcoholism and domestic violence, as these issues prevent or restrict the scope of their participation in conservation and social activities. The mixed group focused more on technocratic changes, such as agro-veterinarian shops providing access to local seeds and organic manures, and District Agriculture Development Offices and NGOs supporting agricultural biodiversity conservation through policy and technical support.

Gendered perspectives on the roles of custodian farmers

The mixed group saw a role of custodian farmers in lobbying for greater support for agricultural biodiversity conservation in their village. They identified the Village and District Development Committees as an appropriate forum for planning and budgeting development programmes related to agricultural biodiversity. They also saw a role for custodian farmers in educating other farmers about the importance of buying good seed.

The women's group saw a much broader role for custodian farmers in the community. They emphasized the need to be active participants in their groups at the grassroots level to raise awareness about agricultural biodiversity. They

also emphasized the role of custodian farmers in sharing their knowledge with other farmers who have not had the opportunity to participate in training and workshops. Issues of social and gender-based discrimination and domestic violence featured prominently in the roles the women recommended custodian farmers should take in their villages.

Synthesis

While there were differences in the issues and stakeholders identified by the four groups (as discussed above) there was actually strong overlap in the vision and recommendations presented by the separate groups, with often two or three groups proposing the same ideas. Given the great overlap in the vision and recommendations observed in the discussions, uniting the messages seemed justified in order to generate a set of guidelines and recommendations for strengthening on farm conservation in Nepal that reflects the input and perspectives of many relevant stakeholders.

The synthesis of the discussions that took place in the four groups is presented below. This vision and set of recommendations is the result of the group discussions but can also be considered as the workshop recommendations, as these discussions took place at the end of this intensive 3-day meeting where these issues were explored at depth. In many cases the groups identified specific stakeholders for carrying out the recommendations and the editors have also indicated relevant stakeholders for the actions but it is possible that there may be other relevant stakeholders for each recommendation that have not been explicitly pointed out.

A vision for Nepal and its communities

Our vision is a **food and nutrition secure** Nepal with a **diverse and nutritious food culture** based on a multitude of food sources, diverse crops, livestock, poultry, and fisheries, as well as medicinal and aromatic plants.

Through conservation of biodiversity, people of Nepal have good diets, reduced rates of malnutrition and more resilient food production. Farmers are **self-sufficient in agriculture and seed**. Nepalese are also able to produce their own medicines using agricultural biodiversity.

Villages are brimming with rich agricultural biodiversity and lost varieties are growing again. There are more farmers working for conservation of agricultural biodiversity and increased conservation and exchange efforts for important seeds.

The market and development contribute to conservation, as **agricultural biodiversity is awarded an appropriate market value**. Market channels for agricultural biodiversity are developed. Farmers can sell seed and produce in their local and regional markets, giving consumers good access to diversity in produce. Farmers gain a good income and livelihood from their integrated farms.

Custodian farmers' roles in contributing to sustainable use and conservation of agricultural biodiversity are recognized by the government, as are villages for their agricultural biodiversity. **There is high respect for farmers**.

Farmers are fully dedicated to continue the work of agricultural biodiversity conservation, continuing to grow and share seeds and knowledge with their community members. All individuals are interested and supportive of agricultural biodiversity conservation. The youth are motivated to take up the management of agricultural biodiversity because they can make a successful living through agriculture.

Farmers are technically knowledgeable and skilled. There is easy exchange and access to knowledge and technology and increased use of local technologies. There is irrigation for food and vegetable production.

Farmers are united and **our society is moving ahead by working together**. Schools, roads, and technology are easily available. Society members are able to read and write as a result of **proper education**. There is easy and affordable access to **health care**. **Women are taking leadership roles** and sharing their experiences with confidence.

Workshop recommendations: how can we get there?

1) Establish and strengthen National programmes for on farm conservation that include custodian farmers and link these efforts with *ex situ* efforts in plant genetic resource conservation.

Establish and strengthen the National on farm conservation programme

Stakeholders: Ministry of Agricultural Development, Department of Agriculture, District Agriculture Development Offices

- Implement the provisions of the National Agricultural Biodiversity Policy (2007)
- Establish priority programmes on agricultural biodiversity conservation, including custodian farmers and community seed banks
- Establish areas for agricultural biodiversity conservation
- Promote an integrated planning, monitoring and evaluation approach
- Implement programmes and projects on agricultural biodiversity conservation jointly with multiple stakeholders based on an understanding of the local situation (opportunities, problems, and ways ahead)
- Organize consultation workshops with farmers' networks
- Organize exposure trips for planners/policy makers to custodian farmers' plots and other agricultural biodiversity sites.

Identify and support custodian farmers within the National on farm conservation programme

Stakeholders: District Agriculture Development Offices, NGOs, Custodian Farmers

- Identify, organize and support diversity-conserving custodian farmers through government programmes, giving women opportunities to engage in conservation work
- Consolidate the roles and rights of custodian farmers in the conservation, innovation and dissemination of locally important agricultural biodiversity through local institutions
- Reward custodian farmers and recognize them for their contribution through prizes and other incentives
- Establish a network of custodian farmers while custodian farmers should unite and be active in such a network and other community groups
- Establish a platform for custodian farmers and community seed banks to engage in dialogue with policy-makers for reorganization, support and implementation of action plans (suggestion to use the NABIC-Nepal platform)
- Invite and include custodian farmers in dialogue with macro-level stakeholders for national planning and policy-making processes.

Continue and strengthen *ex situ* conservation efforts and link them with on farm conservation efforts

Stakeholders: District Agriculture Development Offices, NABIC-Nepal, NGOs, Custodian Farmers, Community Seed Banks

- Continue seed collection efforts to ensure conservation of local varieties and rare seeds
- Search out and maintain threatened crops and varieties (e.g. finger millet, buckwheat) in different locations of the country
- Collect and conserve all cereal crops and varieties in the National Genebank and document associated traditional knowledge
- The National Genebank should work more closely with community seed banks and custodian farmers in surveying, characterizing, evaluating, documenting, conserving and disseminating agricultural biodiversity.

Support on farm management of agricultural biodiversity as a regular extension programme

Stakeholders: District Agriculture Development Offices, NARC, NGOs

- Provide technical backstopping for agricultural biodiversity conservation, e.g. pesticide, fertilizers, modern equipment (e.g. biogas, handheld tractors, etc.), water harvesting technology for irrigation, timely and available technical services, veterinary doctors for pregnant cows/buffalo
- Develop an effective early warning system for climate change to counter the threat to loss of existing agricultural biodiversity and traditional knowledge.

Generate evidence on the effectiveness of the on farm conservation programme

Stakeholders: NARC, NGOs

- Carry out research on custodian farmers and agricultural biodiversity management (such as economics, environmental, social and biological aspects)
- NARC should support and promote research and evidence generation
- Explore UNEP/GEF portfolios to leverage past efforts of agricultural biodiversity conservation in Nepal focusing on conservation and use approach.

2) Enhance awareness and access to agricultural biodiversity and encourage commercial production of local crops/varieties

Enhance awareness and access to agricultural biodiversity

Stakeholders: NGOs, Agro-Veterinary Shops, Private Sector, Custodian Farmers

- Stakeholders should increase access to seed, particularly local and climate-friendly seed and saplings that fit the environment
- NGOs and custodian farmers should continue the organization of national and district-level diversity fairs and conduct them at larger and larger scales
 - o Include competitions about recipes in the diversity fairs and award prizes to young participants

- o Organize at least one fair a year to ensure that traditions and traditional knowledge are not lost
- Continue to implement diversity blocks and other promotional activities on farm
- Custodian farmers should campaign and raise awareness and promote agricultural biodiversity conservation programmes
- Custodian farmers continue seed exchange on farm and encourage all farmers to share their knowledge and seeds
- Grant domesticated wild species free mobility within the country, i.e. remove barriers to their transport
- The private sector should integrate agricultural biodiversity in seed production activities and cooperate in agricultural biodiversity conservation
- Agro-veterinary shops should help with marketing of local seeds and organic manures, broadening from their current focus on improved and hybrid seeds, fertilizers and pesticides.

Encourage commercial farming of local crops for seed and produce and improve their marketability

Stakeholders: NGOs, Agro-Veterinary shops, Custodian Farmers, Private Sector

- Commence commercial farming of local crops
- NGOs to provide support for marketing diversity
- Agro-Veterinary shops help with marketing as well as producing local medicinal herbs and medicines
- Ensure custodian farmers' rights are protected. *Custodian farmers*: lobby about the rights of farmers.

3) Build capacity for on farm conservation through effective education and public awareness

Build capacity of stakeholders in technical aspects of agricultural biodiversity conservation and awareness of farmers' rights.

Stakeholders: District Agriculture Development Offices, NARC, NGOs, Indigenous Community Partnership, Custodian Farmers, Community Seed Banks

- Build capacity of community seed banks and custodian farmers in technical aspects
- Provide training, workshops, and exposure visits to villagers to enhance their contribution to conservation-focus on topics such as safe use of pesticides, organic farming and fertilizers, keeping a sapling nursery, seed production, theory and practical knowledge on agriculture and animal husbandry/medicine, and post-harvest technology
 - o Establish a robust programme of education for farmers in seed saving to facilitate adaptation and seed sovereignty
 - o Engage in cross-learning between custodian farmers
- *Custodian farmers*: interact in workshops, seed exchanges and exposure visits with other farmers and share the outputs, local practices, constraints, and benefits with local farmers' groups and other interested people

- Empower farmers and their organizations through capacity building in how to analyse agricultural biodiversity policy to ensure that farmers' rights are well reflected and implemented
- *Custodian farmers*: educate members of the community about sustainable development and farmers' rights.

Develop and refine education programmes to ensure knowledge on agricultural biodiversity is passed on to younger generations and women and farmers are empowered

Stakeholders: Ministry of Education, Ministry of Health, Custodian Farmers

- Develop and teach curriculum regarding agricultural biodiversity in schools at all levels to promote sustainable conservation and use across the country
 - o Organize student visits to agricultural biodiversity conservation areas
 - o Provide training to youth of 12 to 25 years old about crops, recipes and agricultural biodiversity
- *Custodian farmers*: regularly discuss traditional knowledge, skills and local varieties
- Reduce illiteracy and provide higher education for children
- Encourage more women to take Junior Technical Assistant courses to increase the number of frontline women extension workers to make it easier for women farmers to access technical support and inputs.

4) Secure funding for on farm conservation initiatives

Establish a fund for agricultural biodiversity management at the National level

Stakeholders: District Development Committee, Village Development Committee, NARC, Ministry of Agriculture, Department of Agriculture

- Mobilize resources to strengthen the work of community seed banks and custodian farmers
- *Village and District Development Committees*: Mobilize resources for managing agricultural biodiversity by farmers
- *Custodian farmers*: lobby Village and District Development Committees to support the policy to increase access to funds for management and conservation of agricultural biodiversity
- *National-level stakeholders*: Institutionalize an award system for custodian farmers and community seed banks and explore the possibility for support from the private sector.

Fund research to leverage the role of agricultural biodiversity in addressing malnutrition and poverty in Nepal

Stakeholders: NGOs, IFAD, Bioversity International, GEF/UNEP

- *IFAD*: recognize and finance the role of agricultural biodiversity to address malnutrition and poverty in Nepal
- *Bioversity International*: foster greater cooperation within and outside Nepal to support implementation of the vision

- *GEF/UNEP*: provide more funding for sustainable conservation through use of agricultural biodiversity in Nepal
- *Key stakeholders (Bioversity, NARC, LIBIRD and the Department of Agriculture)*: discuss with IFAD for agricultural biodiversity loan/grants
- *Bioversity International*: support NABIC-Nepal and the network of custodian farmers and community seed banks for application of the benefit sharing fund to strengthen their capacity to manage agricultural biodiversity.

5) Reform forestry policy to promote forest diversification and control deforestation

Reforest with diverse plants and control deforestation

Stakeholders: District Forest Office, Community Forest User Groups

- Implement reforestation programmes with diverse plants, including medicinal species
- Control deforestation.

6) Work towards development of better transportation, healthcare, improved safety, and empowerment of women for a better Nepal and a supportive atmosphere for the conservation of agricultural biodiversity

Improve health and safety in Nepal and empower women and farmers

Stakeholders: NGOs, Custodian Farmers

- Provide timely service for first aid treatment
- Control alcohol
- End domestic violence against women
- *Custodian farmers*: work together to end discrimination between men and women
- *Custodian farmers*: raise awareness and work to end domestic violence, increase awareness to end social discrimination
- Construct roads for transportation of agricultural products.

Stakeholders

The participants identified the following stakeholders as key for realizing their visions at different levels:

Village or community level	District or regional level	National level	International level
Agriculture service centre	District Chambers of Commerce and Industry (DCCI)	Department of Agriculture	Bioversity international
Agriculture, Forestry and Environment Committee	District Seed Sufficiency Programme (DISSPRO)	Department of Forestry	Development Fund, Norway
Agro-veterinarian shops	District Agriculture Development Office	Department for International Development (DFID)	International NGOs
Animal health service / Livestock service centre	District Development Committee	Division cooperative office	IFAD (investment loans)
Banks-provide loans	District Education Office	FAO	Indigenous community partnership
Clubs, Youth clubs	District Forest Office (DFO)	Federations (NGO, Cooperatives, CFUGs, Water users, etc.)	Japan International Cooperation Agency (JICA)
Commercial farmers	District Livestock Services Office	Ministry of Education, University; Schools	The Swiss Agency for Development and Cooperation (SDC)
Community Awareness Center (CAC)	District Soil Conservation Office (DSCO)	Ministry of health, Health post.	United Nations Environment Programme / Global Environment Facility (UNEP/ GEF)
Community Based Organizations (CBOs)	Federations (NGO, Cooperatives, CFUGs, Water users, etc.)	Ministry of Agricultural Development (MoAD)	
Community Based Seed Producer Groups	Federation of Nepalese Chambers of Commerce and Industry (FNCCI)	Ministry of Federal Affairs and Local Development (MoFALD)	
Community Seed Banks (CSBs)	International NGOs	Ministry of Forests and Soil Conservation (MoFSC)	
Custodian farmers	NGOs	Department of Livestock Services (DoLS)	
Farmers' groups/associations	Press, Communication	Department of Soil Conservation (DoSC)	
Federations (NGO, Cooperatives, Community Forest User Groups (CFUGs), Water users, etc.)	Transportation	Network for Agrobiodiversity Conservation in Nepal (NABIC-Nepal)	
Local Leaders		Nepal Agricultural Research Council (NARC)	
Local schools and school teachers		National Genebank	
Village Development Committee (VDC) – budget allocated for agricultural biodiversity management and conservation		National Planning Commission	
Ward Citizenship Forum (WCF)		NGOs	
Ward Office Agriculture		Press, Communication	
Ward Office Forest		Transportation	
NGOs			
Press, Communication			
Transportation			

Observations and ways forward for a gender responsive custodian farmers approach

Marlène Elias
Biodiversity International

Reflection

This three-day workshop on custodian farmers gave women and men farmers a central place in discussions on the conservation and use of agricultural diversity. Their contributions demonstrated that both women and men contribute to managing, adapting, promoting and conserving agricultural biodiversity in distinct ways. Differences were also found within the group of women and the group of men, which were composed of individuals from various ages, marital statuses, castes, and otherwise differentiated backgrounds.

Women farmers discussed seed conservation as one of their major contributions to the management and conservation of agricultural biodiversity and acknowledged that their husbands' support is very important to their participation in agricultural research for development interventions. Men, in turn, emphasized their own roles in managing and promoting knowledge of crop species and varieties and also noted their wives' support for their farming activities. Both women and men farmers noted that NGO interventions had fostered their empowerment by helping them improve their livelihoods, strengthen their ability to speak in public, meet other farmers and discover other organizations, and reduce social discrimination.

Women farmers' perspectives

The women farmers present at the workshop participated in a side-session wherein they identified key constraints hindering the ability of female farmers to take measures to conserve biodiversity and participate in agricultural research for development projects. These barriers included social norms that generate negative perceptions among community members towards women who participate in projects and that cause husbands to object to women's participation, as well as restrictions on women's mobility and travel. Additional constraints were a lack of time due to heavy female household responsibilities, lack of child care, lack of information about projects, insufficient economic incentives associated with projects, too many other concerns, too little land on which to experiment, shyness and inexperience participating in projects, as well as an underestimation of women's capacities—by men and by women themselves—to successfully participate.

Based on these constraints, the women proposed the measures listed in Table 1 to improve their ability to experiment with, conserve and promote biodiversity, and to participate in projects designed to do so. They additionally identified key gatekeepers who could facilitate their role as custodian farmers and their participation in projects. These included outsider women, such as female NGO staff working in the community, reputed men or women in the community, resource persons from the community who travel within the context of research for development projects, and the local Village Development Committee.

Table 1: Support needs and incentives for a more gender-responsive custodian farmers' approach according to participant women farmers

Type of support	Examples
Social	• One-on-one mentoring for women • Women role models: examples of women custodian farmers • Meetings organized by traditional village institutions that call for women's participation • Partners to clarify why women should participate • Assigning women small jobs of interest in projects to motivate them.
Economic	• Better market linkages for the biodiversity that is conserved.
Technical and information-sharing	• Capacity strengthening to improve women's technical skills with respect to seed conservation, storage, etc. • Improved technology (e.g. grading machine to sort seeds) to reduce drudgery and free up women's time • Women-led demonstration plots • Women representatives that attend meetings and bring seed back for others from their travels • Information dissemination on women and child health, sanitation and hygiene, etc., more often, and more resource people invited to discuss women's issues to enhance appeal of meetings • Better information sharing system on crop varieties where women can learn where to acquire varieties; common platform to disseminate information.

Recommendations

Additional recommendations for improving the gender-responsiveness of the custodian farmers' approach include:

- **Understand the gendered context:**
 - o Know the gendered social networks in communities where you work (social mapping): What institutions and networks do women and men rely on? What are other key differentiating factors (age, ethnicity, wealth, and so on) in project sites?
 - o Examine and recognize gendered opportunities and constraints (such as time, mobility, language, labour, education, capital, technology, access to resources, decision-making, and public participation)
 - o Strengthen local institutions such as women's self-help groups when possible, but be inclusive (Who is not included and why? How can they be reached?)

- o Work with women leaders and with men leaders who recognize women's contributions
- o Enlist men's support.

- **Differentiate and include:**

- o Investigate and enhance the visibility of gendered knowledge and skills (e.g. in Community Biodiversity Registers, publications, policies, school curricula) and of knowledge held by specific social groups
- o Favour knowledge exchanges among women, among men, among women and men, and among distinct social groups
- o Evaluate whether gender-segregated or mixed groups – or both – are most suitable in the given project and site context.

- **Make projects relevant to men and women:**

- o Include both women and men in priority setting, separately and together
- o Ask questions about and focus on crops of relevance to both women and men (these may be the same or different crops)
- o Showcase contributions of relevance to women (e.g. competitions for best recipes, most diverse home garden, women's spaces) and men
- o Include women farmers in exposure visits in culturally-appropriate ways.

- **Tailor interventions to women's and men's needs:**

- o Where possible, alleviate constraints on women's participation (e.g. time, mobility, social constraints)
- o Have women NGO staff, researchers, and extension workers work with women
- o Quotas encouraging women's participation in committees, diversity fairs, and so on, may be required at the beginning to encourage women's active participation
- o Include women in capacity strengthening interventions
- o Validate and share results within the community and beyond via channels used by women and men farmers, which may be the same or different channels
- o Monitor and evaluate the impacts of your interventions on men and women, using gender-sensitive indicators (can be defined in a participatory way by women and men).

- **Think across scales:**

- o Promote opportunities for women to have a voice in fora at different scales. For example, representatives from women's groups should be included in national platforms; women's contributions to agricultural biodiversity conservation should be highlighted in school curricula, policies must be designed to benefit women and men.

- **Promote women's participation in the Custodian Farmers' Network**

Valuing, learning from and involving both women and men in efforts to conserve biodiversity and improve livelihoods will benefit entire households, societies and promises to enhance biodiversity conservation efforts.

Reflections on the workshop

Stefano Padulosi¹, Gennifer Meldrum¹ and Sajal Sthapit²

¹Biodiversity International

²LI-BIRD

What brought all of us together – farmers, scientists, and policymakers – in Pokhara is a shared commitment to the conservation of crop diversity. In Nepal, like elsewhere around the world, we are witnessing a great reduction in the use of traditional crops in mainstream agriculture. The accompanying homogenization of farming systems is of great concern because of its negative implications for the resilience and sustainability of agricultural production, as well as nutrition. The role of agricultural biodiversity has never been greater than today, as we strive to make cultivations more resistant to climate change, and our food systems nutritionally more balanced and more resilient against socio-economic and climatic shocks .

During the meeting we discussed what can be done to ensure the conservation of crop diversity and to leverage the strategic work of farmers in this regard - especially of those champions of conservation we call custodian farmers. The workshop was organized around three main objectives namely, discussing methods and tools for supporting the work of custodian farmers, exploring policy options to develop an enabling environment for on farm conservation, and gaining a better understanding of the characteristics and roles of custodian farmers. The workshop was productive on each of these fronts.

With regard to the first objective, discussions around incentives and the creation of a nation-wide platform for on farm conservation were very useful. Discussions explored linking custodian farmer efforts with community and national-level initiatives in plant genetic resource conservation. It was discussed that custodian farmers could be involved in a farmer to farmer network, potentially coordinated by the National Genebank and/or integrated with the community seed bank and community biodiversity register initiative that is in its infancy in Nepal (Shrestha et al. 2013). The National Genebank was seen as a candidate institution to facilitate recognition and rewards for custodian farmers, as well as training. The workshop made important steps in identifying policy options to support on farm conservation, including identifying actions that can be taken within existing policies. National Genebank representatives and other government officials noted several such opportunities in the discussions on day two, including the potential to access funds through the village development committees and the Nepal Agriculture Research and Development Fund, as well as potential for recognition of custodian farmer varieties through the recently implemented ABS Act. These existing opportunities are presented on page 117. Additional recommendations that emerged from the group discussions on the third day are presented on page

154, which represent the collective inputs of multiple stakeholders in plant genetic resource conservation in Nepal and highlight various methods and policy options to further the work of custodian farmers.

A significant topic of discussion was the potential to preserve and duplicate custodian farmer varieties *ex situ*, as well as the reciprocal possibility for custodian farmers to access materials stored in the National Genebank for multiplication. The National Genebank's participation in seed fairs could be a means of providing farmers access to new materials in addition to a cost-effective way for the genebank to collect new accessions. Linking *ex situ* with *in situ* conservation has long been stressed by FAO as fundamental to strengthen plant genetic resource conservation, being mentioned in its first report on the State of the World's Plant Genetic Resources for Food and Agriculture (FAO 1996) and reiterated in the follow up report (FAO 2010). Farmers and scientists working in community seed banks and genebanks, respectively, carry out complementary roles in the conservation and use of crop diversity and their ultimate impact can be bolstered through collaboration. The involvement and active participation of NARC representatives in these discussions and indication of their willingness to realize this linkage is a strong achievement of the workshop and we look upon the developments on this front as an exciting prospect that can be shared with other countries around the world.

Integrating custodian farmers with the national conservation strategy was an important aspect of the discussions at the meeting but at the same time, experiences shared by the Spanish NGO Red de Semillas Resembrando e Intercambiando and the American NGO Native Seeds/SEARCH revealed that success in on farm conservation can also be achieved through bottom-up approaches with the active participation of farmers and other stakeholders. Lack of financial support (from the government or funding agencies) should not be seen as synonymous to failure. The cross-cultural sharing of experience in on farm conservation was indeed a productive and valuable aspect of the meeting. The farmers were surprised that the loss of crop diversity is also a problem, and possibly more so, in the USA and Europe. The custodian farmers were excited to realize that they held knowledge in seed conservation that is valuable to people around the world and that they are seen as true leaders in on farm conservation at the global scale. The work that LI-BIRD and NARC have been undertaking in Nepal was also a source of great inspiration for Chris Schmidt of Native Seeds/SEARCH and Maria Carrascosa of Red de Semillas "Resembrando e Intercambiando."

The participation of farmers in discussions on their roles and responsibilities in on farm conservation has been instrumental in sharpening our understanding of custodian farmers and how to support and leverage their work to strengthen on farm conservation, fulfilling our third objective for the workshop. The farmer profiles documented during the meeting contribute to a growing body of knowledge and deepen our understanding of the characteristics and motivations of custodian farmers. Group discussions exploring the role of the family and

community in supporting the custodianship of agricultural biodiversity indicate that efforts to support custodian farmers should be sensitive to the community dynamics that contribute to maintaining diversity. Strengthening linkages between the community seed bank initiative and custodian farmer programme is seen as a viable way forward..

An important aspect of this workshop was bringing together a diverse set of stakeholders and promoting an open dialogue on equal footing. Scientists, who were present with different competences (covering conservation methods, agronomy, marketing, climate change, gender and other social themes), actively engaged with farmers in working group discussions, sharing perspectives on issues related to on farm conservation. Through these interactions, we contributed to bridge the divide between knowledge deriving from scientific research and that arising from practice and observation in the field by farmers (traditional knowledge). Raising farmers' voices and including their viewpoints in decision-making for agricultural development and on farm conservation has been an important facet of the custodian farmer approach that was spearheaded at the meeting in Delhi in February 2013 (Sthapit et al. 2013). The empowerment and active consideration of farmer perspectives can enable development of more sustainable, effective and appropriate solutions for conservation of agricultural biodiversity. Farmers are the quintessential actors in on farm conservation so their viewpoints should be central in policy discussions and decisions. We hope the approach and methodologies used during this meeting, especially gender-inclusive aspects, will be integrated in other initiatives around the world to encourage the development of a supportive policy environment for on farm conservation. The fresh perspective provided by the women's group enriched the discussions and demonstrated the value of research and development projects engaging more directly with women to gain their perspectives that are informed by their distinct life experiences.

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Annexes



Annex I: Programme schedule

National workshop on enhancing the contribution of custodian farmers to the national plant genetic resources system in Nepal

31 July to 2 August 2013, Pokhara, Nepal

General outline

Registration	08:30-09:00 (On first day)
Session starts	08:30
Closing of the day	18:00
Organizers' review	18:00-18:30
Breakfast	08:00-08:50
Tea/Coffee Break	10:45-11:15 and 16:00-16:35
Lunch	13:00-14:00

Day one (31 July 2013, Wednesday)

09:00-09:15	Inauguration by farmers (one man, one woman)
09:15-09:30	Welcome & acknowledgements <i>Pashupati Chaudhary (LI-BIRD)</i>
09:30-10:00	Premiere of short movie, "Custodians of Agricultural Biodiversity" <i>Mahesh Shrestha (LI-BIRD)</i>
10:00-10:30	About the workshop <i>Stefano Padulosi (Bioversity, Italy)</i>
10:30-10:45	Few words <i>Dharma Datta Baral (Regional Agriculture Directorate)</i>
11:15-12:45	Participatory seed exchange (ice-breaker). Scientists and farmers interact with each other, discuss on the seeds brought for display. Farmers exchange seeds. Participants mingle. <i>All farmers, Pitambar Shrestha and Indra Paudel (LI-BIRD)</i>
12:45-13:00	Group photograph <i>Mahesh Shrestha (LI-BIRD)</i>

14:00-17:00	Farmer introductions: farmers explain who they are, why they care for biodiversity, the crops they care for and their aspirations <i>Saraswati Bhurtyal (LI-BIRD)</i>
17:00-17:20	Reflection and outcomes from the February 2013 custodian farmers workshop in India <i>Bhuwon Sthapit (Bioversity, India)</i>
17:20-17:40	Results and discussion on custodian farmers' survey from India <i>Hugo Lamers (Bioversity, India)</i>
17:40-18:00	Summary of results from the April 2013 custodian farmers' workshop in Pokhara <i>Sajal Sthapit (LI-BIRD)</i>

Day two (1 August 2013, Thursday)

08:30-08:45	Reflection by farmers on what they noted and learned in the previous day.
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Contribution of individuals, households and communities

08:45-09:15	Connecting farmers through community-level institutions to strengthen on farm conservation (maintain, adapt, promote) <i>Gennifer Meldrum (Bioversity, Italy)</i>
09:15-09:45	Importance of gender in agricultural research <i>Marlene Elias (Bioversity, Malaysia)</i>
09:45-10:00	Explanation of format for group discussion and documentation. Participants are split into 3 groups that including 6-7 farmers, translators, facilitators and other participants. <i>Gennifer Meldrum and Sajal Sthapit</i>
10:00-13:00	Group work and presentation preparation: 1) Contributions of individual farmers in maintaining, adapting, and promoting crop diversity, 2) Contributions of households in maintaining, adapting and promoting crop diversity, 3) Contributions of communities in maintaining, adapting and promoting crop diversity.
14:00-15:30	Presentation of and discussion of results from activities 1 to 3.

15:30-16:00	Session summary <i>Chairperson</i>
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16:00-16:30	Tea/Coffee Break
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Case Studies of Custodian and Seed Networks

16:30-17:00	Work of custodian farmers in Kolli Hills, India Oliver King (MS Swaminathan Research Foundation, India)
17:00-17:30	The role of seed networks in the management and use of cultivated biodiversity: a case from Spain <i>María Carrascosa (Red de Semillas, Spain)</i>
17:30-18:00	History, mission, and strategies of Native Seeds/SEARCH and custom platform for sourcing and sharing crop-specific information for climate change adaptation <i>Chris Schmidt (Native Seeds/SEARCH, USA)</i>
18:00-18:15	Summary of the session and the day

Day three (2 August 2013, Friday)

08:30-08:45	Reflection by farmers on what they noted and learned in the previous day.
08:45-09:15	A citizen science approach to crop adaptation under climate change <i>Jacob van Etten (Bioversity, Colombia)</i>
09:15-10:15	The economics of agrobiodiversity conservation and use: exploring the potential for economic valuation methods, decision-support tools and incentive mechanisms to support the conservation of agricultural biodiversity in Nepali context. <i>Adam Drucker (Bioversity, Italy)</i>

How to support the work of custodian farmers

10:30-10:45	Explanation of format for group discussion and documentation. Participants are split into 4 groups. Two groups will be farmer heavy, and two groups will be researcher heavy. <i>Gennifer Meldrum and Sajal Sthapit</i>
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11:15-13:00	Group work and presentation preparation: 1) How to strengthen maintenance, adaptation, and promotion of crop diversity at individual and community scales? 2) Refining the definition of custodian farmers, 3) How to develop a national custodian farmers' network?
14:00-15:30	Presentation of and discussion of results from activities 1 to 3.
15:30-16:00	Session summary and reflections
16:30-17:00	Gendered observations and considerations from topics covered during the meeting and suggestions for best way forward to ensure gender sensitivity in the custodian farmer approach <i>Marlène Elias (Bioversity, Malaysia)</i>
17:00-18:00	Closing remarks and conclusions

Annex II: Workshop participants



Mahesh Shrestha/LI-BIRD

Farmers

Adhikari, Surya Prasad and Saraswati, Custodian Farmers, Begnas, Kaski, Nepal

Biswakarma, Prem Bahadur and Jhuma, Custodian Farmers, Kachanapur, Banke, Nepal

Biswakarma, Dilsara, Farmer Participant, Ghanteshwor, Doti, Nepal

Bohora, Shanta, Custodian Farmer, Chamkipur, Rupendehi, Nepal

Chand, Khem Bahadur and Rijana Chand, Custodian Farmers, Patharaiya, Kailali, Nepal

Ghalan, Man Bahadur, Custodian Farmer, Dalchoki, Lalitpur, Nepal

Khadka Sherpa, Anita, Custodian Farmer, Duwagadi, Jhapa, Nepal

Krishna Jaiswal, Kumari, Farmer Participant, Kachorwa, Bara, Nepal

Magar, Som Bahadur Ale, Custodian Farmer, Faparbari, Makawanpur, Nepal

Oli, Indra Devi, Custodian Farmer, Ghanteshwor, Doti, Nepal

Rawal, Til Bahadur, Custodian Farmer, Talium, Jumla, Nepal

Thapa, Lal Kumari and Jaya Bahadur, Custodian Farmers, Chaur, Kaski, Nepal

Tharu, Phularani, Custodian Farmer, Naubasta, Banke, Nepal

Tharu, Kaliram and Indrani, Custodian Farmers, Beluwa Bardiya, Nepal

Ranee, Bibiana, Custodian Farmer, East Khasi Hills, Meghalaya, India

Shyangtan, Harka Bahadur, Custodian Farmer, Parwanipuur, Bohore, Nepal

Syiern, Redian, Custodian Farmer, Khweng, Meghalaya, India

Tenzin, Karma, Farmer Participant, Khamaedthang, Samdrup Jongkhar, Bhutan

Yadav, Ram Ekval, Farmer Participant, Kachorwa, Bara, Nepal

Government representatives

Dorji, Rinchen, Coordinator for On Farm Conservation, National Government, Bhutan

Ghimire, Krishna Hari, Scientist, National Genebank, Nepal

Pandey, Kanchan Raj, Planning Officer, Department of Agriculture

Pokharel, Suroj, Chief of the Crop Development Directorate, Department of Agriculture, Nepal

Baral, Dharma Datta, Director, Regional Agriculture Directorate, Western Development Region, Pokhara, Kaski, Nepal

LI-BIRD representatives

Basnet, Kiran, Programme Officer

Bhurtyal, Saraswati, Intern

Devkota, Rachana, Theme Leader for Social Research and Policy Advocacy and Focal Person for Gender Equity and Social Inclusion

Neupane, Sandesh, Project Officer

Paudel, Indra, Project Officer

Pudasaini, Roshan, Project Officer

Rana, Pratima, Programme Assistant

Shrestha, Mahesh, Information and Publication Officer

Shrestha, Pitambar, Project Officer

Sthapit, Sajal, Programme Coordinator for Biodiversity and Ecosystem Services for Sustainable Livelihoods

Thapa, Keshab, Programme Coordinator for Community Resilience to Climate Change

Thapa, Balaram, Executive Director

Upadhya, Deepak, Programme Officer

National NGO representatives

Badal, Mahesh, Programme Officer, Parivartan Nepal

Rana, Ram Bahadur, CEO, Anamolbiu (private seed company)

Sharma, Jib Nath, Programme Officer, SAHAS-Nepal

Shrestha, Guna Kumar, Programme Coordinator, Macchapuchhre Development Organization

Sunar, Buddha, Chairperson of the Board of Directors, Dalit Welfare Organization

Bioversity International representatives

Bergamini, Nadia, Research Assistant, Bioversity International, Italy

Drucker, Adam, Theme Leader, *In Situ* and On Farm Conservation, Bioversity International, Italy

Elias, Marlène, Gender Specialist, Conservation and Management of Forest Genetic Resources, Bioversity International, Malaysia

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Carrascosa, Maria, Chairwoman, Red de Semillas “Resembrando e Intercambiando”, Spain

King, E.D.I. Oliver, Principal Scientist, M. S. Swaminathan Foundation, India

Passah, Wansalan, Acting Director, North East Slow Food and Agrobiodiversity Society, India

Schmidt, Chris, Director of Conservation, Native Seeds/SEARCH, USA

Shrestha, Pratap, Regional Representative and Scientific Advisor, USC Canada Asia Office, Nepal

Annex III: Notes from group discussions on day three

Group 1: Kumari Krishna, Lal Kumari Thapa, Shanta Bohora, Phularani Tharu, Indrani Tharu, Rijana Chand, Dilsara BK, Marelene Elias, Saraswati Bhurtyal, Rachana Devkota, Gennifer Meldrum, Maria Carrascosa, Pratima Rana, Deepa Gurung

Group 1 chose to answer the first two questions together as they thought the questions were similar.

What is your vision for your community in 5 years? In this vision, what role do you see for agricultural biodiversity and custodian farmers? What are the actions that should happen or be happening to achieve your vision in this time frame?

- We envision a society brimming with agricultural biodiversity and greenery in which the farmers are united, technically knowledgeable, skilled and fully dedicated to continue the work of agricultural biodiversity conservation
- We want the market and development to contribute to conservation
- We want easy and affordable access to health care
- Easy exchange and access to knowledge and technology (such as biogas, handheld tractors, etc.)
- Skills to produce seed
- Increased use of local technologies
- We want to see all individuals interested and supportive for agricultural biodiversity conservation
- We want Nepalese to be able to produce their own medication using diversity
- We want farmers to be self-sufficient in agriculture through modernization
- We cannot eat money. Even if we have money, we will still need to eat good diversity. If there is conservation of biodiversity, we can have a good diet
- We want to be able to sell seed and produce in our local and regional markets so that consumers can have good access to diversity in food and produce
- School, roads, and technology are easily available
- Irrigation for food and vegetable production at home
- Illiteracy is common. We want to see our society members to be able to read and write through adult education
- Women continue to be behind men. We want to see women taking leadership roles and be able to share their experiences in confidence.
- Conservation of local varieties
- We want to see our society ahead in all aspects by working together.
- *Sabai janni janni, kas le lyaula pani?* (means, if everyone wants to be the boss, who will fetch the water?) If everyone wants to be a political leader, who will grow our food? Society needs all kinds of works to be done. We

want more respect for farmers. We want to see our children making a successful living through agriculture

- Developed local markets
- Seed that fits our environment. Seed exchange through modern processes
- Schooling for better education
- If villagers cannot contribute to conservation, we need to build their capacity through training.

Aside from custodian farmers like you, who are the other actors/stakeholders (persons, institutions, etc.) that can influence your vision and desired actions within your community?

- Banks and clubs support us with loans and saplings
- Organizations help raise awareness of community seed banks
- The District Agriculture Development Office (DADO) provides agricultural support (pest, fertilizers, etc.). We would love to have instructions on safe use of pesticides, use of organic fertilizers
- Communication
- Transportation
- The government takes responsibility in conserving rare seeds
- Animal health service
- Organizations that work with us by building on our traditional knowledge and are committed to having a long-term engagement in our community
- District Forest Office (DFO)
- Higher level schools
- Ward office (Agriculture and Forest)
- Health post.

What change in behaviour (actions) of these actors / stakeholders do you see should happen to achieve your vision?

- Training in different subjects (such as: sapling and seedling nursery management, organic farming, use of post-harvest technology), workshops, exposure visits
- Theory and practical knowledge about agriculture and veterinary aspects.
- Junior Technical Assistant (J.T.A) courses for women.
- Higher education for children and adult education (*prodh sikchya*) for adults
- Engage youth (12 to 25 years old) and train them about crops, recipes and agricultural biodiversity.
- Provide education on traditional knowledge, skills and local varieties.
- Organize fairs and competitions about recipes and award prizes to young participants.
- Knowledge about practices and farming.
- Technicians, knowledge.
- Access to modern and better technologies, including for post-harvest and water harvesting for irrigation

- Provide access to local seeds and climate-friendly saplings, and conduct reforestation programmes
- Provide technical and health (first aid) services on time. Services of veterinary doctor for proper handling of pregnant and milking cow and buffalo would be helpful.
- Develop better road access for transportation of agricultural products,
- Control alcohol
- Control domestic violence against women.

What can custodian farmers do to bring about these changes in behaviour (actions they take)?

- Be active in our groups and campaign about agricultural biodiversity
- Help the members that are not educated and raise awareness about biodiversity and conservation
- Unite in groups and educate the members of the community about sustainable development
- Interact in workshops, seed exchanges and exposure visits with other farmers and share the outputs, local practices, constraints, benefits, etc. with interested people/ local farmer groups, etc.
- Encourage farmers to share their knowledge and seeds
- Organize at least one fair in a year to ensure that our traditions and traditional knowledge are not lost
- Lobby about the rights of custodian farmers
- Work in a group to end discrimination between men and women
- Fight against domestic violence and raise awareness on domestic violence
- Increase awareness to end social discrimination
- Engage more women in conservation work. Give them opportunities.

Group 2: Til Bahadur Rawal, Khem Chand, Harka Syangtan, Bibiana Rane, Redian Syiem, Man Bahadur Ghalan, Som Ale Magar, Karma Tenzin, Indra Paudel, Sandesh Neupane, Sajal Sthapit, Wansalan Passah, Guna K Shrestha, Oliver King

What is your vision for your community in 5 years? In this vision, what role do you see for agricultural biodiversity and custodian farmers?

- Increase in the number of farmers working for conservation
- Village is brimming with rich agricultural biodiversity (*krishi jaibik bibidhta le gaun harabhara*)
- We want our village to be recognized for its agricultural biodiversity
- We want to see lost varieties growing again
- Agricultural biodiversity gets appropriate market value
- We want to see custodian farmers playing the following roles: i) they are continuously engaged in conservation; ii) they increase the conservation and exchange efforts for important seed.

What are the actions that should happen or be happening to achieve your vision in this time frame?

- We want to see good practices such as seed collection, seed exchange, diversity block, diversity fair, etc. to continue on farm
- Agricultural biodiversity should be marketed appropriately
- Diversity conserving farmers should be supported
- Diversity fairs and promotions should be conducted at larger and larger scales.

Aside from custodian farmers like you, who are the other actors/stakeholders (persons, institutions, etc.) that can influence your vision and desired actions within your community?

- Agro-veterinarian shops
- District Agriculture Development Offices (DADO)
- NGOs – support in marketing
- Village Development Committee (VDC) – budget allocated for agricultural biodiversity management and conservation
- Commercial farmers
- Schools.

What change in behaviour (actions) of these actors / stakeholders do you see should happen to achieve your vision?

- Agro-veterinarian shops should help with marketing of local seeds, organic manures, producing local medicinal herbs and medicines. Currently they focus mostly on improved and hybrid seeds, fertilizers and pesticides
- DADO should set aside agricultural biodiversity area and provide recognition to custodian farmers
- NGOs should provide additional support for marketing and creating incentives for custodian farmers
- Technical backstopping strategy for agricultural biodiversity conservation
- Commercial farming of local crops and their conservation
- Schools should develop and teach curriculum regarding agricultural biodiversity and organize student visits to agricultural biodiversity conservation areas
- Forestry groups tend to plant limited diversity. In the future, we want them to plant diverse plants, including medicinal ones. After deforestation, barren lands have been restored by monoculture. Also need to control deforestation
- Need to establish rules and regulation and their implementation
- What can custodian farmers do to bring about these changes in behaviour (actions they take)?
- There are agro-veterinarian shops that consistently sell good quality seeds. Such shops should be supported by patronage
- Lobby to support the policy in VDC or District Development Committee (DDC) to increase access to agricultural biodiversity budget.

Promotion of agricultural biodiversity conservation programme

Group 3: Surya Adhikari, Kaliram Tharu, Kanchan Raj Pandey, Jacob van Etten, Hugo Lamers, Kiran Basnet, Deepak Upadhya, Keshab Thapa, Nadia Bergamini, Buddha Sunar, Mahesh Badal, Pashupati Chaudhary, Adam Drucker

What is your vision for your country in 5 years' time? In this vision, what is the role of agricultural biodiversity and custodian farmers?

- Nepal will be a food secure country through a diverse and nutritious food culture built on diverse sources of crops, livestock, poultry, fishery, medicinal and aromatic plants. Where: i) farmers gain a good income and livelihood from their integrated farms; ii) custodian farmers continue to grow and share seeds and knowledge with their community members and their roles are recognized by the government; and iii) youth are motivated to take up the management of agro-biodiversity.

What are the actions that should happen/ be happening to achieve your vision in this time frame?

- Raising awareness about agricultural biodiversity policy and farmers' rights. Empowering farmers and their organizations to enable them to know and analyse agro-biodiversity policy to ensure that farmers' rights are well reflected and implemented
- Establishment of a network of custodian farmers
- Inclusion of agricultural biodiversity in educational curriculum (schools)
- Establishment and promotion of model agricultural biodiversity conservation areas
- Strengthening capacity of stakeholders of agricultural biodiversity at all levels
- Organizing policy dialogue with macro-level stakeholders
- Establishment of a fund for agricultural biodiversity management at the national level
- Generation of evidence through research on custodian farmers and agricultural biodiversity management (such as economics, environmental social and biological aspects)
- Organization of national and district level diversity fairs.

Who are the actors/stakeholders that can influence your vision and desired actions at the national level?

Micro-level:

- Custodian farmers, farmers' groups, Community Seed Banks, District Seed Sufficiency Programme (DISSPRO), Community Based Seed Production (CBSP), Local Leaders

- Village Development Committee (VDC) [Agriculture, Forestry and Environmental Committee (AFEC), Community Awareness Centre (CAC), Ward Citizenship Forum (WCF)]
- Schools and school teachers
- Agriculture service centre, livestock service centre
- Youth clubs
- Community based organizations (CBOs)
- Agro-veterinarian shops.

Meso-level:

- District Agriculture Development Office (DADO), District Livestock Service Office (DLSO), District Development Committee (DDC), Division cooperative office, District Soil Conservation Office (DSCO), District Forest Office (DFO), District Education Office (DEO)
- Federations
- District Chambers of Commerce and Industry (DCCI)
- Press
- International NGOs.

Macro-level:

- National Planning Commission (NPC), Ministry of Agricultural Development (MoAD), Department of Agriculture (DoA), Department of Livestock Services (DoLS), Nepal Agricultural Research Council (NARC), National Gene Bank, Ministry of Education (MoE), Ministry of Forests and Soil Conservation (MoFSC), Department of Forests (DoF), Department of Soil Conservation (DoSC), Ministry of Federal Affairs and Local Development (MoFALD). Federation of Nepalese Chambers of Commerce and Industry/Agro Enterprise Center (AEC-FNCCI). Other Federations (NGOs, Cooperatives, Community Forest User Group (CFUGs), Water users, etc.). International Development Partners (e.g.: the Food and Agriculture Organization of the United Nations (FAO), the International Fund for Agricultural Development (IFAD), The Development Fund, Norway, Bioversity International, The Swiss Agency for Development and Cooperation (SDC), DF, Department for International Development (DFID), United Nations Environment Programme (UNEP), Global Environment Facility (GEF), Japan International Cooperation Agency (JICA), etc.

What change in behaviour (actions they take) of these actors / stakeholders do you see should happen to achieve your vision?

- Stakeholders initiate and promote programmes on agricultural biodiversity conservation, recognizing the importance of agricultural biodiversity and understanding the local situation (opportunities, problems, and ways ahead)
- The government establishes priority programmes on agricultural biodiversity conservation
- Custodian farmers and their networks are invited and included in national planning and policy making process
- Custodian farmers are rewarded and recognized for their contribution through prizes

- Many NGOs do not work in agricultural biodiversity. We want to see more NGOs working on agricultural biodiversity (integration in their programmes)
- Domesticated wild species should have free mobility within the country like agricultural planting materials and products, rather than farmers being given difficulties by police/ forest police
- Private sectors cooperate and coordinate in agricultural biodiversity conservation
- Joint implementation of programmes and projects by multiple stakeholders.

How can these changes in behaviour (actions they take) be facilitated?

- Training and capacity building
- Policy lobbying/dialogue
- Consultation workshops with farmers networks
- Exposure trips (for planners/policy makers) to custodian farmers' farms and other agricultural biodiversity sites
- Funding support
- Research and evidence generation
- Creating a multi-stakeholder forum
- Regularly involve stakeholders in the planning process
- Promotion of an integrated planning, monitoring and evaluation approach.

Group 4: Indra Devi Oli, Ram Ekwel Yadav, Dharma Datta Baral, Krishna Hari Ghimire, Rinchen Dorji, Pitambar Shrestha, Bhuwon Sthapit, Jib Nath Sharma, Bharat Bhandari, Stefano Padulosi, Chris Schmidt

What is your vision for your country in 5 years' time? In this vision, what is the role of agricultural biodiversity and custodian farmers?

Our vision is a food and nutrition secure Nepal where agricultural biodiversity is used effectively to eliminate malnutrition, hidden hunger to create resilient food system and deploy genetic resources as a foundation for production systems adapted to change. This vision will be realized through full appreciation of the roles and rights of custodian farmers in contributing to sustainable use and conservation of agricultural biodiversity.

What are the actions that should happen or be happening to achieve your vision in this time frame?

- Self-sustaining in seed and rich in agro biodiversity
- Replication of custodian farmers' role by other farmers
- Find out (search) and maintained threatened crop and variety in different location of the country like finger millet, buckwheat, etc.
- Market channel developed from farmers community to market
- Block development (in community) in suitable climatic zone (Himali ban in Himalyan area). Certain areas should be set aside for agricultural biodiversity conservation

- Extension offices supporting on farm management of agricultural biodiversity (i.e. community biodiversity management (CBM)) as a regular programme
- Consolidate roles and rights of custodian farmers for conservation, innovation and dissemination of locally important agricultural biodiversity through important local institution
- Reduce rate of malnutrition
- More resilient food production
- Foundation for adaptation (wider genetic base as foundation for adaptation). Custodian farmers will have been explored/ identified, organized and supported by government programmes
- Collect and conserve all cereal crops and its varieties in the genebank and documentation of its associated traditional knowledge
- Options of diverse local food continue to be available now and in the future across the country
- Community seed banks and custodian farmers are linked effectively to National Genebank
- Participatory documentation and monitoring system developed and implemented
- Have an effective early warning system from climate change perspective to counter the threat to loss of existing agricultural biodiversity and traditional knowledge system
- A robust programme of education for farmers in seeds saving to facilitate adaptation and seed sovereignty
- Develop school curriculum to promote sustainable conservation/ use across the country.

Who are the actors/stakeholders that can influence your vision and desired actions at the national level?

- International: International Fund for Agricultural Development (IFAD) investment loans/ Bioversity international /United Nations Environment Programme (UNEP) project
- National: Ministry of health and education, Network for Agrobiodiversity Conservation in Nepal (NABIC), Universities, Nepal Agricultural Research Council (NARC), National Gene Bank, NGOs, Ministry of Agricultural Development (MoAD), Global Environment Facility (GEF). Local: District Development Committee (DDC)/District Agriculture Development Offices (DADOs), Village Development Committees (VDCs), Community Seed Banks, Private Sector
- Indigenous community partnership.

What change in behaviour (actions they take) of these actors / stakeholders do you see should happen to achieve your vision?

- IFAD: recognize the role of agricultural biodiversity to address malnutrition and poverty in Nepal and finance

- Bioversity International: Foster greater cooperation within and outside Nepal to support implementation of the vision
- GEF/UNEP project: Provide more funding for sustainable conservation through use of agricultural biodiversity in Nepal
- Ministry of Education and health: Support inclusion of agricultural biodiversity relevant topics in curricula at all levels
- DDC/VDC: Recognize the role of agricultural biodiversity in improving livelihood and mobilize resources for management of agricultural biodiversity by farmers
- MoAD: Implementation of provisions of National agricultural biodiversity policy 2007
- Mobilize resources to strengthen the work of community seed banks/ custodian farmers
- Community seed bank: Local institutional mechanism to increase access of local varieties and benefits sharing/ social learning
- NABIC: Mission of NABIC is self-sustaining agricultural biodiversity conservation and promotion initiatives by bringing together various community based organizations (CBOs)/ NGOs/ custodian farmers
- NGB: Work more closely with community seed banks, custodian farmers in surveying, characterizing, evaluating, documenting conserving and disseminating / exchange agricultural biodiversity
- Capacity building of community seed banks/ custodian farmers in technical aspects
- Integrate and support community seed banks/ custodian farmers in national plant genetic resources conservation system
- Private sector: Appreciate the role of the value of agricultural biodiversity and integrate in seed production activities
- Indigenous community group partnership: Cross learning.

How can these changes in behaviour (actions they take) be facilitated?

- Create platform of custodian farmers and community seed banks to dialogue with policy makers for reorganization, support and implementation of action plans (use platform of NABIC) through media
- Key stakeholders (Bioversity, NARC, LI-BIRD and Department of Agriculture (DoA)) discuss with IFAD for agricultural biodiversity loan/grants
- Exploring UNEP/GEF portfolios to leverage past efforts of agricultural biodiversity conservation in Nepal focusing on conservation and use approach
- Lobbying for to institutionalize award system to custodian farmers/ community seed banks and explore possibility to support from private sector
- Biodiversity support NABIC/network of CSBs for application of benefit sharing fund to strengthen CSBs/custodian farmers capacity to manage agricultural biodiversity.



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