5

SECTION

Key informant and land user interview

Introduction

Results emerging from the community focus group discussion, household livelihoods interviews and other parts of the assessment should be used by the team to cross-check or discuss further with specific land users and key informants. These land user and key informant interviews need to be flexible and the questions posed according to the issues requiring further discussion. In particular, it will be important at some point to discuss aspects of sustainable land management and crop / pasture productivity with land users and with officials from land, water, agriculture and forestry offices. These individuals may offer plausible explanations for particular observations or behaviour.

The team should decide on the local land users and key informants who should be interviewed along the transect walk and during the detailed assessments of soil and vegetation, in order to understand the reasons why land users do or do not invest to maintain land productivity and ecosystem services.

This section includes guidelines to interview on aspects of land degradation and sustainable land management (Tool 5.1), on vegetation resources (pasture and livestock productivity) (Tool 5.2), and on cropping productivity and yield (Tool 5.3).

Tool 5.1 Land User and Key Informant Interview on LD / SLM

This interview focuses on sustainable land management and practices adopted to mitigate the impacts of land degradation in the study area, and can be conducted during the reconnaissance visit, transect walk or during meetings with natural resources officers. The team should question the interviewees on the following:

1. What are the main changes experienced in the study area (e.g. lower yields, increase in gullies, change in grazing species composition, invasive species, less palatable species, lower groundwater table, increase salinity, etc.)?

2. What is done to remedy this / these change(s)? What are the methods used to improve soil fertility, to reduce erosion, and to manage water resources? Has there been adoption of new practices and / or changed your management patterns?

If adoption:

3. Is the measure used to prevent, reduce degradation or rehabilitate degraded lands?

4. Who introduced the practice (Land user, extension officer, and project)?

5. What is the effectiveness of the new/ traditional practices (+, neutral or –)?

6. Is the practice labour demanding or costly to implement? Does it need special material, expertise or maintenance?

7. What is the % of farmers and / or herders using these practices?

8. What are the advantages and disadvantages or the practice? The possible replies include:
   - soil services (protective cover, organic matter and nutrient cycling and vulnerability to wind erosion (windbreaks, shelterbelts etc.);
   - water regulation (evaporation, infiltration, runoff and erosion) and water supply (surface, ground);
   - climate regulation (carbon sequestration; greenhouse gas emissions e.g. wetland, paddy rice);
   - productivity (status and trends) and livelihoods.

If no adoption:

9. What are the constraints that impede adoption of sustainable land management practices / conservation measures (e.g. insecurity of tenure, seasonal migration, land shortage, lack of capital, labour unavailability)?

10. Identify the sustainable land management practices implemented by land users to maintain land productivity and ecosystem services using Table 30.

Tool 5.2 Land User and Key Informant Interview on Vegetation Resources

Some initial information on vegetation resources will have been obtained from the initial community focus group discussion (Tool 1.1) and the reconnaissance / transect walk (Tool 2.1).

Additional FGDs on vegetation resources should be organized with 6-10 established community members separately for i) forest / woodland ii) grazing land and iii) cropland.

TABLE 30 **Field form – Sustainable land management practices**

Land degradation problem	**Sustainable land management practice**	**Conservation effectiveness** (+, neutral, -)	**Benefits of SLM practice**	**Utilization by land users in the area %**	**Constraints to adoption***

* Examples of Constraints: No perception of land degradation
No incentives to adopt SLM practices (e.g. insecurity of tenure, seasonal migration, etc)
No capability to remedy (e.g. land shortage, labour unavailability, lack of capital)

These persons should be experienced in using and managing these resources (e.g. for grazing, cropping, fuelwood and other products). There will be some variation in topics for discussion, depending on the local context, but some important topics are given here:

Identifying plant indicators

1. Has the quality of the [forest] [grazing] [crop] land changed over the last 20 years? How and why?
2. What plants show that [forest] [grazing] [crop] land/soil quality is i) good? or ii) bad? Do they have any particular characteristics?
3. Which plants have appeared in [forest] [grazing] [crop] areas that indicate that land quality and productivity has:
   i) improved? What do they indicate?
   ii) declined? What do they indicate?
   (e.g. grazing land: palatability / toxicity, overgrazing, annual vs. perennial grasses etc.)

(e.g. forest / wood land: loss of valuable species and products; invasive shrub species)
(e.g. cropland – weed intensity, infertile soils (e.g. parasitic weeds such as Striga) species resilient to salinity)

Record up to 3 plant species for each land use and for each species identified, record the local name and if possible, its botanical name. Where possible, photograph the indicator plants and, as required, collect samples to obtain the botanical / scientific names (see Table 31 below).

Checklists of indicator species can be developed within countries / agroecological zones.

Obtaining information on the grazing regime and stocking rate
To back up observations on the grazing regime and stocking rate, further information can be obtained through the FGD and through household interviews with land users and compared with the information obtained on the ground:

4. How many and what type of livestock are supported (no./ha/annum) (this may need estimation of herd size and common grazing area) and what are the trends (e.g. over the last (approx) 10 years)?;
5. What are the main livestock products (milk, meat, hides), yields/annum and trends?;
6. What are the forage production trends (increasing, stable, decreasing)?
7. What other significant sources of fodder are there?

If possible, record any given reasons for the changes. Technical experts may be able to provide information on carrying capacity and recommended stocking rates for specific vegetation types and agro-ecological zones.

Obtaining information on fires and drought risk / resilience and coping / management strategies
Discuss with informants the intensity and frequency of fires and droughts and their effects on vegetation and uses/products.

8. How common are fires (rare, occasional, frequent)? Are they wild or controlled?
9. How severe is fire damage to the rangeland and forest vegetation (none, low, moderate, severe)?
10. What effect (if any) does fire have on species composition in rangelands and forest (e.g. loss of valued species / products, increase in less palatable species, % of non re-sprouting shrubs that do not re-grow after severe fire / drought etc.)?
11. Are there any control measures (e.g. bye laws, fire breaks or fire committees)?
12. How frequent and severe are drought periods? (It may help to draw a timeline)

TABLE 31 **Field form – Plant indicator species**

Common name	Scientific name	What does it Indicate?	Specific qualities, characteristics	Causes/ pressures
1				
2				
3				
etc.				

13. Has drought caused any changes in land-use over the last (approx.) 10 years?
14. Are there any drought coping strategies (e.g. resilient species, bye-laws on grazing/ livestock/forest management, water harvesting/irrigation)?

Obtaining information on laws and regulations that affect vegetation quality

It is common for there to be many formal and informal policies, regulations and arrangements governing access and use of vegetation / forest resources. These should be identified and discussed. Specific questions are not detailed here but potentially interesting discussion points are:

15. Areas once heavily utilized may have become protected, preventing the harvesting of forest products, use for grazing etc.. What impact has this had on the vegetation and on the land-users livelihoods?
16. Customary (informal) regulations may be more significant / effective than formal policies and laws in controlling grazing periods, forest access etc.. Document both formal and informal mechanisms.

Tool 5.3 Interview with Land-User on Crop Productivity and Yield

It is important to understand the characteristics, management and environmental history of the sampling sites. Discussions with farmers are most important. The best location for this interview is in the field, next to the plots of interest.

Record all possible information as this is the basis of interpreting subsequent observations and measurements. These include items of management and environmental history, past information and trends over the last 5 -10 years and current information (not all factors are relevant depending on land use):

- land uses changes in terms of crop production;
- crops (type, health, yield - above or below expectations);
- land preparation/tillage: type, direction and depths;
- power: hand, animal, tractor (size);
- presence of minimum or no till (and for how many years / seasons);
- crop residues (kept in field, removed – partially or totally etc);
- fertilization (and response to) – organic (includes manures) and mineral;
- other soil ameliorants applied, for example lime, gypsum;
- land management such as bunding, levelling, terracing, (and if in specific areas of the site);
- rainfall (recent and historical) (e.g. “very wet at last harvest”);
- water for domestic and agricultural use:
  - Are additional water resources besides rainfall used (rivers, streams, boreholes, etc.)?
  - Are there problems with availability of water, flooding, water quality?
  - Are there difficulties in accessing water (perhaps prohibited by rules or laws or ownership issues)?
- have there been changes (in the last 1, 5, 10 years) in quality, quantity, access?
- what attempts have been made to introduce “best” or altered practices?
- land degradation observations – location, type, history, apparent causes.

This is a “check-list” rather than a fixed list of questions. Ask additional questions and / or explore additional areas if raised during discussion and relevant. It is important to probe on trends and changes when appropriate e.g. changes in land degradation and people’s

perceptions of its effects or the extent to which land-users engage with conservation / SLM.

Note: Although the objective of this interview is to provide contextual and management information to accompany the land degradation assessment it is important that the household livelihoods interview (Tool 7.1) builds on this interview and does not duplicate it when the land user is interviewed for both. Ideally, therefore, the record of this interview should be available to those carrying out the livelihoods interview and at least one member of the LADA-L team should be involved in both.

Time line - yield trend

Discussions with land users may reveal that yields have fallen over time and this may be an indicator that land degradation has taken place, particularly if the yield decline is found in areas suffering land degradation. Caution is required with interpretation, as crop yields are affected by many factors and there will not always be a "cause and effect" relationship between declining yield and land degradation when they are found together.

Even if yields are stable or increasing, land degradation may also be occurring, but its effects are not yet felt (e.g. on land cultivated for the first time) or masked by land user's management (e.g. increasing amounts of fertilizer use). Where the assessment team believes this is occurring, there is potential to use economic valuation tools to calculate the value of future lost production. These are not detailed here but can be powerful in demonstrating the impacts of LD / SLM on future production.

Change in crop yield may be caused by a decline in soil fertility among many factors such as extreme weather, pests / diseases etc. However, unlike the effects of extreme weather and pest / diseases, the effect of soil fertility on crop yield is usually more gradual. Reconstructing a crop yield time line can help to identify the causes of yield change and the extent of the impact of the change.

A time-line of crop yield can be constructed using the following steps:

- Find key informants and farmers who know about past and present conditions of the community and who are willing to share their knowledge. It is important to include elders in the community, because information relating to the past needs to be found and shared.
- Discuss how far back in time participants would like to talk about these issues. Draw a time line of particular events (e.g. drought, significant pest/disease attack, conservation/management practices, change of variety etc.). The time line of particular events helps participants remember and also helps to explain the change of crop yield over time.
- Participants can then write down the crop yield for 1980, 1990, 2000, 2005, 2010 comparing the yields from different years. It is better to use farmers' own units (e.g. the number of bags per acre), but it is useful to convert these units into standard units (e.g. kg/ha) when the exercise is completed. Record the information in Table 32.
- Discuss the yield-time lines with participants; attempt to assess the contributions of soil fertility decline, drought, diseases to the change and fluctuation of crop yield. Discussion topics which should be covered include:
  – If we have good rainfall now, can we get a yield as high as 20 years ago without using fertilizer?
  – (if no)
  – What inputs are required to get a yield as good as the yields 20 years ago?

TABLE 32 **Field form – Yield trend analysis**

Time (year)	**Yield**	**Events**

– If the yield has increased in the last 20 years, what are the main reasons for the increase?
– What is the highest yield in this area for a particular crop?

Economics of soil erosion and conservation

(This section has been adapted from Stocking and Murnaghan, 2001)

Impact of soil erosion on productivity

Soil erosion has both on-site and off-site impacts. The main on-site impact is the reduction in soil productivity which results from the loss of the nutrient-rich upper layers of the soil, and the reduced water-holding capacity of many eroded soils. Movement of sediment and associated agricultural pollutants into watercourses is the major off-site impact resulting from soil erosion.

The effects of erosion on productivity is site specific. The same amount of soil erosion can have different impacts in different soils, while for the same soil, the impact on productivity of same amount of soil loss varies with time (or the stage of erosion). Crop yield is often used as an indicator of soil productivity. Figure 21 shows the way in which yields (productivity) declines with cumulative soil loss – the sort of soil loss that could accumulate over a number of years, depending upon the rate of land degradation.

The impact of soil erosion can be partially masked by various soil management measures, such as use of fertilizers and / or organic matter (compost / manure). Part of these inputs is in fact used to compensate for the productivity loss caused by soil erosion and nutrient loss. The productivity impact of soil erosion can also be assessed using the extra compensating inputs.

The productivity impact of soil erosion is often mixed with other factors, which also contribute to crop yield changes, such as drought and pest attacks. A reliable way to isolate the erosion impact from other factors is to examine soil erosion and soil productivity changes over a longer period.

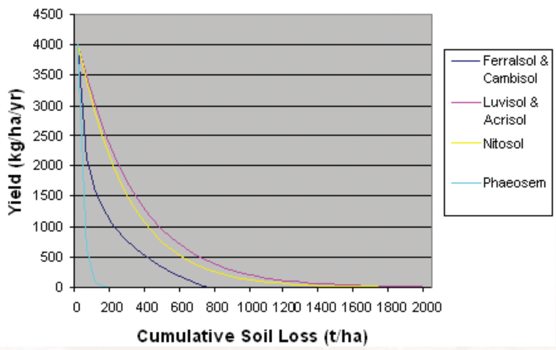

FIGURE 21 **Erosion-productivity relationships for different soil types**

Cost and benefit of soil erosion and conservation

Soil erosion involves a *cost* to land users, in terms of declined crop yield or increased input demand in order to maintain the same yield. By preventing soil erosion through conservation measures a *benefit* is derived for the land user in terms of yields and easier farming practices. Figure 22 a) and b) shows the costs of soil erosion and the benefits of soil conservation. The shaded part shows the cost and benefit measured as yield lost (compared with baseline of non-degradation) and yield saved (compared with base line of continuing degradation).

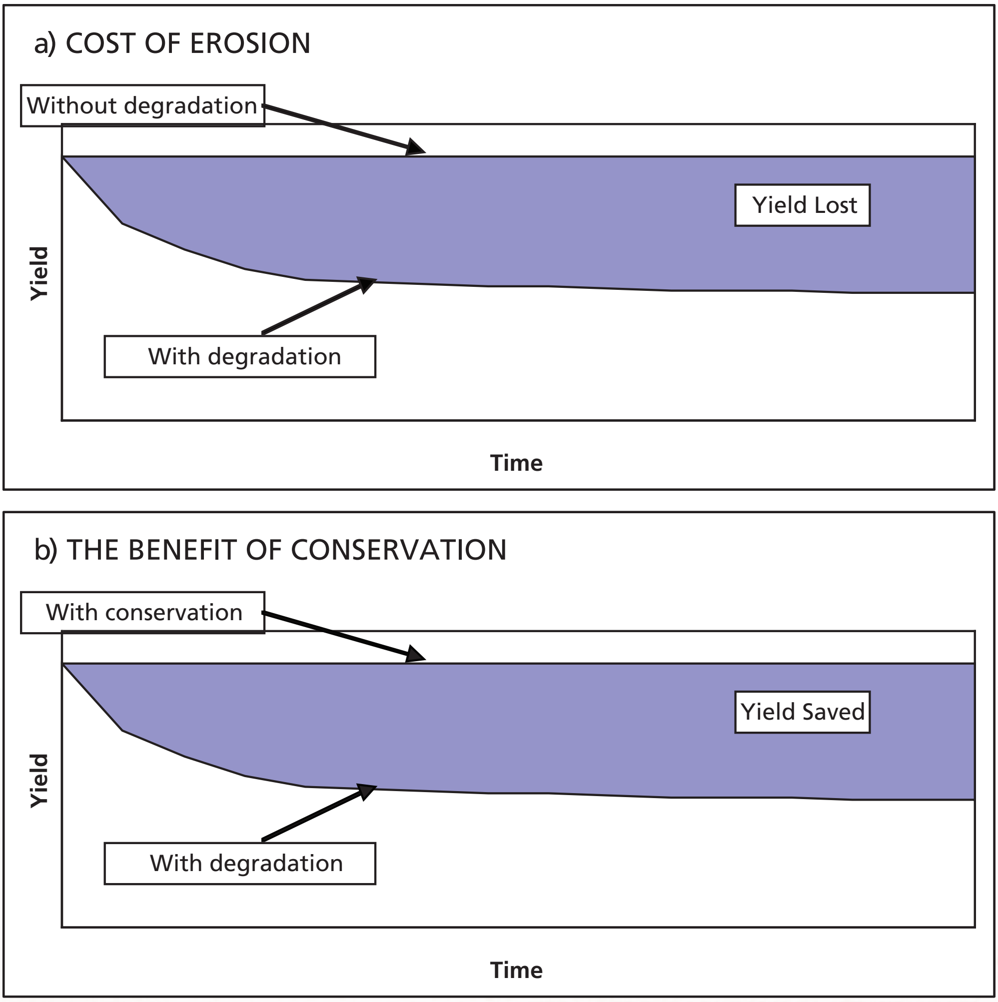

FIGURE 22 **a) Costs of erosion and b) benefits of conservation**

Comparing the costs and benefits of soil erosion and conservation is essential for land users to make decision on when and where conservation measures to be taken. Most of conservation measures involve extra costs, either labour, material or the land forgone. To determine which conservation measure is more appropriate, a cost-benefit analysis for conservation measures is needed.

The following 10 steps are a suggested approach for assessing the net benefit gained from implementing a conservation measure. They are given only in outline form, to illustrate the sequence – for more information the reader is referred to any standard text on cost-benefit analysis.

Step 1: Define the 'with' and 'without' technology situations.
A systematic description is needed of the technology to be appraised. How does it function? What does it do? What materials are needed to implement it? And so on.

> *In this example, the 'with technology' situation is single-row Gliricidia hedgerows planted across the contour. The 'without technology' situation is steep-slope arable cropping without any direct measure of keeping soil on the slope.*

Step 2: Convert the data into common units.
Usually it is sensible to convert field areas into hectares, and yields into kilogrammes per hectare, although locally relevant measures may also be used. Money should be in local currency terms, with values reflecting real values and real costs to the land user. So, crop revenues should be calculated based on the price paid to farmers for their crops – the producer price – not the price at which they can be bought in the market – the market price. Inflation is a major problem in many countries, so a fixed date for valuation will usually need to be specified.

Step 3: List the costs and benefits.
This is the first vital step in bringing the information into some common format – two columns representing costs to the land user and benefits. Field observations and data collected from farmers are vital in undertaking this listing. The list should include only costs and benefits that occur as a result of adopting the technology. Any cost or benefit that would also occur if the farmer did not adopt the technology should not be included. Double-counting of benefits must be avoided.

Step 4: List the monetary values for each costs and benefit
The monetary values must be based on the costs and benefits to the land user, expressed usually in local currency (such as Rupees) per hectare. Costs and benefits for which there are no monetary values are usually excluded.

Step 5: Identify the ranges in data to be used in the appraisal
One of the commonest mistakes is to assume that rural society is homogeneous and that all farmers have the same perspectives. Different farmers have different values and they give responses accordingly. This variation needs to be reflected in terms of minima and maxima (i.e. ranges in value that encompass the spread). These ranges are then used for further calculation; they will identify especially where some farmers may gain a net benefit and others a net cost because of their different circumstances.

Step 6: Identify the time period for the appraisal
The time period may be the life of the technology itself, as recognised by farmers, or it may be the number of years over which farmers assess it

as an investment in improving their land. The time period has important implications, because improvement in land quality happens slowly, so some benefits may only be realised after the life of the technology.

Step 7: Construct a summary table

The summary table (Table 33) should have years listed in the first column, with a row assigned to each year of the appraisal. The body of the table is then devoted to two main sections for costs and benefits, with two columns for each type of cost or benefit to accommodate the range of values from the minimum to the maximum. If actual and relatively unchangeable costs are known for some items, then these are used.

Table 33 shows an example of summary of costs and benefits for *Gliricidia* hedgerows. Costs and benefits are specified in local currency at prevailing prices to the farmer. So fertilizer 'benefit' is priced at the price delivered at the farm gate. The values a to k will be used in the next step.

Step 8: Calculate total costs and benefits, and net cash flow for each year

The minimum and maximum data are kept separately. So for both total cost and total benefit, a minimum and maximum value is calculated for each year. The net cash flow is then calculated for each year by subtracting total costs from total benefits (see Table 34).

From the summary table for *Gliricidia* hedgerows, total costs, benefits and net cash flow are entered. The items a to k at Step 7 show how the data are ordered. Note especially that minimum net cash flow equals minimum total benefits minus maximum total costs. Similarly, maximum net cash flow equals maximum total benefits minus minimum total costs.

TABLE 33 **Summary table of costs and benefits of management practices**

Year	Costs (and resources required)					Benefits					
	Labour		Tools	Loss in crop area		Increase in crop yield		Savings on fertiliser		Pole production	
	Min	Max	Actual	Min	Max	Min	Max	Min	Max	Min	Max
1											
2	a	b	c	d	e	f	g	h	i	j	k
3											
etc.											

TABLE 34 **Calculating net cash flow**

Year	Total Costs		Total Benefits		Net Cash Flow	
	Min	Max	Min	Max	Min	Max
1						
2	a + c + d = r	b + c + e = s	f + h + j = t	g + i + k = u	t – s	u - r
3						
etc.						

Step 9: Adjust the net cash flow for the time value of money

The time-value of money is involved in investment on conservation measures because sums of money are received (benefits) and spent (costs) at different points in time. The sums of money are multiplied by a factor that is related to 'discount rate', which expresses how the value of money diminishes over time. The appraisal reflects only the value now – or 'net present value' (NPV), so a benefit in the future is worth less than a benefit now. A cost in the future is worth less at the present time than a cost now. Because discount rates are often difficult to fix and depend upon external factors such as the cost of borrowing money, it is good practice to set a lower and upper discount rate and to use both of these in the calculations (see final step 10).

Gliricidia hedgerows and their associated terraces demand a lot of labour to plant and to construct initially. Then there are some maintenance costs in pruning the hedges and replanting any trees that have died, but this is relatively small in cost. Benefits, however, come only slowly. The soil improves in quality only after a long time, having to recover from the initial earth movement in making the terraces. So, with the costs coming early and the benefits coming late, the adjustment for net cash flow for the time value of money means that very few farmers will find investing in these hedgerows financially worthwhile. Maybe only farmers who are retired employees with other sources of income can afford them.

Step 10: Calculate the net present value of the technology

The net present value (NPV) is calculated by adding the present values of the net cash flow for each year of the appraisal. The upper and lower discount rates and the minimum and maximum discounted cash flows should be kept separate. The discount factor is derived from standard tables – the further into the future, the smaller is the factor to account for the lower net present value of money as time progresses. NPV then is the sum of discounted net cash flows over the period of the appraisal. If NPV is positive it indicates that at that discount rate, the benefits of the investment exceed the costs. So the investment is economically worthwhile at that discount rate. Alternatively, if NPV is negative, the investment is not economically viable. Conservation technologies with negative NPV are very unlikely to be acceptable to land

Table 35 **Comparing cash flow scenarios**

Year	Lower discount rate			Upper discount rate		
	Discount factor	Minimum discounted net cash flow	Maximum discounted net cash flow	Discount factor	Minimum discounted net cash flow	Maximum discounted net cash flow
1						
2						
3						
etc.						
NPV Total	-			-		

users because, to implement them, the land user would be poorer.

Because the whole appraisal has been carried out with ranges of data (minimum/maximum; upper/lower discount rate) there will be several answers, ranging from a best to a worst case scenario.

The final table brings all the calculations together (see Table 35). This will show the varying values for NPV ranging from best case scenario (maximum discounted net cash flow at the lower discount rate) to worst case scenario (minimum discounted net cash flow at upper discount rate).