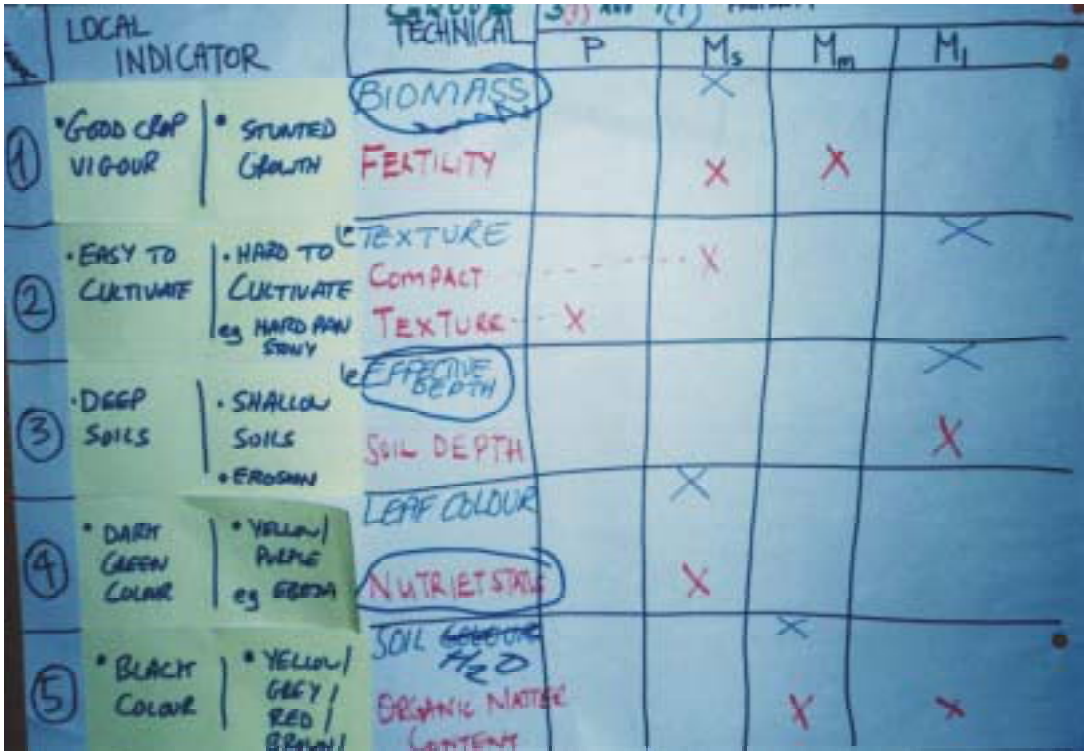
SECTION 4

Integrating technical and local indicators of soil quality



Section 4: Integrating technical and local indicators of soil quality

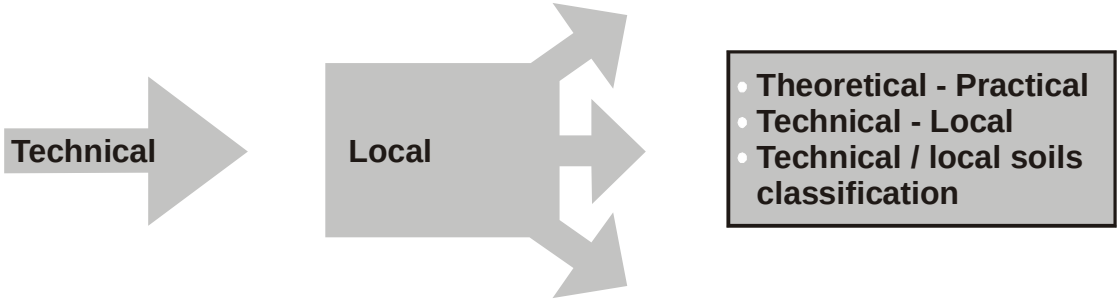
4.1 Introduction

In the previous sections we identified and categorized TISQ (Section 2) and we saw the methodology for the collection, classification and prioritization of LISQ (Section 3). In this section we will compare these two sets of indicators of soil quality and classify local indicators in technical terms and differentiate between permanent and modifiable properties

4.1.1 Objectives

- At the end of this section the trainees will be able to,
- Relate local indicators with soil properties.
- Relate technical indicators of soil quality with local indicators of soil quality.
- Differentiate between indicators of soil quality associated to soil properties that are modifiable or permanent.

4.1.2 Section structure



4.1.3 Opening questions

1. Do you know what "soil texture" is?

2. Do you know what "soil acidity" or "alkalinity "is?

3. How are the following conditions locally known (local terminology)?

    - Frequently flooded soils
    - Easy-to-plough soils
    - Good soils

4. What is a permanent soil quality property or indicator, and what is a modifiable property?

4.2 Relationship between TISQ and LISQ

The theoretical framework to compare local and technical indicators is based on the premise that the soil is a natural body organized as a continuum through the landscape, instead of being a discreet unit at smallholding or farm level. This concept is fundamental to understand how the intrinsic properties of a soil are more related to the environment in which the soil was formed (factors and processes), than to the agronomic management and its use.

If the soil is regarded as a resulting product (see the simplified formation model Section 2), and if its properties are broken down into permanent and modifiable, the process of comparing both local and technical knowledge about soils becomes easier. This is because the attributes and characteristics inherited from soil formation factors tend to become permanent properties, while the attributes

conditioned by the environment (e.g. processes of nutrient lose and gain) tend to become modifiable properties. For instance, farmers frequently regard the slope as an attribute conditioning soil quality. On the other hand, farmers consider soil fertility as a quality attribute (very fertile land vs. washed land) and, in fact, in general terms soil fertility is an attribute considered to be something that can change through amendments (for example: fertilizers, incorporation of green manures).

The above discussion proposes a simple system to integrate local knowledge with technically recognized attributes and properties. This integration is done once after the prioritization of local indicators (Table 4.1 from Section 3).

Table 4.1 Example of prioritized LISQ from the training workshop held in Kampala in March 2000.

Order of importance	Local indicator of Soil Quality
1	Presence of earthworms/absence of earthworms
2	Good crop/stunted growth
3	Dark green plant colour/yellow,purple plant colour
4	Deep soils/shallow soils: erosion
5	Not salty/ salty i.e. visible at surface
6	Smell or rotting vegetation/no smell
7	Black soil colour/yellowish or greyish
8	Easy to cultivate/hard to cultivate e.g. hard pan
9	Presence of good indicator weed species e.g. *Commelina*/ presence of bad indicators e.g. Bracken fern, *Digitaria*
10	Good water retention-well drained/water logged, sandy soils

During the process of integration the objective is to make comparable the local knowledge with the technical knowledge, not vice versa. To do this technical terms are decided on that best capture each LISQ that the farmers use to classify their soils (Table 4.2).

Table 4.2 Example of the Integration of LISQ with LISQ from the training workshop held in Kampala in March 2000.

Indicator	
Local	**Technical**
Presence of earthworms/absence of earthworms	Biological activity
Good crop/stunted growth	Fertility
Dark green plant colour/yellow,purple plant colour	Leaf colour or nutrient status
Deep soils/shallow soils: erosion	Effective depth
Not salty/ salty i.e. visible at surface	Electrical conductivity and pH
Smell or rotting vegetation/no smell	Redox potential
Black soil colour/yellowish or greyish	OM content
Easy to cultivate/hard to cultivate e.g. hard pan	Texture or compaction
Presence of good indicator weed species e.g. C*ommelina*/ presence of bad indicators e.g. Bracken fern, *Digitaria*	Soil fertility or weed diversity
Good water retention-well drained/water logged, sandy soils	water holding capacity or infiltration

The last step in this integration exercise is to classify each of the TISQ into one of two groups, permanent properties and modifiable properties. In section 2 we saw that a permanent property is something about the soil which is unchangeable with time, for example, the slope of the land or the type of clay. In contrast, a modifiable property can be altered given time. The types of modifiable properties will be discussed further in Section 5. Table 4.3 shows an example of integration and classification for each group of prioritized indicators generated during from the training workshop held in Kampala in March 2000.

Table 4.3 Example of the final integration of TISQ with LISQ and classification of property type from the trainees during the training workshop held in Kampala, March 2000.

Order of importance	Indicator			Type of property
	Local	**Technical**	**Permanent**	**Modifiable**
1	Presence of earth worms/absence of earthworms	Biological activity		X
2	Good crop/ stunted growth	Fertility		X
3	Dark green plant colour/yellow, purple plant colour	Leaf colour or nutrient status		X
4	Deep soils/ shallow soils: erosion	Effective depth		X
5	Not salty/ salty i.e. visible at surface	Electrical conductivity and pH		X
6	Smell or rotting vegetation/no smell	Redox potential		X
7	Black soil colour/ yellowish or greyish	OM content		X
8	Easy to cultivate/ hard to cultivate	Texture	X	
9	Presence of good indicator weed species e.g. *Commelina*/ presence of bad indicators e.g.Bracken fern, *Digitaria*	Soil fertility or weed diversity		X
10	Good water retention-well drained/water logged, sandy soils	water holding capacity or infiltration		X

4.3 Exercise 4.1 Classifying local indicators in technical terms and differentiation between permanent and modifiable properties.

Objectives

After completing this exercise the trainees will be able to:

Relate local indicators with soil properties;
Make compatible local language elements with the technical language;
Differentiate between permanent local indicators of soil quality and modifiable local soil quality indicators.

Orientations for the Instructor

Using Worksheet No. 1, review the list of prioritized LISQ

Using Worksheet No. 2, insert the list of LISQ from Section 3, divide the trainees into 3-5 groups and ask them to decide on a TISQ to match each LISQ. Return to plenary to summarize the findings

Using worksheet No. 3, in the same groups decide which of these TISQ are permanent and which are modifiable properties of soil. Return to plenary to summarize the findings

After this second summary, group the results and discuss differences and discuss the result in terms of time span and management options (leading into Section 5)

Resources necessary

- Thick tip markers (various colours)
- Flip chart paper
- Masking tape
- Overhead projector

Suggested time: 45 minutes.

Exercise 4.1 Classifying local indicators in technical terms and differentiation between permanent and modifiable properties.

Worksheet No. 1

Prioritization of LISQ

Order of importance	Local Indicator of Soil Quality
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Exercise 4.1 Classifying local indicators in technical terms and differentiation between permanent and modifiable properties.

Worksheet No. 2

Integration of LISQ with LISQ

Indicator	
Local	**Technical**

Exercise 4.1 Classifying local indicators in technical terms and differentiation between permanent and modifiable properties.

Worksheet No. 3

Order of importance	Indicator		Type of property	
	Local	Technical	Permanent	Modifiable
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

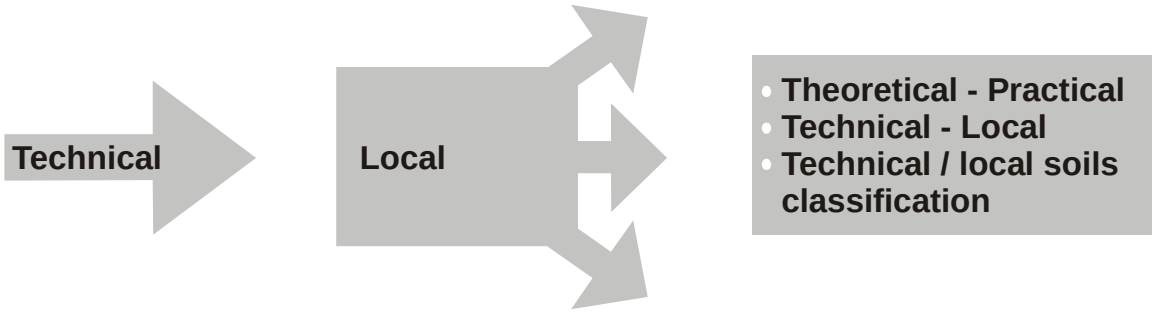
4.4 Summary

In this section we saw how to integrate the farmer classification of LISQ with TISQ to design a common language. This common language will be invaluable to enable the trainees to discuss with farmers their soils and the problems and constraints they face on their farms. In addition we developed the common language further to help us understand which of the problems and constraints faced by the farmers are modifiable and those that are not given a reasonable length of time and effort

In the next section we will look at the modifiable properties in more detail and group them into three classes depending on the time it will take to overcome the constraint short-term (0-2 years), medium-term (2-6 years) and long-term (more than 6 years). The final part of the program is then to define soil management principles and strategies that can be used to overcome the different constraints that farmers have identified.

Originals for overheads

Integrating soil characterization properties with local soil quality indicators



Objectives

At the end of this section the trainees will be able to,

- relate local indicators with soil properties.
- relate technical indicators of soil quality with local indicators of soil quality.
- differentiate between indicators of soil quality associated to soil properties that are modifiable or permanent.

Integrating soil properties with local indicators of soil quality

- During the process of integration the objective is to make comparable the local knowledge with the technical knowledge, not vice versa.

- To do this technical terms are decided on that best capture each LISQ that the farmers use to classify their soils

- The last step in this integration exercise is to classify indicators associated with permanent or modifiable soil properties

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4	Deep soils/ shallow soils: erosion	Effective depth		X
5	Not salty/ salty i.e. visible at surface	Electrical conductivity and pH		X
6	Smell or rotting vegetation/no smell	Redox potential		X
7	Black soil colour/ yellowish or greyish	OM content		X
8	Easy to cultivate/ hard to cultivate	Texture	X	
9	Presence of good indicator weed species e.g. *Commelina*/ presence of bad indicators e.g.Bracken fern, *Digitaria*	Soil fertility or weed diversity		X
10	Good water retention-well drained/water logged, sandy soils	water holding capacity or infiltration		X