

Evaluation of Best Practices for Landrace Conservation: Farmer Evaluation

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Preface

Traditional farming systems and conservation of local cultivars and associated indigenous knowledge are under threat and growing pressure resulting in genetic erosion of crop diversity. These systems are an essential component of sustainable crop production, household income and human nutrition for many of the poor farmers found in fragile semi-arid ecosystems of sub-Saharan Africa (SSA). With the signing of the Convention on Biological Diversity (CBD) in 1992, *in situ* conservation for crops and their related genetic resources has been given prominent mention in global and national policies for biodiversity conservation. *In situ* strategies are an important and complementary component of the overall agrobiodiversity conservation efforts that aim to conserve not only crop genetic resources but also crop evolutionary processes. However, policy support of the science and practice of *in situ* conservation, lag behind CBD commitment in much of SSA.

The need for activities on *in situ* conservation of plant genetic resources is emphasized in the CBD and in Agenda 21. Article 2 of the Convention specifically includes reference to domesticated or cultivated species. This is also anticipated in Article 8, which requires signatory Nations to “preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity ...” Agenda 21 reflects this commitment to *in situ* conservation as an essential component of sustainable agriculture, and in Chapter 14, notes the need for establishing programmes and policies to strengthen *in situ* conservation. In its second meeting, the Conference of the Parties to the CBD (COP 2) identified implementation of Article 8 of the CBD as a high priority and reaffirmed the importance of regional and international cooperation for the implementation of this Article. It also stressed the importance of the exchange of relevant information and experience among all stakeholders on measures taken for its implementation (Decision II/7 of COP 2).

Many national PGR programmes in SSA are unable to meet their obligations towards *in situ* (more specifically on-farm) conservation as stated in the CBD and the Global Plan of Action (GPA) because of ineffective enabling of national policy environments that do not support traditional farming systems and *in situ* conservation on-farm.

In order to strengthen the capacity of countries to implement effective policy, Bioversity International and national programme partners developed a project on “Community-based management of plant genetic resources in arid and semi-arid areas of Africa” funded by the Global Environment Facility (GEF) through the United Nations Environment Programme (UNEP). The countries involved in the project were **Benin, Burkina Faso, Ghana, Kenya, Malawi, Mali, Uganda and Zimbabwe**. Through case studies, the project analysed farming systems in semi-arid ecosystems in these countries, focussing on how these systems supported the conservation of landraces of local and global significance. The methodology described in the present publication was designed within this project to draw out ‘best’ practices on how landraces have been incorporated into farming systems and/or national agricultural policies and biodiversity conservation strategies. On one hand, the farmer or resource user determines what makes the practice the ‘best one’, and they base their choices on a survival strategy or utilitarian point of view. On the other hand, the scientists on the project primarily judged how effective the practices are in conserving agrobiodiversity at different levels. The project attempted to reconcile the two views in developing frameworks for the determination of ‘best practice’.

Our hope is that the lessons learnt from project experiences will be used to develop models to begin to integrate and incorporate the approaches into national decision-making strategies on PGR at policy level. This is in accordance with article 6b of the CBD of which the COP of the CBD has requested the GEF to take action thereby advancing global efforts to safeguard the world’s plant genetic resources.

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This methodology is a product of a **Bioversity**-coordinated project conducted in semi-arid ecosystems in **Benin, Burkina Faso, Ghana, Kenya, Mali, Malawi, Uganda** and **Zimbabwe**, with implementation support from the United Nations Environment Programme (**UNEP**) and co financing from the Global Environment Facility (**GEF**). The authors would like to thank the United Nations Environment Programme and the Global Environment Facility for their financial and technical backing.

The project that generated the methodology outlined in this manual benefited enormously from the input of many experienced unnamed individuals, especially farmers and communities around Africa who provided much information of value to the project. The authors would like first to thank them and the members of the national project teams in **Benin, Burkina Faso, Ghana, Kenya, Mali, Malawi, Uganda** and **Zimbabwe**, particularly their country focal persons: Mr Nasser Baco, Dr Didier Balma, Professor Edwin Gyasi, Mr Godfrey Muthamia, Dr Amadou Sidibe, Mr Kingslay Kapila, Mr John Mulumba Wasswa and Mr Claid Mujaju. We are grateful to all the participants—from farmers to development workers, researchers and government officials—who helped to shape the thoughts expressed in this report.

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Finally, we would like to thank Dr Bhuwon Sthapit of Bioversity Nepal, who originally introduced us to the participatory extent and distribution (or four-square) analysis, which plays such a central role in this methodology.

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Introduction

The challenge of developing a methodology for farmer evaluation of practices for landrace conservation lies largely in finding a systematic way of determining whether practices are likely to contribute to maintaining high levels of diversity on-farm. We have taken an approach that evaluates a practice's importance for rare landraces and the practice's contribution to the main farmer livelihood strategies: in other words, is the practice helping rare landraces survive, and is the practice sustainable?

We have attempted to make the evaluation process truly participative, involving farmers not just in an extractive information gathering process, but also in a large part of the analytical process. The process aims to provide farmers as well as development agents and researchers with new insights into what keeps landraces on farms. In addition, the process attempts to be sufficiently objective (though not impersonal) to convincingly communicate this information to a broader audience of researchers and development workers.

The method involves three basic steps (each constituting a different visit) with farmers:

- The participatory analysis of extent and distribution of landrace diversity (also known as the four square analysis), which aims to identify the rare landraces, their traits and possible practices for landrace conservation.
- The evaluation of the importance of practices for the survival or maintenance of rare landraces.
- The evaluation of the contribution of these practices to three basic livelihood strategies for which farmers often use diversity: risk minimization, resource-use optimization and diverse end uses, including sale.

We recommend that each stage is completed in a number of villages, before moving on to the next stage. We also show how researchers can gain additional insights through statistical analysis of the data and propose opportunities for discussing these results with farmers.



1. Participatory extent and distribution analysis (four-square analysis)

Farmers generally manage landraces in the form of farmer-named varieties that are unequally distributed among and within farms. Two dimensions of a landrace's distribution are how many farms it is grown on, and what area it is grown on within each farm.

The first step towards our objective of identifying best practices for landrace conservation uses the four-square analysis to identify varieties that are rare and possibly threatened by looking at these two dimensions; the reasons for the variety's status; and provides the initial insight into what practices help to maintain these rare varieties in the system. The study should focus on one or two major crops, conducting the exercise for one crop at a time, as it is likely to prove too time consuming to repeat for many crops.

Materials required

1. Objects to represent varieties:
These may be some identifiable part of the plant, such as yam tubers, bean seeds, etc.
Cards may represent the varieties with a variety name on each card.
2. Four squares for placing the varieties in during the four-square analysis:
This may simply consist of two lines of 2 x 2 m drawn in the sand, or a flip chart or blackboard.
3. Drawing tools:
Depending on whether the four-square analysis will be carried out on the ground or on a flip chart or blackboard, appropriate drawing tools are needed.
4. Seating for the participants.
5. Data sheets.
6. Photographic camera.

Participants

There should preferably be a minimum of eight participating farmers for each group to be formed during the analysis, that is, if two groups are to be formed, one with older farmers and one with younger farmers, a minimum of sixteen farmers are required. In some cases it may also be of interest to have a separate group or two for women, if numbers allow.

Each group requires a facilitator and two scribes. Once farmers understand the principle, the facilitator may well come from among the farmers.

Process

When organizing the event, farmers may be asked to bring a sample of each variety to use in the subsequent exercises.

Farmers are split into groups as described above under "Participants". Farmers then create a list of varieties, including those that no longer exist in the village. The young farmers are asked to list all varieties currently grown in the village and the older farmers are asked to do the same for varieties grown 20-40 years ago (select the most appropriate time frame with farmers).

For the best participatory effect, two lines measuring 2 x 2 m are drawn on the ground as shown in Figure 1. A number of houses are then drawn in the top two quadrants to indicate that varieties grown by many households are to be placed in these quadrants. One house is drawn in each of the lower quadrants to indicate that these quadrants are for varieties grown by few households. A large circle is drawn in each of the quadrants to the left and a small circle in the quadrants to the right to indicate that these quadrants are for varieties grown on large and small areas of land respectively. In case appropriate space is not available, a flipchart or blackboard may be used instead.

Farmers stand or sit around the four-square design. The facilitator stands in the middle of the four-square holding up the first variety and asks whether this variety is grown by many or by few households. As farmers respond, the facilitator moves to the relevant half of the square. The facilitator then asks whether the variety is grown on large areas of land or on small areas of land. When farmers respond, the facilitator places the variety in the appropriate quadrant. The process then moves on to the next variety. The facilitator should try to get a farmer to take over the facilitation as soon as they appear to understand what is expected. In cases where a sample of each variety is not available or is impractical, other objects or cards with the variety names may be used to represent the varieties.

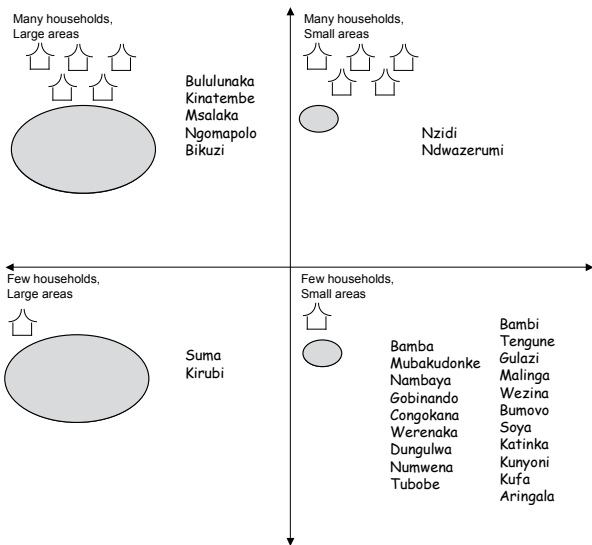


Figure 1. Participatory extent and distribution analysis (four-square analysis)

In many cases farmers will agree immediately on where a variety belongs, but in other cases there will be considerable discussion before deciding where to place it. Often it is useful to prompt with comparative questions such as, “Is it grown on smaller or larger areas than variety X?” Occasionally farmers will not know enough about what other farmers are growing to answer the question. This may be resolved through more discussion, but in a few instances has required the organization of farm visits before doing the analysis.

While this is going on, the scribes do two things. One takes notes about the different varieties and comments made about them, using Table 1. The other listens for indications of practices and takes notes on these, for instance a comment about a variety being suitable for making beer leads the scribe to record the practice of brewing.

When all the varieties have been placed in a square, the discussion moves back to details of each variety with the objective of completing Table 1 in the Annex for every one of the varieties. One variety is taken at a time. The facilitator asks when it was first introduced to the village and from where. If it is no longer grown in the community, the facilitator asks for the year that it was last grown. Only a very approximate answer is expected. Then the discussion moves on to positive and negative traits of the varieties and comments about them, taking particular note of personal experiences with the varieties. It is on these points that the four-square comes in really useful. Often farmers will say some very positive things about varieties in the bottom right corner or negative things

about varieties in the top left corner. This gives the facilitator the opportunity to challenge what is being said, often leading to further discussion that sheds new light, not only on the variety, but also on farmers’ priorities and strategies. At this point it is important that the second scribe is teasing out practices (see section 2 for definition) from the discussion.

To bring all farmers into the discussion as early as possible, it is important to pick on some of the rare varieties early in the discussion and to ask the farmers that grow these varieties for comments. Once again, comparative questions come in useful, “Does this common variety (in the top left corner) taste worse/better than this rare variety (in the bottom right corner)?”

Patterns should be sought, for example, we have on a number of occasions seen that the varieties in the top right hand corner have high but unstable yields, so that all farmers will grow them hoping for a good season with a high yield, while they do not dare grow very much of these varieties as they may fail in bad seasons. Other patterns have been detected that will not be mentioned here to avoid biasing the research.

The length of this exercise will depend very much on the number of varieties present in the community for the particular crop under study, but will often take from two to four hours. It is advisable not to rush the process as some of the most interesting information comes out of the deep probing that goes on when the facilitator is patient.

If time allows, presenting a preliminary list of practices and asking farmers to comment and add additional practices can complete the day’s work.

Follow up

Based on the day’s discussion, previous project experience and the literature review, develop a preliminary list of practices for the next visit.

2. Conservation practices and their relationship with varieties

This exercise helps determine which practices are important for the maintenance of which varieties. By looking at which practices are of specific importance to rare varieties, we get an evaluation of a practice's contribution to conservation.

Materials required

1. Flip chart or blackboard.
2. Drawing tools: Depending on whether using a flip chart or blackboard, appropriate drawing tools are needed.
3. Seating for the participants.
4. Data sheets.
5. Camera.

Participants

The participants should as far as possible be the same as in the previous exercise, and divided into the same groups.

For the plenary session it is a good idea to have a facilitator and a scribe, while for the group session, one person can probably handle both tasks.

Process

The approach described in this manual was developed in a project on "Community-based management of plant genetic resources in arid and semi-arid areas of Africa" funded by the Global Environment Facility (GEF) through the United Nations Environment Programme (UNEP). In that project the following definition of a good practice was used:

Broadly conceived, a good practice for conservation of landraces is a system, organization or process that, in a given space (from the local levels of resolution through the national and regional to the global), and over time, maintains, enhances or creates crop genetic resources and ensures their availability to and from farmers and other stakeholders for improved livelihoods on a sustainable basis.

The day starts with a discussion of what factors contribute to conservation, defined as the sustained use of a landrace in production systems. The

participants are presented with the project definition of a practice translated into the local language and explained in terms comprehensible to the community. The definition is discussed in relation to local circumstances.

Based on this definition, the participants review the list of conservation practices to complement it and to ensure that the groups are later working with the same list and the same understanding of the list. It is important to capture local systems and organizations that may contribute to the conservation of landraces, though their contribution may not at first be obvious.

Table 2 in the Annex is filled out for each practice. This involves describing the practice, preferably to a degree where someone else could replicate the practice based on the description (under the heading, "How is the practice carried out / techniques"). The rest of the table is about the farmer's objectives with the practice, who decides the objective, who is directly involved and how, strengths of the practice and weaknesses, limitations, or difficulties with the practice. This preliminary description of the practice can be light with a substantially more in-depth description sought for the most important practices once their importance has been analyzed.

The participants are then divided into the groups of the first day to discuss the merits of each practice in relation to specific varieties. Table 3 in the Annex is used for this discussion. The practices are listed down the left-hand column. The varieties for which the practice is very important are then listed in the second column. These are the varieties that might be threatened if this practice was not maintained. The third column (normal importance) is usually where most varieties would be expected to fall and if working with a large number of varieties, it may not even be necessary to fill in the column. It can be considered the default column, that is, where the varieties not appearing in the two other columns belong. The varieties for which the practice is of particularly low importance are listed in column four.

When you have gone through all the practices, you can now refer to the four-square analysis to provide a score in the last column, based on the following criteria:

- A score of **three** is given to a practice for each variety that is grown by few households on small areas of land **and** for which the practice is of high importance.
- A score of **one** is given to a practice for each variety that is grown by few households on large areas of land **and** for which the practice is of high importance.
- A score of **one** is given to a practice for each variety that is grown by many households on small areas of land **and** for which the practice is of high importance.
- **No** score is given to a practice for varieties that are grown by many farmers on large areas of land, as these varieties are not considered threatened.
- **No** score is given to a practice for varieties for which the practice is of normal or low importance, as the practice is not considered crucial to these varieties.

The scores for each practice are then added up to have a score for the overall conservation value of the practice.

This part of the exercise does not usually take very long, but it is important to keep each group's list separate to allow for some analysis of consistency among groups.

If time allows, the groups can now assemble to present their results to each other and discuss differences. The scribe captures these points in freeform, which requires considerable skill.

Follow up

Before the next interaction with the community, the research team should organize and analyze their data. A biplot of varieties and practices as shown in Figure 2 should be drawn up on a flipchart for discussion with the community.

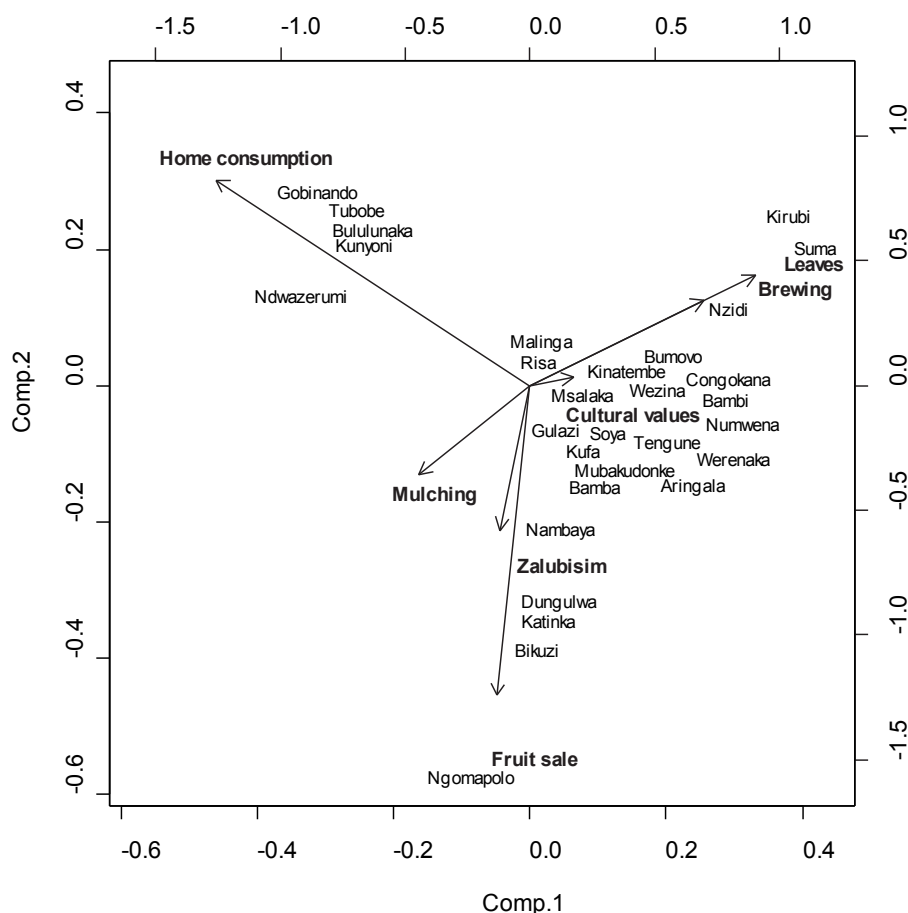


Figure 2. Principal components analysis of the relationship between best practices and varieties. The arrows represent practices and varieties are written in black. Varieties will generally be situated in the direction of the practice that is most important to their survival.

3. The contribution of conservation practices to basic livelihood strategies

This exercise helps determine the contribution that a practice makes to farmers' livelihood strategies based on natural resource management. As farmers are unlikely to maintain diversity simply for its own sake or the general benefit to society that conserving diversity could provide, an indication of the private value, or personal benefits, of maintaining diversity and the associated practices is a good indicator of sustainability of a practice.

Materials required

1. Flip chart or blackboard.
2. Drawing tools: Depending on whether using a flip chart or blackboard, appropriate drawing tools are needed.
3. Seeds of different colours and shapes for scoring. Enough colours and shapes are needed for each participant in a group to have his or her own distinct shape or colour. This could, for example, be four different colours or shapes of beans, some maize seeds, some peas, some cowpeas and some sunflower seeds.
4. A large number of empty tins. One tin is needed for each practice in each group.
5. Seating for the participants.
6. Data sheets.
7. Photographic camera.

Participants

The participants should as far as possible be the same as in the previous exercises, and divided into the same groups.

Process

This session starts off where the previous session ended. If the groups did not manage to present their results to each other during the previous session, the day should start with this. Otherwise go straight to the next step.

The biplot of varieties and practices is presented to the participants for discussion. This is a very visual way of presenting the relationship between practices and varieties, which facilitates the discussion among farmers and between farmers and researchers.

In the sample biplot in Figure 2 we see that different practices are important for the maintenance of different varieties, which essentially means that no single practice will conserve large levels of diversity and that a diversity of practices is therefore essential to maintaining high levels of diversity. The result may not be the same in all situations and if the team sees that some villages have had very different results, it may be worthwhile to show the diagrams from other villages as comparisons.

This part of the exercise also serves to demonstrate the researchers' willingness to bring research results back to farmers and helps to cement a collaborative relationship between the two parties.

After the review of the biplot, the participants break into the same groups as in the previous exercises. Each group participant is given a different colour or shape of seed for scoring the practices during the exercise. This later enables the scribe to record the scores given by each participant, which in turn makes it possible to carry out a statistical analysis of the scores. The groups then work on filling Table 4.

The facilitator describes the process and particularly the three diversity-based livelihood strategies described below that form the criteria for the evaluation. These criteria are based on extensive prior fieldwork with farmers, and although they may not cover all possible aspects, experience shows that it is difficult to handle more criteria in practice and that the key considerations for farmers can usually be classified under these three headings. The three strategies are described below:

1. Enhance diverse uses of farmers' varieties

Different varieties have a number of different uses, largely divided into:

a. *Products*

Example: Some sorghum varieties are good for producing porridge; others for boiling; others for beer production; others meet the requirements of the market; some have stalks good for fencing; others are suitable as fodder; others have sweet stalks for chewing; one variety is used as a coffee substitute.

Key question: Does the practice increase the number of different ways in which the crop is used (including the creation of new niches), or does it enhance specific uses?

b. *Services*

Examples: Ecological ones, notably soil nitrogen fixation and pest control by certain plants; spiritual functions, notably the growing of special types of yam, *Dioscorea* sp. for the purposes of honouring God and ancestors and for heralding annual traditional festivals in Ghana, and also the reported intermixing of some black-grained cowpea varieties with other varieties for the purpose of keeping away evil spirits in Mali.

Key question: Does the practice increase use of unfarmed areas within the extensive land holdings, for example, a conserved forest that harbours wild or semi-wild varieties of yam, cocoyam, and cassava?

2. Optimize the use of diverse on-farm resources

a. *Ecological niches*

Different varieties make use of different ecological niches within the landscape, that is, they are adapted to different topographical and biophysical conditions and, therefore, make more effective use of the natural resources underpinning the agro-ecosystem.

Key question: Does the practice increase the number of ecological niches in use (including the creation of new niches), or does it enhance the use of specific niches?

b. *Land*

Un-farmed patches within extensive agricultural holdings may be used for conserving a diversity of wild and semi-wild relatives of crops cultivated in the farmed areas.

Key question: Does the practice increase use of unfarmed areas within the extensive land holdings, for example, a conserved forest that harbours wild or semi-wild varieties of yam, cocoyam, and cassava? Subsequent questions: See questionnaire.

c. *Labour*

Different varieties have different seasonal labour requirements, or can be better adapted

to the labour resources available, or particularly adapted to existing labour constraints. Key question: Does the mix of varieties grown make for greater and balanced use of the available labour, from the perspective of gender and age during the day and over the seasons?

3. Increase resilience of the system and/or reduce risk

Farmers have several strategies for maintaining the ability to recover from shocks, for example, of civil war, or avoid losses or changes in the system. They include: exploration and collection, seed exchange and markets, home gardens, seed storage methods.

Key question: Does the practice increase farmers' ability to recover from, or minimize losses or adverse changes in the system?

Also, farmers face many risks. They include:

- Climate variability
- Pests and diseases
- Fluctuations in market conditions

By growing different varieties with different susceptibilities to these risks, farmers attempt to ensure that they harvest at least something every year. For example, a farmer may grow a high-yielding variety that is susceptible to a disease hoping that the climate will be unfavorable to the disease, but then also grow a lower-yielding variety that is resistant to the disease to insure against a bad year. A market example would be a farmer growing both a red sorghum variety for sale to the breweries, and a white sorghum variety for sale at the local market. As the prices of the two do not necessarily follow each other, this provides some insurance against a collapse in the price of one of the two.

Key question: Does the practice produce varieties with differential susceptibilities to known risks?

Going over one practice at a time, farmers are then asked to score the practice's contribution to each of the livelihood strategies on a scale from one to five by placing one to five seeds in a tin representing the practice. Farmers are asked to consider both the relative contribution to each of the criteria and the weighting among practices. There are situations where farmers tend to say that everything is important and give the same score to all, or to score only zero or five. This situation can be avoided with

Careful explanation and a step-by-step approach to ensuring that everyone has understood the approach. While farmers should be able to discuss the relative merits of practices *vis-à-vis* the livelihood strategies, they should not openly discuss the scores that they give.

The scores are counted and written up on a flipchart with Table 4. The groups get together to discuss the scoring in plenary. Results from the sustainability scoring of practices should be compared with the conservation scores and the implications for development actions discussed. What is likely to affect the continuation of these practices positively or negatively? The discussion should move on to actions that can be taken to improve landrace conservation for the long-term benefit of the entire community.

Follow up

The information gathered through the above exercise should be thoroughly analyzed and written up in a technical report that should include the following sections:

- Summary
- Introduction
- People, materials and methods

- Communities involved
- Data gathering process
- Analysis
- Results
- Discussion
- Recommendations
 - For communities
 - For projects
 - For policy makers
- Appendices
 - Detailed description of each practice
 - Description of each variety
 - Others

The next step, not covered by this manual, involves the evaluation of best practices for landrace conservation by the project team. This includes a much broader range of criteria, and a more free-form evaluation based on the years of experience of project participants.

The final step includes an evaluation of best practices for landrace conservation by policy and decision makers with a view to incorporating these practices into national development strategies. This step should to a large extent be led by the policy makers, to ensure ownership and commitment.

Annexes

Annex 1

Table 1.

Variety name:

Year of introduction:

Source:

Year last grown (if no longer available):

Positive traits:

Negative traits:

Comments and personal experiences:

Annex 2

Table 2.

Practice:

Farmer's objective with practice:

Who decides objective?

Who is directly involved and how?

How is the practice carried out / techniques?

Strengths of practice

Weaknesses / limitations of practice

Annex 3

Table 3.

Practice	Varieties for which practice is of high importance	Varieties for which practice is of normal importance	Varieties for which practice is of low importance	Score

Checklist of areas to consider when brainstorming for conservation practices

- Seed selection
- Sourcing new cultivars
- Seed sourcing
- Evaluation methods – variety testing techniques
- Seed multiplication
- Seed exchanges
- Project interventions
- Community organizations
- National legislation that effects conservation
- Market channels
- Infrastructure
- All uses – from commercial uses to cultural values, etc.

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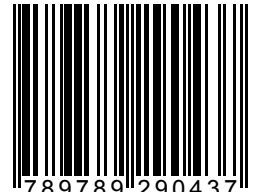
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